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Which households are credit constrained in Europe¹?

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Abstract

The important role of credit in contributing to aggregate demand during severe reductions has been highlighted during the last year when the covid-19 pandemic led to major demand contractions. But many households are subject to credit constraints. Credit constraints may prevent the lifetime utility maximisation by households and prevent them from transferring consumption into periods of distress from future periods. We investigate and compare the characteristics of households that were credit constrained in seventeen European countries in 2021 using the latest data in the Household Consumption and Finance Survey that has been harmonised by the European Central Bank. We decompose whether a household is constrained into whether it is rejected or discouraged and examine the characteristics explaining each. We find many differences between households in Northern European countries, Mediterranean countries and former Eastern bloc countries in terms of debt holdings and the characteristics of those that are constrained within these regions. We also investigate differences in institutional factors as explanations of differences between countries in otherwise similar households being constrained..

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1. Introduction

The importance of the ability to gain credit has been highlighted during the recent COVID19 pandemic when household credit played a vital role in enabling households to avoid severe reductions in living standards. More generally, the ability to gain credit facilitates the intertemporal transfer of utility between periods when income exceeds desired expenditures to periods when desired expenditures exceed income. However, the characteristics of households that may access credit differs between countries. This is important for a monetary union. If the incidence of credit constraints differs between countries, then this, amongst other factors, may impede the interest rate transmission mechanism of monetary policy more in some countries than in others and it may mean that there will be differential effects of monetary policy between sectors of the population between European countries. In addition, if different profiles of households are constrained in different countries, then different social policies or economic policies may need to be designed to enhance access to credit in different countries.

Whilst there is some literature on the characteristics of those who apply but are declined, in almost all cases each paper concentrates on one individual country and the data are not comparable between them or is now dated. In this paper, we investigate differences in the characteristics of households that are credit constrained between seventeen European countries in 2021. We rely on data from each country from the Household Finance and Consumption Survey (European Central Bank (2023)) that has been harmonised by the European Central Bank (ECB) and so the results are comparable across the countries included. By using a wave thirteen years after the 2008 crisis we can be confident that the effects of the crisis are no longer apparent. We present the most up to date and comprehensive analysis of household credit constraints across European countries to date.

We find that in almost all countries wealthier households are less likely to apply and less likely to be turned down, gain only part of the amount they applied for or to be discouraged. On average, across all nineteen countries in aggregate, households with higher incomes are more likely to apply and less likely to be constrained and whilst this is generally the case for most individual countries it is most clearly discernible in Finland and France. Increased age is associated with a lower chance of making an application for countries in aggregate and it is associated with a lower chance of being constrained in most individual countries. Having more children aged under 13 years or aged 20 years or over increases the chance of making an application across all countries in aggregate, but the effect of the former was detected only for Belgium, Germany and Finland and of the latter only for Spain and Portugal. The probability of being constrained when a household has more children under 6 years is apparent in France, Germany and Finland, whilst the effect of having more children aged 20 years or above is seen in Estonia, Spain, France, Germany and Portugal. Whilst on average households where the head has

completed a higher level of education are more likely to apply for credit, for individual countries this is found only for Germany and France. Households with a more educated head are less likely to be constrained only in Estonia and Spain and we did not find this for other countries. Households where the head is unemployed are less likely to apply for credit in France Finland, Spain and Portugal and on average were more likely to be constrained. On average the self-employed are more likely to apply for credit than employees or family workers and more likely to be constrained. But in terms of individual countries, we did not detect an effect of being self-employed on the probability of being constrained except in Italy. For the countries considered in aggregate households with a male head were more likely to apply than households with a female head. Interestingly, native households are more likely to apply for credit than those born in another country and they are less likely to be constrained.

When we consider regional areas, we find interesting differences in the profiles of households that are constrained between Northern European countries, Mediterranean countries and former Eastern bloc (EB) countries. Whilst in Northern and Mediterranean countries increased age of the household head up until 30 years is associated with a higher probability of being constrained, we do not see this in EB countries. Whilst more children in a household aged up to 13 years increases the chance of being credit constrained in Northern and EB countries this is not apparent in Mediterranean countries. Unlike Mediterranean and EB countries a higher level of education completed by the head reduces the chance of the household being constrained. Unlike in EB countries, if the head is unemployed there is a greater chance of being constrained. In Northern countries, unlike in Mediterranean and EB countries, being born in the country where the household lives is associated with a greater chance an application will be made and a lower chance the household will be credit constrained.

Considering the effects of institutional differences between countries we find that in countries where contracts take a longer time to be enforce, there is a lower probability an application will be made and of a household being constrained. But if a household does make an application there would be a higher chance that it would be rejected or that the household does not gain all that it applied for. In countries where private credit bureaux hold information relating to a relatively high proportion of the adult population the probability of being constrained is higher and there is a higher chance a household would have an application rejected or rationed if it applied. But interestingly, the greater the depth of the information held by the bureaux the lower is the chance an average household will be constrained.

We make several contributions to the literature. First our paper is the first to estimate the effects of household characteristics for a range of different European countries on the probability that a household is credit constrained. For a sample of European countries the paper is the first to decompose the effects of these characteristics into their effects on the probability a household is turned down or rationed and, separately, on the probability the household is discouraged from applying. The paper is also the first to estimate the marginal effects of household characteristics on the probability of being turned down or

rationed, given that a household applies. In addition, the paper is the first to estimate the effects of the efficiency of the legal contract enforcement processes of different countries and of the coverage of credit bureaux as explanations for inter-country differences in the probability of a household being credit constrained in Europe. The paper uses the very latest data recently released by the ECB that is harmonised across European countries so allowing both meaningful comparisons between countries and the ability to pool data to estimate models for Europe as a whole.

In the next section, we review the literature and in section three we outline the empirical model. Section 4 presents the results and section 5 concludes.

2. Literature Review

In almost all cases the literature relating to the characteristics of households that are credit constrained has related to only a limited number of countries. These studies have largely used self-reported credit constraints. The commonest methodology is to estimate posterior probability models of the probability a member of a household was constrained in some sense. Crook (2006) summarises ten studies for the US (Jappelli 1990, Cox and Japelli 1993, Duca & Rosenthal 1993, Ferri & Simon 2002, and Crook 1996) and Italy (Guiso et al 1996 and Magri 2007) relating to the 1980s and 90s. On the whole, income, wealth and age were negatively related for both countries. Being married reduced the probability for Italy but not the US whilst being unemployed increased the chance in Italy but not the US. Crook & Hochguertel (2013) looked at the probability in the Netherlands, Italy, Spain and the US, between 1991 and 2012 using panel models for the latter three. They found substantial differences in the effects of income, age, education, family composition, labour market status and marital status between the countries. Crossley and Low (2014) examine credit constraints faced by job losers in Canada. Xidonas et al (2024) examined the characteristics of constrained households in 2017 for France.

Fabbri and Padula (2004) proposed a model that showed that when the efficiency of legal enforcement increases in a country the probability of a household being credit constrained decreases. Using the Italian Survey of Household Income and Wealth for the 1990s they find supportive evidence. Duygan-Bump and Grant (2009) use data from the European Community Household Panel for 1994-2001 for ten countries to find that if income shocks occur, then the time taken to enforce a legal contract increases the probability a household will fall into credit arrears and the greater the coverage of private or public credit bureau the lower the chance of credit arrears.

Our paper is similar to Le Blanc et al (2015) who model self-reported credit constraints for 2010-11 across fifteen European countries using data from the first wave of the ECBs HFCS. However, they did not investigate differences between countries, they did not decompose the cause of being constrained and their results are based on a somewhat smaller sample than is available from more recent waves. In addition, their results may still be affected by the changing credit conditions that occurred during the financial crisis of 2008 when banks considerably reduced the supply of credit both in terms

of the risk levels they would accept (Leow & Crook 2014) and so in terms of the characteristics of the applicants that would be accepted. We also investigate the roles of credit bureau, but unlike Dygan-Bump and Grant look at their association with the probability of a household being *credit constrained*.

3. The Empirical model

There are many definitions of being credit constrained. We adopt the definition that an individual is credit constrained if at current interest rates the amount of debt an individual wishes to hold is greater than the amount, she is able to obtain. Stiglitz and Weiss (1981) argued that individuals may be credit constrained due to an adverse selection effect that leads the supply of debt function to always be to the left of the demand function and so market interest rates do not adjust to equate demand and supply. This comes about because at higher interest rates the proportion of applicants that are good payers decreases because they realise, they cannot repay and that of poor payers rises because poor payers have a lower probability than good payers of actually paying the interest due. Therefore, at higher interest rates lenders will reduce their supply to avoid lending to poor applicants and making lower returns. If the rate is raised to cover additional risk this may actually increase the chance of default amongst poor payers. The supply function is backward bending and may not intersect the demand function at any interest rate. There is also information asymmetry between applicants and lenders. This means some applicants are declined even though they are observationally identical to some who are offered a loan. A similar approach is to argue that borrower specific pricing may still result in credit being declined, for example if the optimal interest rate for a lender exceeds that at which a borrower wishes to borrow. Alternatively, lenders may have a policy rule to decline applicants where the risk of default exceeds a cut-off value. The cut-off is probably lower for high street banks than for doorstep lenders.

To consider which individuals may not gain as much credit as they wish we need to consider factors affecting an individual's demand and those affecting the supply to an individual to identify which characteristics are likely to result in demand exceeding supply.

The starting point for the theory of the demand for debt is the permanent income hypothesis (PIH) (Friedman 1957). Under the PIH a representative consumer wishes to maximise her expected discounted lifetime utility which in each period depends on the amount of consumption enjoyed and on factors that affect the marginal utility of consumption, but subject to an intertemporal budget constraint. The first order conditions can be represented by the familiar Euler equation (see Jappelli and Pistaferri (2017) and Bertola et al. (2006).

If we assume the individual's subjective discount rate equals the interest rate we can derive an expression for saving (see: Deaton 1992, Campbell 1987):

$$s_t = - \sum_{j=1}^{\infty} R^{-j} E_t(\Delta y_{t+j}), \quad (1)$$

where s_t denotes savings in period t , R denotes one plus the interest rate, y denotes labour income and E is the expectations operator. Equation (1) says that if income is expected to increase, the individual will run down assets now or borrow and then repay in future years when income has risen to be above permanent income. For example, if income unexpectedly falls below permanent income, perhaps due to unemployment but is expected to be restored in the future, the individual will borrow and repay later. On the other hand, if income is expected to fall, perhaps due to retirement, savings will be increased. Whilst permanent income is constant over time, consumption will increase as one's lifestyle changes perhaps due to having children, and would be financed by borrowing, given the expectation that income will increase. As one grows older still expenditure will be expected to fall and so then the individual repays debt or saves. Borrowing and saving allow one to enjoy consumption earlier than current income would allow and so to smooth expenditures between different stages of life.

The PIH assumes that an individual can borrow at any time any amount she expects to be able to repay. However potential borrowers may be liquidity constrained in the sense that an individual may wish to borrow more than lenders will grant at current interest rates and given the applicant's expected future income. In this case the Euler equation is replaced by

$$u'(c_t, z_t) = \max [u'(x_t), \beta \cdot R \cdot E_t u'(c_{t+j}, z_{t+j})], \quad (2)$$

Where z_t denotes factors affecting preferences, and x_t denotes cash in hand: assets plus current income (Deaton 1992) and is the total resource she can spend if liquidity constrained. Of course, being constrained in one period does not mean the individual is constrained in others and when the constraint is not binding the standard Euler equation holds. But as Deaton notes the individual will alter her consumption behaviour taking into account the possibility of a borrowing constraint binding in the future. Crook and Hochguertel (2013) simulate consumption expenditure over an individual's lifetime when liquidity constraints bind and the individual saves as a precaution against future income losses, to show the effects of interest rates, income shocks, relative risk aversion, time preference rates and income growth

So far, we have argued that the demand for debt depends on an individual's time preference rate, expected changes in income, and aspects of their life stage that may affect their desired consumption. Average time preference rates might be expected to be lower for younger consumers with many more future opportunities to consume in later life than for older consumers. But on the other hand, younger people may have greater family commitments than older people suggesting higher time preference rates. Expected changes in income are likely to be more positive for younger people than for those in later life, suggesting a higher demand for debt. Expected income changes may be expected to be positive if a person is currently unemployed and also amongst those with more education and so more human capital. Characteristics of a person's life cycle apart from age may also affect the amount

of debt demanded. For example, if the individual has a partner or is married, whether she has children and their ages affect desired consumption.

Turning to the household supply of debt, lenders assess the risk of default of a credit applicant and whether a credit applicant can “afford” the loan. If the predicted risk of default exceeds a cut-off value or the applicant is judged not to be able to “afford” the repayments a credit application is declined (Thomas et al 2017, Anderson 2007). Characteristics that are used to assess the probability of default (PD) are chosen more for their predictive accuracy than for any hypothesised causal relationship with PD. They include static variables, gleaned at the time of application for example: income, age, debt outstanding on other instruments, years in the same job, and at the same address and on repayment history, employment status, repayment behaviour of people living in the same geographic area and past use of the credit facilities (Thomas et al (2017), Anderson (2007), Banasik and Crook (2007)).

When explaining inter-country differences in the probability a household is credit constrained we would expect institutional factors to play a role in supply. Fabbri and Padula’s model (Fabbri and Padula (2004)) that predicted that geographic differences in the efficiency of the legal enforcement of contracts may be used to explain geographic differences in the probability a household is credit constrained may be applied to observed systematic inter-national differences in such probabilities. In addition, international differences in the availability of information that lenders have about potential borrowers, as provided by credit bureau would be expected to affect the probability applicants would apply and the probability they would be rejected, especially since Dygan and Grant (2009) found these factors affected the probability an individual will be behind with credit repayments.

Our approach follows others (Jappelli 1990, Crook and Hochguertel 2013, Blanc et al 2015) and assumes demand and supply functions of the forms:

$$D_{i,t} = \beta_1^T X_{1,i,t} + \varepsilon_{1,i,t}$$

$$S_{i,t} = \beta_2^T X_{2,i,t} + \varepsilon_{2,i,t} ,$$

where $D_{i,t}$ ($S_{i,t}$) denotes *ex ante* demand for (supply of) debt by household i in period t , $X_{1,i,t}$ ($X_{2,i,t}$) denotes a vector of explanatory variables affecting demand (supply) and $\varepsilon_{1,i,t}$ ($\varepsilon_{2,i,t}$) denotes the error term for the demand (supply) function.

We form $C_{i,t} = D_{i,t} - S_{i,t} = (\beta_1^T X_{1,i,t} + \varepsilon_{1,i,t}) - (\beta_2^T X_{2,i,t} + \varepsilon_{2,i,t})$ which we represent as

$C_{i,t} = \beta_3^T X_{3,i,t} + \eta_{i,t}$ where $X_{3,i,t} = \{X_{1,i,t} \cup X_{2,i,t}\}$ and $\eta_{i,t} = \varepsilon_{1,i,t} - \varepsilon_{2,i,t}$. An individual is constrained if $C_{i,t} > 0$. Notice that $C_{i,t}$ is an unobserved continuous latent variable. However, we can observe whether a household is constrained and represent this state by an indicator function

$$I_{i,t} = 1 \text{ if } C_{i,t} > 0$$

$$I_{i,t} = 0 \text{ if } C_{i,t} \leq 0 ,$$

To model the probability a household is constrained can write

$$\begin{aligned} \Pr(I_{i,t} = 1 | X_{3,i,t}) &= \Pr(C_{i,t} > 0 | X_{3,i,t}) \\ &= \Pr(\eta_{i,t} < \beta_3^T X_{3,i,t} | X_{3,i,t}) \end{aligned} \quad (3)$$

since we assume the distribution of $\eta_{i,t}$ is symmetric. Equation (3) is true for any arbitrary scaling of $\eta_{i,t}$ and β . We can divide $\eta_{i,t}$ and β by the standard deviation of $\eta_{i,t}$, σ . This makes (3) a cumulative distribution function of a standard normal (probit) variable. In this model σ equals 1, thus $\eta_{i,t} \sim \mathcal{N}(0,1)$. The cumulative distribution function for a probit is

$$\Pr(I_{i,t}=1 | X_{3,i,t}) = \Pr\left(\frac{\eta_{i,t}}{\sigma} < \frac{\beta}{\sigma}\right)$$

We are interested in comparing the determinants of being credit constrained across countries. But since β and $\eta_{i,t}$ are subject to an arbitrary scaling we cannot compare the coefficients directly between groups of households (Allison (1999)). However, we can compare whether each variable is statistically significant and we can compare *average* marginal effects (rather than conditional marginal effects) (Norton and Dowd (2018), Wooldridge (2002), Best and Wolf (2015)). An average marginal effect is the marginal effect for each case averaged over a sample.

Notice that $\{X_{1,i,t}\}$ and $\{X_{2,i,t}\}$ will overlap and so we are estimating merely a reduced form expression and not the structural demand or supply functions. We also assume that the interest rate charged for each consumer may not adjust to equate demand and supply for some individuals for reasons given above.

Our choice of observable variables that determine demand and supply is motivated by the PIH for demand and literature on credit scoring for supply that we have outlined above. We include wealth, income, and a measure of whether current income exceeds permanent income. If the PIH holds we would expect that income below permanent income would indicate an expectation that income will rise and the individual would wish to borrow more, that is demand for debt would be relatively high. At the same time lenders may reason in a similar way and lend less, thus increasing the chance the individual is constrained. Alternatively, lenders may consider only current income and so may consider a higher current income to indicate less risk and lend more. A priori then the effect of this variable is unclear. The PIH suggests demand for credit is quadratic in borrower age with older people repaying debt taken out in earlier years. Credit scoring models almost universally predict lower risk of default in older borrowers with the highest risk amongst young borrowers (Djeundje & Crook 2019) thus indicating, ceteris paribus, greater supply with age. We would therefore expect the chance of being constrained to be highest in young and middle age groups and least in older age groups.

4. Data and Variables

4.1 Data and dependent variables

We use data from wave 4 collected by the European Central Bank's Household Finance and Consumption Network (ECB 2023). This is a harmonised collection of surveys carried out by statistical agencies in each of a large number of European countries. Wave 4 of the data was collected mainly in 2021 over periods spanning from two to nine months depending on country (ECB 2023). The cross-sectional data for 2021 is available for our measures of constraints and covariates for: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxemburg, Latvia, the Netherlands, Portugal, Slovenia, Slovakia³. Some of the missing values for some of the household level variables have been imputed five times by the ECB but many of the individual level variables still have missing values. We use impute 1 only in our analyses.

The surveys ask four relevant questions. These are:

1. *"In the last three years have you (or a member of your household) applied for a loan or other credit? Yes/No"*

2. *"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 as much as you applied for?"*

Yes, turned down/Yes not given as much credit/No, not denied

Yes, turned down/Yes, not given as much credit

No "

[Asked if answer to previous question was Yes]

3. *"(Were you/Was your household) later able to obtain the amount requested, by reapplying to the same institution or somewhere else?"*

Yes/No "

³ We were able to include Spain for some regressions if we omitted one covariate as is apparent in the results tables.

[Asked if response to previous question was Yes, turned down.]

4. *“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?*

Yes/No”

By combining responses to these questions, we devise several possible indicators of being constrained. Identifying that a household has applied for credit indicates that it demanded credit. A household that demands credit may however be declined partially or completely indicating experience of a constraint. But an application is not necessary to indicate demand. A household that does not apply may also be constrained if its members did not apply because they thought they would be turned down. We tease out these types of constrained households by combining responses to the above questions as follows.

- i) $apcr = 1$ if respondent answered “yes” to question 1
 $apcr = 0$ if answered “No”
- ii) $discorej3 = 1$ if the household applied for credit and was turned down and there was no evidence that it was later able to obtain the amount requested (from the same or another institution) or that it was turned down and not given as much as it applied for or that it considered applying but then decided not to thinking that it’s application would be rejected. We refer to households for whom $discorej3=1$ as “constrained”

$discorej3 = 0$ if the household did not apply, or did apply and was not turned down, or applied and was turned down but was able to get the same amount when it reapplied, and was never discouraged in the three-year window.⁴

This variable identifies those who a) applied and b) were fully declined or partially declined and unable, subsequently, to gain the full amount by applying again and c) those who, at some point in the three-year window, decided not to apply for a loan because they thought they would be declined from all other households. It recognizes that a household may not be constrained if it was turned down but subsequently able to get the full amount by

⁴ Some households applied but their response to the second question was missing. Following the computation of $dccreditc$ in the dataset by the ECB we classify these cases as $discorej3=0$.

reapplication. It also recognises that a household may be constrained if it does not apply because it fears rejection.⁵

- iii) *rejorpt4* = 1 if household applied and was turned down and there was no evidence that it was later able to obtain the amount requested (from the same or another institution) or that it was turned down and not given as much as it applied for .

rejorpt4 = 0 if it did not apply or applied and was not turned down or applied and was turned down but was able to get the same amount when reapplied.

This is the same as *discorj3* but does not include those who did not apply because they were discouraged. We refer to households for whom *rejorpt4*=1 as “rejected or rationed”.

- iv) *disc* = 1 if household considered applying for a loan but decided not to, thinking that the application would be rejected.

disc = 0 if household did not consider applying for a loan or did consider applying and was not deterred from making an application because it thought it would be rejected.

- v) *rejless* = 1 if household applied and was turned down or applied and was not given as much as applied for.

rejless = 0 if household applied and was not turned down nor given only part of the amount they applied for.

This variable relates only to households that applied and separates those households who were either turned down or gained less than they wished from those who were given all of the credit they applied for. All these households demanded credit. The latter gained all that they applied for and so were not constrained in this sense. The former were rejected or rationed by lenders and so were constrained in this sense.

We estimate a probit model to explain the probability that a household applies for credit, denoted $\Pr (apcr = 1)$ and a probit model to explain the probability that a household is constrained,

⁵ This variable is almost identical to *dccreditc* in the dataset.

denoted as $\Pr(\text{discorej3} = 1)$. Notice that the indicator of whether a household is constrained, discorej3 , takes on the value 1 if either *or* both of two conditions holds. First, whether the household applied and was rejected or rationed and second, whether the household was discouraged. Hence we may write:

$$\Pr(\text{discorej3} = 1) = \Pr(\text{rejorpt4} = 1) + \Pr(\text{disc} = 1) - \Pr(\text{rejorpt4} = 1 \text{ and } \text{disc} = 1) \quad (5)$$

We wish to examine whether the effect of a change in each covariate on the probability a household is constrained is due mainly to its effect on whether the household is rejected or rationed by lenders as opposed to being discouraged from applying. Therefore, we consider the average marginal effects of each covariate on the probabilities that $\text{rejorpt4}=1$ and that $\text{disc}=1$, separately.

We used the King and Dicks-Mireaux (1982) method to estimate permanent income to compute the difference between income and permanent income to test the prediction that if income exceeds permanent income, it may be expected to fall and so according to the PIH result in lower demand for debt.

4.2 Descriptive statistics

Table 1 shows the mean balances per household for each of four categories of loans across 22 European countries in 2021. Following Le Blanc et al (2015) we divide countries into three groups: Northern European, Southern European and those formerly associated with the Soviet bloc which we shall (loosely) refer to as Eastern bloc (EB) countries^{6,7}.

Table 1 here

There are very marked differences between countries and country-groups. Average total balances per household are almost universally higher in Northern countries compared with Southern areas that in turn have larger average balances than do households in EB countries. The ranking largely

⁶ We have included Ireland and Malta in both Tables 1 and 2 to demonstrate more clearly the trichotomy of regions in terms of mean outstanding balances and incidence of credit constraints. However certain covariates were unavailable for these two countries and so they are not included in the regressions.

⁷ Whilst Hungary is included in the regressions relating to the probability of application, due to the unavailability of data for certain questions, Hungary is omitted from the regressions relating to constraints.

follows that of the average balances on mortgage loans. Luxembourg has the largest mean overdraft amounts by a considerable margin and Ireland and Finland have the largest credit card balances. When balances are computed conditional on having any form of debt the rankings of the geographic groups remain the same. The mean balances per household for those that have debt are largest in Luxembourg and the Netherlands with Cyprus third. The lowest balances are held by households in Hungary and Croatia. These differences are closely associated with GDP per capita, the average for Northern, Southern and EB countries being \$68,55, \$29,923 and \$22,912, respectively (data from World Bank (2024)).

The distribution of debt balances outstanding is highly skewed in each country with the median in all countries except Ireland and Luxembourg being zero. In Table 2 therefore show the median debt balances outstanding for those that hold each type of debt. Again, we can see that the median total liabilities for households in Northern European countries are higher than those in the Eastern bloc countries and there is considerable overlap between the medians in Northern and Mediterranean countries. As with the mean values the countries with the largest median balance are Luxembourg, the Netherlands and Cyprus respectively. There is considerable variation in the outstanding balances in the Northern and Mediterranean groups with households in Cyprus, Malta, Italy, Greece and Spain having higher median balances than those in any Northern country except Luxembourg.

Table 2 here

Table 3 column three shows country level proportions of households that are constrained. First, we can see that whilst a higher average proportion of households applied in northern countries (26.65%) than in Mediterranean and Eastern countries, there was little difference between the average proportion Mediterranean countries (15.22%) and that in the Eastern bloc countries (17.66%). The Eastern countries had the highest proportion who were constrained at 7.39% whilst the proportions in the other two regions were about the same. This however masks considerable differences between countries with Luxembourg having the highest proportion who were constrained followed by Lithuania and Latvia. There is a loose positive relationship between the proportions who applied and the proportions being constrained, although there are some exceptions. For example, Ireland had a relatively high proportion who applied and a below average proportion who were constrained.

Table 3 here

We noted above that the indicator of whether a household is constrained is composed of two parts. First, whether the household applied and was rejected or rationed and second, whether at any time in the previous three years the household did not apply because its members *thought* they would be turned down. Column four in Table 3 shows the proportion that met the first condition and column five shows the proportion that met the second.⁸ We can see that for all countries the proportion who were discouraged is greater, often considerably so, than the proportion who were turned down or rationed. There is no obvious association between the proportion of households that applied and the proportion turned down or rationed. That is the evidence does not support the idea that countries having a higher percentage of the population who apply also have a high percentage of relatively risky applicants. The same applies to those who are discouraged: there is no association between this proportion and the proportion that apply. For example, Luxembourg has the highest proportion of households that are discouraged but one of the highest proportions that apply. On the other hand, Austria and the Netherlands have two of the lowest proportions that are discouraged and two of the lowest proportions that apply.

Finally, we consider households who applied and consider the proportion that were turned down or given only part of what they applied for rather than not turned down or were turned down and able to get the full amount on subsequent application (*rejlless* in column seven). This shows the differing attitudes of lenders towards applicants between countries. Here we can see that Greece and Lithuania stand out as having the highest proportions of households constrained in this sense. In the case of Greece this may be result from continued caution following the 2008 financial crisis. Excluding these two outliers, the proportion of households who were so constrained in Eastern countries, at 20.45%, was somewhat higher than in Mediterranean countries with 13.25% and Northern countries with 11.49%. In short, on average Northern countries have the highest proportion of households who apply and the lowest proportion who are rejected whilst Eastern countries have an average proportion who apply but the highest proportion rejected.

5. Regression results

5.1 Probability of making an application

We show results firstly for the probability a household makes an application for any form of credit in the previous 3 years. Secondly, we show results relating to the probability of being credit constrained using three different definitions.

⁸ Notice the two proportions do not sum to 100% because a household can be constrained if either *or both* conditions apply.

Table 4 shows the estimates of the average marginal effects of each covariate on the probability of making an application for any form of credit in the previous three years. We show the results using data pooled across all countries and, separately, for each of the major European economies where there is sufficient data to yield credible results. Firstly, we discuss the pooled results. When we consider all countries in the sample together, the higher is a household's current net wealth the lower is the chance it made an application. This suggests that, on average, if a household has sufficient wealth to bring forward consumption it would prefer to fund this consumption in this way rather than to borrow, thus losing a smaller amount of interest than it would pay on an equal sized loan. As expected, as current income increases within the first four income ranges, above the lowest (up to € 12,701), the chance of applying also increases, perhaps representing increased confidence in the ability to repay. However, there is threshold income range (€53,254 to €88,418) above which the chance of application does not increase.

Table 4 here

The PIH implies that if income is expected to increase then an individual will borrow now. We capture this by a variable equalling the difference between current income and permanent income. However, we find that this difference has no detectable effect on the probability a household makes an application. This particular result does not appear to support the PIH.

We find that for Europe as a whole, as the age of the head of the household increases, at first households are more likely to make an application for credit, but once the head reaches 30 years of age they are increasingly less likely to apply. The chance decreases most rapidly above the age of 50 years. In the first age range, this may be due to higher income being earned or more demand due, for example, to having children. However, we have regressed these effects out and both effects can be seen separately. Thus, the chance of applying is greater when a household has more children under 6 years of age which would typically be the case for young families with high future income expectations. We find that the probability of applying also increases in households with a greater number of family members over 20 years of age. This may be due to borrowing to fund tertiary education.

We find that if a head of a household is unemployed the probability that the household will apply for a loan is lower than if not unemployed and we find that being self-employed (whether with or without employees) rather than an employee or not doing regular work, increases the chance as well. Both are as expected with some self-employed persons expected to borrow to fund their business. Interestingly, households where the head is male are more likely to apply for a loan than if the head is female. Single person households are less likely to apply than when the head is widowed or divorced.

Households where the head is married or partnered rather than widowed or divorced are also less likely to apply. Interestingly, across the EU as a whole, if a household head was born in a country where he or she lives, there is a higher chance (s)he will make a credit application than if (s)he was not born in the country. In other words, immigrants have a lower probability of applying for a loan.

These are average results across eighteen countries. When we consider each country separately, interesting differences are revealed. The negative effect of wealth is maintained in each of the countries shown except Belgium. The average marginal effects are greatest in Spain and Italy with the average marginal effects for France being only a quarter of those for Spain. The lowest marginal effects are for Austria and Belgium. In the case of gross income, positive relationships are generally found in all of the countries examined, but these are significant for only a minority of income ranges. The clearest pattern is in France where the chance of making an application increases steeply in the second, third and fourth (out of six) income ranges.

We find the probability of applying for credit decreases in all countries in the highest age groups (over 50 years). In all countries except Austria, Germany, and Belgium the probability of applying decreases as age increases from age 30 years. But in these three countries the decrease with age starts when households are older or, in the case of Austria, does not appear at all. Having more children under 6 years does not affect the chance of application except in Germany and Finland, and apart from France, Spain and Portugal where more children aged 20 or over increases the chance of application, having more children is unrelated to the probability of making an application. This is surprising. We expected those with more younger children to apply because of the higher expenditures likely to be incurred and we expected borrowing to increase to fund education when there are more children in the upper age groups.

A relationship with the highest level of educational completed is not supported in many countries, with Germany and France being exceptions. The increase in the chance of making an application appears greater in France for each level of attainment than it is for any other country. We found that households where the head was unemployed had a lower chance of applying only in Portugal, Finland, France and Spain. Alternatively, the self-employed had a higher chance of applying in Finland and Italy than those employed or not doing regular work. In all countries, except Belgium and the Netherlands, households in which the head is single have a lower chance of making an application than those divorced or widowed. Finally, being born in the country of residence increases the chance of making an application in Finland and France but not in the others. Put another way, apart from in Finland and France, immigrants are conditionally less likely to apply for loans than native residents.

5.2 Probability of being constrained.

5.2.1 If applied and was rejected or did not get as much as applied for or was discouraged

In Table 5 we show the results of distinguishing between those households who (a) applied for a loan or credit and were turned down and there was no evidence they could gain the full amount on a subsequent application, or they were not given as much as they applied for, or they were at any time in the last three years discouraged from applying and (b) who did not apply or did apply and were not turned down or were turned down but were able to gain the full amount when they subsequently applied and were never discouraged in the three year window. This is variable *discorej3* defined earlier and is our most comprehensive definition of being constrained.

Table 5 here

For the sample countries in aggregate (column two) we can see that the higher is the net wealth of a household the lower the chance of applying and being turned down or gaining only a portion of what it applied for, or of being discouraged. This is expected since we would expect that lenders would be willing to supply at least as much credit as is demanded by such households with greater collateral being available if the borrower defaults. In addition, from Table 3, we see that more wealthy households have a lower probability of making an application.

Looking at gross household income we can see that there is an inverted U-shaped relationship with the probability of being constrained. Increases in income up to €12,701 increase the chance of being constrained whereas increases in income in each range above that decrease the chance. Combining this with the result from Table 4 we see that as income increases the probability of making an application increases and that of being constrained reduces. We find that when income is above permanent income the probability of being constrained increases. This is consistent with lenders thinking that current income is abnormally high and is expected to fall. We did not find such an effect in Table 4, the probability of making an application, so the effect of income above permanent income is unlikely to be leading to households being discouraged.

Households where the head is of increased age, but under 30 years, are more likely to be turned down or discouraged whereas households in which the head is over 30 years are *increasingly* less likely to be constrained if they are older. Those households with more children under 6 years of age and those with more children aged seven to thirteen years are all more likely to be constrained and so are households which contain more children aged over 20 years. Those households where the head has completed higher levels of education are less likely to be constrained, specifically if the head has

completed secondary or tertiary education rather than only primary education. Those where the head is unemployed rather than doing regular work, is disabled or a student, and those where the head is self-employed (with or without employees) rather than being an employee or not doing regular work are more likely to be constrained. Alternatively, those where the head is retired are less likely to be constrained. Households where the head is married or in a legal partnership and those who are single are each less likely to be declined or discouraged than those widowed or divorced. Those where the head of the household lives in the same country as that in which they were born are less likely to be turned down or discouraged, implying that immigrants are more likely to be constrained in either or both of these ways.

Looking across individual countries we see the negative affect of increased wealth on the probability of being rejected or discouraged is almost universally observed for all individual countries, the exception being the Netherlands. The marginal effects are very similar (in the range -0.0027 to -0.0038) apart from for Spain and Portugal, where they are much higher (in absolute terms) at -0.0061 and -0.0047, respectively.

Fewer variables are significant in the country level regressions than in the aggregate regression model, probably due to the smaller sample sizes compared with those used for the aggregate models. Nevertheless, the negative effects of increased income are more clearly seen in Finland, France and Portugal than in the other countries. The reduced chance of being constrained at older ages are more clearly seen in Spain, Finland, Greece and Portugal than in the other countries. The increased chance of being constrained as the number of children aged under 6 years increases is apparent in Germany, Finland, and France and the most common finding is for the number of children aged over 20 years in the household to increase the chance of being constrained being observed for Estonia, France, Greece and Portugal. Level of education had no detectable correlation with the probability of being constrained at country level, except for France and Spain, whereas if the head was single there was a lower chance in Estonia, Spain and Finland. The correlation with the head living in the his or her country of birth was detectable only for Greece and Finland.

In this section we have estimated the effects of the covariates on (a) being rejected or unable to gain the full amount applied for *or* (b) being discouraged. In the next two subsections we examine the marginal effects of each characteristic on each of these two aspects of being constrained *separately*. Notice from Table 3 that the proportion of households that were discouraged was noticeably higher than the proportion rejected or gaining only part of what they applied for – for every country separately.

5.2.1 If applied and turned down or gained only part (Rejorpt4)

Table 6 shows the results of distinguishing between those households who (a) applied for a loan or credit and were turned down and there was no evidence they could gain the full amount on a subsequent application, or they were not given as much as they applied for and (b) those who did not apply, or did apply and were not turned down or were turned down but able to gain the full amount when they subsequently applied. We denote the former as being ‘rejected or rationed’.

Table 6 here

Considering all countries in aggregate (shown in column two), we see that the average marginal effect of increased net wealth is negative, which is expected since higher net wealth may be regarded as collateral for some types of loans so reducing the risk to lenders. Notice that the average marginal effects in Table 6 are much smaller than the values in Table 5 where the possibility of being discouraged is included in the definition of being constrained. The effects of having higher income are only significant for the range €53,254 to 88,418 whereas it was observed for every income range in Table 4. The effect of income in excess of permanent income is still significant when we remove the possibility of being discouraged, consistent with the hypothesis that when income exceeds permanent income lenders turn down or ration applications or households do not apply. In Table 4 we did not detect an effect of this variable on the probability of a household making an application. We shall return to this later. For relatively young households, as the head becomes older up to age 30 years, there is a higher chance the household will be turned down or gain only part of the amount they applied for. But interestingly the relationship changes at this age. Households where the head is in their 30s or in their 50s or 60s are less likely to be declined or rationed or more likely to have not applied or, if they did apply, to gain all that they asked for. There are two possible explanations. One is that, as the literature on credit scoring models shows, older applicants have a lower probability of defaulting (Djeundje and Crook: 2019) and so are less likely than other groups to be declined by lenders. A second is that, since from Table 4 we learned that those above 30 years are increasingly less likely to apply, perhaps applicants above 30 years who are potentially more risky are the ones who do not apply. Households with a head under 30 years are more likely to apply and less likely to be successful in their application, or to gain all they apply for. Put another way, applicants under 30 years that apply are more heterogeneous in risk characteristics than those in higher age groups.

Households with more children under 6 years of age or over 20 years of age have a higher chance of applying and being rejected or rationed. From Table 4 we see that households with more children over 20 years increases the chance of applying rather than not applying. Possible explanations for this finding are that it may be more likely that such households apply for credit to fund their children’s higher education, but are unable to afford it and this is recognised by lenders who reject or

ration them. A second explanation may be that children themselves who are over 20 years and living with parents apply for credit and, as indicated by the credit scoring literature (Djeundje and Crook 2019), have a relatively high probability of default.

Interestingly, being unemployed rather than doing regular work or being disabled or a student does not appear to affect the chance of being declined or rationed. A possible explanation could be that this group is less likely to apply (see Table 4), or put another way, only those who are unemployed and credit worthy apply for loans. Alternatively, the effect of being unemployed in credit scoring models is taken into account by assessing income. Households where the head is self-employed with employees are both more likely to apply (Table 4) and more likely to be turned down or rationed (Table 6) than those with another employment status. Households where the head is male are more likely to apply (Table 4) but also more likely be turned down or not gain all they apply for, than households where the head is female. This is interesting because whilst direct use of gender to allocate credit is against EU legislation, it is possible that other credit risk predictors are correlated with gender and may incidentally result in males being conditionally likely to be declined. Andreeva and Matiuszyk (2019) found that, conditional on many other characteristics, female borrowers from a European bank had a lower probability of default than male borrowers, but that gender is correlated with other predictors. Lin et al (2017) found the conditional probability of default for female borrowers from a peer-to-peer lending platform were substantially lower than that for males. Vissing-Jorgensen (2011) found that the conditional loss rates for female borrowers from a Mexican store were less than for male borrowers. Findings concerning the rejection rates of entrepreneurs by gender are rather more mixed (see Ongena and Popov (2015), Galli and Rossi (2014) and De Andres et al (2020).

Turning to individual countries the negative effect of net wealth on the probability of being turned down or rationed were again observed in all countries with the marginal effects in Spain and Greece being markedly larger than those in other countries. There are no noticeable differences between countries concerning the relationship between being rejected or rationed and age, whilst the probability of being rejected or rationed is higher the greater the number of children over 20 years in Germany and Spain. Households where the head is male are more likely to be rejected or rationed in Germany, Spain, Finland and France but not in Greece, Italy or Portugal. Finally, if the head of a household is born in the country in which they live the chance of being constrained is lower in Finland and France, but this was not detected in the other countries shown.

5.2.3 Probability of being Discouraged (disc)

We now turn to the second aspect of the comprehensive definition of being constrained: whether a household thought of applying sometime in the previous three years but did not apply because they thought they may be turned down as opposed to those who did not think of applying or thought of applying and despite possibly thinking they would be declined were not put off from applying. Table 7 shows the results. Taking all countries together (shown in column two) the negative effect of net wealth is clearly observed. Comparing the estimated average marginal effects of an additional unit of net wealth on the chance of being rejected or rationed (Table 6) with those in Table 7 we can see that a unit increase in net wealth reduces the probability of being discouraged by 0.26% but reduces the probability of being rejected or rationed by only 0.10%. Turning now to income, we see that whilst increased income in the range €0-12,701 has no effect on being rejected or rationed (Table 6), it does increase the chance of being discouraged. This may be because these households also have other characteristics associated with rejection, such as great balances outstanding on other loans. However, within most age ranges, from 30-39 years and upwards, there is a greater increase in the probability of being discouraged than there is of being rejected or rationed, as age increases. A similar effect is observed for those with children under 6 years of age and those with children over 20 years: having more such children increases the probability of being discouraged than the probability of being rejected or rationed. Those with a tertiary or upper secondary education, rather than a primary or secondary education, have a lower probability of being discouraged (a reduction of 1.36%) and those with an upper secondary education also have a reduced chance of being discouraged (by 0.83%) whereas there was no detectable association between any level of education and the probability of being rejected or rationed, as seen in Table 6.

Table 7 here

Table 7 also shows that households where the head is unemployed are more likely to be discouraged than those doing regular work or who are permanently disabled or a student and Table 4 shows they are less likely to apply than those with other employment statuses. Notice, however that being unemployed is not associated with a higher probability of being rejected or rationed (Table 6). This may be because unemployed heads rarely apply for loans because they are not confident of repaying. Interestingly, those households where the head is self-employed are more likely to be discouraged (the marginal effects are 0.0249 with employees and 0.0110 without employees) than likely to be rejected or rationed, where the marginal effects are 0.103, with employees and 0.0081 without employees. Having a male head of household reduces the probability of being discouraged by more than it reduces the probability of being rejected or rationed (by 0.76% compared with 0.39%, respectively). Finally, being born in the same country as the household lives reduces the probability of

being discouraged by 0.92% but reduces the chance of being rejected or rationed by only 0.54%. Put another way, immigrants have a higher chance of feeling discouraged than natives but this difference is less than the increased probability they will be rejected or rationed relative to natives.

Turning to individual countries, the decrease in probability of being discouraged if net wealth were higher is much greater than the decrease in the probability of being rejected or rationed, in every country shown. In terms of gross income, the effect of a unit increase seems undetectable until a certain income range is reached at which the probability of being discouraged decreases but thereafter remains constant. This threshold varies by country; for example in Germany, Spain and France it is within the range €12,702-€22,661 whereas in Greece and Portugal it is in the range €22,662-€35,141. This effect is not observed in individual countries for the probability of being rejected or rationed.

There is a similar plateau pattern for age, where for Estonia, Germany, France and Spain the threshold is in the range 40-49 years but for Portugal and Greece it is in the range 50-59 years. Being unemployed increases the probability of being discouraged in Belgium, Spain, Finland and Portugal, but not in any of the other countries considered and, as we have observed, has no effect on the probability of being rejected or rationed. Being married or partnered rather than widowed or divorced reduces the probability of being discouraged in Estonia, Spain and Finland but not in other countries. Finally, if the head is born in the country where the household lives, the household has a lower chance of being discouraged in Greece, but not in any of the other individual countries considered.

5.2.4 If applied and was turned down or rationed (rejless)

In this section we consider only households that applied for a loan or credit. We identify the characteristics of those who, in the three-year window, were ever turned down and not given as much as they applied for rather than those who were not turned down nor given only a portion of what they applied for. This section attempts to identify the supply side decisions by lenders; that is who was turned down and who was not. Table 8 shows the results. We consider all households in aggregate because the sample of those who applied is too small to make convincing inferences about individual countries.

Table 8 here

Interestingly, the average marginal effect of an increase in household net wealth (-0.0037) is much greater in absolute terms than that on being rejected or rationed (-0.0010 – Table 6). In fact, in

absolute terms, it is larger than that for being discouraged which was -0.0026. In other words, the average contribution of an increase in net wealth to the reduction in the chance of being constrained in the comprehensive sense is due more to having a lower chance of being rejected by lenders than to being less discouraged from applying. Considering gross income, increases within each range decrease the probability of being rejected, generally from the second income range whereas when we consider those discouraged the effect occurs from the third income range. However, the average marginal effects within each range are approximately double those for the probability of being discouraged. In average terms, increases in income reduce the chance of being rejected or rationed by almost double the reduction in the chance of being discouraged.

The effects of age are slightly puzzling. Only in the highest range is there a detectable effect on the prob of being rejected or discouraged and increasing age in this range actually increases this probability. This is puzzling because a common finding in credit scoring models is that the probability of default decreases with age (Djeundje and Crook 2018). Having more children aged 6 years or under increases the chance of being rejected or rationed by more than it increases the probability that a household would feel discouraged (0.0199 versus 0.0066, respectively). If the head of household is unemployed the probability of being rejected or rationed (0.0539) is much higher than is the probability of being discouraged (0.0293). Finally, being born in the country in which a household lives, on average reduces the probability of being rejected or rationed by much more than it reduces the probability of being discouraged.

However, we must be aware of a caveat to the interpretation of this section. The results in Table 8 relate only to those who actually applied. Our conclusion would have to be modified if the marginal effects of a model for those who applied differ from those of a model for the population, in short if there is a missing not at random sample selection effect present.

6. Regional Differences

In Tables 1 and 3 we have grouped countries by geographic zone: northern Europe, Mediterranean countries and former socialist bloc countries that we refer to as Eastern bloc countries, denoted EB. Each group contains countries that have similar proportions of households that have applied for credit in the last 3 years and approximately similar amounts of debt per household. The Northern countries group, has the highest average proportion of households that apply (25.65%) and the largest average debt outstanding (€41,404) compared with the other groups. Mediterranean countries have the lowest proportion that applied (15.22%) but the median average debt outstanding. EB countries have the lowest average amount of debt per household (€7,808) but the median proportion that applied (17.66).

To see if the sensitivity of making an application or of being constrained to the socio-demographics differed between these regions we estimated each model for each of the three regional blocs, separately.

The results in Table 9 show some interesting similarities and differences. Consider the probability of making an application (Panel a). There is a lower probability that higher net wealth households apply for credit in all three regions. On the other hand, as income rises in the Northern countries the chance of making an application increases in each income range until €88,418 whereas the increase in the chance of applying only occurs up until €35,141 in Mediterranean countries and in EB countries until €53,254. This is consistent with households in Northern countries borrowing larger amounts per head, as seen in Table 1. It may also arise because income levels are higher in Northern countries and, with the same spline knots for all countries, the negative effect is masked in the latter two regions.

Table 9 here

Although the PIH predicts that income in excess of permanent income would result in less debt being applied for we do not detect that this in Northern and Eastern countries and we detect the opposite for Mediterranean countries. It may be that the effect is masked by correlation between gross income and the excess of gross income over permanent income.

Whilst increasing age in the under 30 years age group does not alter the chance of application for Northern countries it does increase it in Mediterranean and EB countries. Above age 30 years, in all three regions, greater age is associated with a lower chance of making an application. This decrease in probability is rapid at first in the age range 30-39 but then lessens when the head is in their 40s before decreasing increasingly rapidly. This is consistent with the PIH. This might be interpreted in conjunction with the effects of numbers of children of different ages in Northern countries where households with more children under 7 years have a greater probability of making an application. Surprisingly in Mediterranean and Eastern countries households with more children aged 7 to 13 years or in their teens has no detectable effect on the chance of making an application. This suggests the increased expense of bringing up children is funded in other ways in these regions. In all three regions the greater the number of children aged 20 years and above in a household the greater the chance the household applies for debt.

If the head of a household is unemployed the probability an application is made is smaller than if the head has another employment status and the effect on this probability is almost double in the North than in the Mediterranean or Eastern countries, where the proportions applying are lower. If the head is self-employed with employees, there is a greater chance of an application than if the head is an employee or not doing regular work in Northern and Mediterranean countries, but no effect in Eastern countries. This may suggest a greater proportion of SMEs are funded by equity in Eastern countries and a higher proportion by debt in the North and Mediterranean regions.

Interestingly, households with a male rather than a female head are more likely to make an application in Northern and Mediterranean countries but not in Eastern countries. Households where the head is single, rather than widowed or divorced, are less likely to apply in all three regions. Also interesting is that if a head is born in the same country as they live then the probability of making an application is higher in Northern countries but not different in Mediterranean or Eastern countries.

We now turn to constraints in the sense of a household having applied and been rejected or gained less than was applied for or was discouraged from applying at all. The results, in Panel (b), show that, consistent with the aggregate results in Table 5, in all three regions higher net wealth reduces the chance of being constrained. However, there are marked differences between the regions when we consider gross income. In Northern regions, in all income ranges above the first segment of income (above €12,701) the chance of being constrained decreases. In contrast, gross income appears to have no effect on the chance of being constrained in the Mediterranean area until income reaches €22,662 when it decreases, but does not decrease further until income reaches €53,254. In short, there are plateaus in the effect. In Eastern regions, the relationship is similar to that in Mediterranean countries except that the chance of being constrained increases with income in the lowest income range and surprisingly also increases in the highest income range. This suggests different risk profiles or expectations about being rejected by very high-income households in Eastern countries that are not present in the other regions.

In Northern countries at higher ages of the head of household, when under 30 years, there is a greater chance the household will be constrained, but no greater chance they will apply (Panel a). In Mediterranean countries there is both a greater chance they will apply and that they will be constrained. Above the youngest age group, in both Northern and Mediterranean countries, older heads have a lower chance of applying (Panel a) and lower chance of being constrained. In contrast, in EB countries we do not detect an effect of age on being constrained until the head is aged at least 40 years, when the probability decreases increasingly in older groups. A further difference between the regions is that in Northern countries households with a head who has completed upper secondary and especially tertiary education has a lower chance than those with merely a primary education but this is not observed in the other two regions.

Being unemployed increases the chance of being wholly or partly rejected in Northern and Mediterranean countries, whereas in EB countries we detected no effect on being constrained. The self-employed with no employees have a higher chance of being constrained in all regions, although the effect on the probability of being constrained is much higher in Northern countries than in the other regions. In terms of gender, we do detect neither males nor females to be more likely to be constrained.

Interestingly, in Northern countries those born in the country in which they live have a lower chance of being constrained; immigrants have a higher chance. But we did not detect this in the other two regions.

We now consider the two components of being constrained to gain a better understanding of why there may be differences between regions. Panel c shows the marginal effect of each characteristic on the probability of making an application and being turned down completely or gaining only a portion of the amount they applied for. Panel d shows the effects of characteristics on the probability of being constrained at some time in the previous three years.

The marginal effect of an increase in wealth on the probability of being discouraged from applying is similar in all three regions. But the marginal effect of an increase in net wealth on being rejected or rationed is much more negative for Eastern countries than for Northern and Mediterranean countries. There are substantial differences between countries in the effects of increases in gross income on the chance of being rejected for credit or rationed. Increases in gross income reduce the probability only in the highest income range (over €88,418) in both Northern and Eastern countries but gross income has no detectable effect in any income ranges in Mediterranean countries. Differences in the probability of being discouraged are even greater. For Northern countries increases in income reduce the chance of being discouraged in almost every income range for Northern countries but only in the middle income range (€22,662-€35,141) in Mediterranean countries and have no detectable effect in Eastern countries.

In all three countries, increases in income appear to have a larger estimated effect in absolute terms on the probability of being discouraged than on the probability of being rejected or rationed. The lower probability of being constrained as income increases (panel b) in the North appears due much more to the decrease in the probability of being discouraged than to the decrease in the probability of being rejected or rationed. The same applies in Mediterranean countries, but only in the income range (€22,662-€35,141). On the other hand, the increase in the chance of being constrained in the highest income range in Eastern countries is due to an increase in the probability of being rejected or rationed (marginal effect 0.0394) rather than a changed probability of being discouraged (marginal effect not different from zero).

The increase in the probability of being constrained within the under 30 years of age group in the Northern and Mediterranean regions is again due more to the increase in the probability of being discouraged than the increase in the probability of being rejected or rationed. The same is true as the age of the household head increases within their 30s 50s and 65 plus. The same also appears true for Eastern countries, but only for the over 65 age range.

The increase in the probability of being constrained in the Northern countries if the number of children aged under 6 years or aged 7 to 13 years increases also appears due to higher increases in the

probability of being discouraged than of being rejected or rationed. The same is true for all three regions as the number of children over 20 years of age in the household increases. The same applies to the increased probability of being constrained experienced by the unemployed seen in the Northern and Mediterranean countries and the same is true if the head is self employed with employees in Northern and Eastern countries but we cannot say this for the Mediterranean countries. Finally, the increased probability of being constrained if the head is an immigrant in Northern countries can be seen to be more down to the higher increase in the probability of being discouraged than the increase in the probability of being rejected or rationed.

7. Institutional factors

We re-estimate each of the previous equations for all countries in aggregate, but, following Duygan-Bump and Grant (2009) instead of including dummy fixed effects for each country we include five institutional factors representing the efficiency of the legal system in each country at gaining redress in the event of payment delinquency.

These factors are as follows:

Time to enforce contracts is the number of calendar days between the date of filing a lawsuit in a court until the final determination and where appropriate payment being made (in 2019).

Private credit bureau coverage is the number of individuals or firms listed by private credit bureau with information on repayment history, unpaid debts or credit outstanding as a percentage of the adult population (in 2019).

Public credit bureau is as for private credit bureau except relates to the coverage by public registers (in 2019).

Depth of information in credit bureau is an index constructed by the World Bank which measures rules affecting the scope, accessibility and quality of credit information available through private or public credit registries. The index has a range of 0 to 8 with a higher number indicating more credit information being available (in 2019).

Adequacy of unemployment benefits is the net annualised income of a jobless couple that claim minimum income benefits and who have two children aged 4 and 6 years as a percentage of median disposable household income (in 2019).

The first factors were taken from the World Bank (2024b) World Development Indicators data bank and the fifth from the OECD⁹. The results are shown in Table 10.

Table 10 here

Comparing the average marginal effects for each dependent variable with those in the equations without the institutional factors (column two in each of tables 4, 5, 6, 7 and 8) we see the values are almost identical and our earlier conclusions hold. We now concentrate on difference between countries in the institutional factors – the five variables at the bottom of the table.

We can see from column three that on average, in countries where the time to enforcement is longer, the chance of being constrained in the sense of applying and being declined, rationed or discouraged, is lower. This is because the probability of making an application and being rejected or rationed is lower (column four) and because the chance of being discouraged is lower (column five). The probability of applying and being rejected or rationed is affected by two behaviours. One is the probability of making an application and the other is the probability of being rejected or rationed, if an application is made. We can see from column one that longer legal enforcement times reduce the chance of a household making an application but they also increase the chance of lenders declining or rationing any application that is made. These actions by lenders are entirely expected since longer enforcement costs increase the cost of making a loan and reduce the expected profit from making it. Our result is consistent with Fabbri and Padula's (2004) finding for the probability of being constrained in Italy.

Credit bureaux provide administrative information about a potential borrower's past behaviour, that is, information gained from the records of lenders, rather than information gained from the applicant himself. Credit bureaux also provide aggregated data on the behaviour of associated persons. Literature shows that credit bureau variables considerably enhance the predictive accuracy of credit scoring models (REF). Such data also facilitates the use of statistical credit scoring models which, by their nature, are more consistent than human-made credit decisions (REF). In short, the greater the availability of credit bureau data the more accurate and consistent on average credit risk models relating

⁹ Data sources:

Percentage of adults covered by private credit bureau: World Bank databank variable: IC.CRD.PRVT.ZS downloaded 8.7.24
 Percentage of adults covered by public credit bureau: World Bank databank variable: IC.CRD.PUBL.ZS downloaded 8.7.24
 Depth of credit information index: World Bank databank variable :IC.CRD.INFO.XQ, downloaded 9.7.24
 Time required to enforce a contract: World Bank databank Variable: IC.LGL.DURS, downloaded 8.7.24
 Adequacy of unemployment benefits: OECD Adequacy of minimum income benefits, couple, 2 children aged 4 and 6 years, no eligibility for rent supplements, downloaded 9.7.24.

to households' credit applications will be compared with scoring models based on other data from other sources. Column two shows that in countries where the proportion of adults for which private credit bureau data is available is larger, the probability a household is constrained, is also greater. This is the case whether the bureau is privately or publicly owned. In the case of private bureaux, the average marginal effect on the probability a household will apply and be rejected or rationed is significantly positive; but we could not detect an effect on the probability of a household being discouraged from applying. Looking at the effect on the household applying and being rejected or rationed, we can see from column five that in countries where the coverage of private bureau is higher, the chance of a household being rejected or rationed if they apply is significantly lower than in countries where the coverage is lower. However greater coverage by private bureaux is also associated with a lower chance a household will apply. Turning to the coverage of public bureaux, whilst greater coverage increases the chance a household is constrained, we do not detect an effect on the chance the household applies and is rejected or rationed nor on the probability of a household being discouraged. Interestingly, in countries with greater coverage by public bureaux there is a higher chance a household will apply for credit and no detectable effect on the probability a household will be rejected or rationed.

Interestingly, when we also consider the quality, accessibility and volume of credit bureau information available from either private or public bureau we gain greater insight. In countries where there is a greater scope of bureau information the probability of a household being constrained (column three) is actually lower than when there is less bureau information. Households have a lower chance of applying and being rejected or rationed (column four) and are less likely to be discouraged (column five). They are less likely to apply and be rejected or rationed because they are less likely to apply (column two) and if they do apply, they are less likely to be rejected or given less than they applied for (column six). We argued above that credit bureau-based decisions may be expected to be more accurate than those based on information from other sources (which is typically less when considering household loans such as credit cards, personal loans and mortgages). Our results show that greater depth of bureau coverage increases the chances an average household will apply and reduces the chance they will be declined or rationed if they do.

Finally, we consider the level of income benefits of a jobless couple with two children relative to median income. In countries where this ratio is relatively high there is a lower chance a household will apply for credit (column two). This is as one might expect since welfare payments, rather than credit, may be used to fund living expenses. In countries where such payments are high the probability of being constrained is also relatively high (column three). Looking at columns four and five we can see this is due to a higher chance of being discouraged from making an application than to having a higher chance of applying and being rejected or rationed. However, if they do apply, then column six shows that they have a higher chance of being declined or rationed.

Conclusion

We have used the most recent and largest surveys of households that are credit constrained in Europe to identify the contributions of each of a large number of household characteristics to the probability a household applies for credit or a loan and the probability it is credit constrained. We have considered a household as being constrained if, in the three-year period 2018-2021 any member had applied for credit and been turned down, not gained as much credit as they applied for or if they were discouraged from applying. We have decomposed the effect of each characteristic according to its effect on the probability of being turned down or rationed and, separately, its effect on a household being discouraged from applying. We have done this for seventeen countries separately and in aggregate. We have grouped European countries into three regions, Northern, Mediterranean and Eastern regions, where the probability of applying differs and we have compared the effects of each characteristic on the probability of being constrained between these regions. We have also used the pooled sample to measure the marginal effects of certain institutional differences between countries in terms of the coverage of credit bureau, the depth of information of credit bureau, time to enforce contracts and level of unemployment benefits on the probability of being constrained and its two components.

In addition to finding that greater wealth reduces the probability of being constrained we find that this probability increases with gross income until €12,701 (2021 prices) and decreases as income increases until €88,419. Age has an inverse U-shape relative to the probability of being constrained whilst having more children under 6 years and in the 7-13 age range increasing the probability as does have more children aged 20 years or more living in the household. Head of household with more years on education completed has an increasingly lower chance of being constrained. If the head is unemployed, male or self-employed there is greater chance of being constrained whilst if the head is retired, single or married or partnered the household has a lower chance. When we decompose the effects of each characteristic into the probability of being rejected or rationed and being discouraged, we see that generally the effects on the probability of being discouraged are greater than the effect on the chance of being turned down or rationed.

We conclude that native residents have a higher probability of applying for credit than those who were born in a different country, they have a lower probability of being discouraged, a lower probability of being rejected or rationed and there is a lower chance they are discouraged from applying. They also have a lower chance of being rejected or rationed if they do apply for credit.

When we look at individual countries, for virtually every country wealthier households are less likely to be constrained due to being less likely to apply, less likely to be discouraged from applying and less likely to be turned down or rationed. The marginal effects are similar in all of the countries we considered except for France and Portugal where they appear larger. The negative effect of age on the chance of being constrained is most clearly seen in Germany, Finland, Portugal Spain and Greece. In all countries except France, Greece, the Netherlands and Estonia the older the head is above 65 years the lower the chance the household is constrained. Being unemployed increased the chance of being constrained in Belgium Spain and Finland, but we did not detect this for other countries. Being born in the country in which the head lives reduces the chance of being constrained in Finland and France, but increases it in Greece. Overall, the modest sample sizes for individual countries probably inhibits our ability to detect the roles of individual variables in individual countries.

However, when we pool the data across countries and consider the roles of institutional factors, we conclude that in countries where the time to enforce legal contracts (for example to recover debt) is longer there is a lower probability a household will be constrained with both a lower chance the household will be declined or rationed and a lower chance they will be discouraged from applying. In countries where a private credit reference agencies have records on a higher proportion of adults there is a higher chance of a household being constrained which is associated with a higher chance of being rejected or rationed rather than being more likely to be discouraged. However, in countries where the volume of information held by these agencies is greater there is a lower chance of a household being constrained, a higher chance they will make an application and a lower chance they will be turned down or rationed if they do. Finally, in countries with higher relative unemployment benefit, there is a lower chance households will apply for credit but a higher chance they would be constrained and a higher chance they would be rejected or rationed if they do apply.

Our paper contributes to the literature in several ways. First our paper is the first to estimate the marginal effects of household characteristics for a large range of European countries on the probability that a household is credit constrained. The paper is the first to decompose the effects of these characteristics into their effects on the probability of a household being turned down and on the probability of being discouraged. This is the first paper to estimate the marginal effects of household characteristics on the probability of being turned down or rationed, given that a household applied for credit. Our paper provides this analysis for the very latest comprehensive data on households in Europe. The paper is the first for over two decades to consider the role of institutional factors on the probability of a household being credit constrained. The paper is the first to consider the effect of being a native of a European country on the probability of being credit constrained.

Table 1
Mean Debt Balances Outstanding per Household (Euro) 2021

	All households					Conditional on holding any debt				
	Mortgages	Overdrafts	Credit Cards	Non-collateralised	Total	Mortgages	Overdrafts	Credit Cards	Non-collateralised	Total
Luxemburg	145,572	1,580	88	12,920	160,160	267,942	2,909	161	23,781	294,793
Netherlands	81,627	291	37	3,640	85,595	138,734	494	63	6,187	145,479
Ireland	60,702	116	501	5,933	67,252	89,162	170	736	8,714	98,783
Belgium	44,253	189	59	3,276	47,777	88,311	377	118	6,538	95,343
Finland	33,930	266	395	11,927	46,518	57,277	449	666	20,134	78,527
France	33,604	110	21	5,021	38,756	72,802	237	46	10,878	83,963
Germany	26,741	385	36	2,865	30,027	64,520	930	87	6,912	72,448
Austria	13,003	189	28	2,086	15,306	45,026	655	96	7,223	53,000
Cyprus	41,103	398	205	5,374	47,079	88,734	860	442	11,601	101,637
Portugal	22,775	79	117	2,258	25,288	48,889	170	251	4,846	54,155
Malta	20,556	376	131	2,269	23,332	62,176	1,138	397	6,864	70,574
Italy	17,302	197	34	3,837	21,370	62,955	716	124	13,961	77,757
Greece	5,738	162	202	763	6,865	27,853	788	979	3,704	33,325
Spain	29,034	207	171	4,997	34,409	51,040	364	301	8,784	60,489
Slovakia	12,180	14	18	872	13,084	31,350	37	46	2,245	33,677
Latvia	4,310	31	26	943	5,309	12,594	90	76	2,755	15,515
Estonia	1 3,542	20	203	1,486	15,251	28,760	43	430	3,156	32,389
Lithuania	4,575	60	10	366	5,011	19,295	254	41	1,545	21,135
Slovenia	6,063	97	32	2,435	8,627	20,919	335	110	8,400	29,764
Hungary	2,907	55	27	879	3,870	9,808	187	92	2,966	13,054
Czechia	5,515	7	3	2,339	7,865	23,098	31	13	9,799	32,941
Croatia	2,193	159	30	1,061	3,443	7,223	525	97	3,494	11,340

Figures are the arithmetic mean over all observations for a country. 2021 prices.Observed values are weighted by probability sampling weights.

Table 2
Median Household Debt Balances Outstanding Conditional on holding each
type of debt (Euro) 2021

	Mortgages	Overdrafts	Credit Cards	Non-collateralised	Total Liabilities
Luxemburg	320,000	5,100	1,500	18,000	127,300
Netherlands	149,000	2,100	1,400	14,000	117,919
Ireland	129,979	572	729	7,308	24,859
Belgium	100,000	600	628	7,500	60,000
Finland	77,421	2,100	1,500	11,133	36,077
France	96,972	600	1,200	6,820	35,504
Germany	85,000	1,500	310	7,000	18,000
Austria	52,000	1,285	700	6,500	15,977
Cyprus	92,685	3,000	2,000	13,000	70,000
Portugal	57,000	504	700	6,230	39,800
Malta	73,000	3,000	680	8,300	45,000
Italy	95,000	4,528	1,421	8,000	34,000
Greece	38,000	4,000	1,250	6,000	18,500
Spain	69,000	4,000	900	6,670	33,000
Slovakia	34,000	500	300	4,000	19,000
Latvia	21,369	1,000	705	1,344	4,072
Estonia	40,869	80	560	2,093	11,388
Lithuania	30,170	349	300	1,000	3,000
Slovenia	38,000	1,000	300	8,000	12,000
Hungary	11,040	581	436	2,720	5,956
Czechia	32,638	351	585	5,069	15,558
Croatia	22,236	557	398	6,636	2,500

Figures are the median value over all observations for a country. 2021 prices. Observed values are weighted by probability sampling weights.

Table 3
Percentage of Households who are credit constrained 2021

	% that applied (<i>apcr</i>)	% constrained (<i>discorej3</i>)	% rejected or rationed (<i>rejorpt4</i>)	% discouraged (<i>disc</i>)	N	% rejected or rationed condnl on application (<i>rejless</i>)	N	GDP/capita (\$) 2021
Austria	5.98	3.21	0.82	2.55	2,293	13.82	118	53,518
Belgium	22.75	5.10	1.90	3.51	2,130	9.76	413	51,850
Germany	20.06	6.08	2.00	4.60	4,119	11.49	795	51,427
Finland	29.08	6.45	1.84	5.36	9,474	11.53	3,055	53,505
France	30.28	8.68	2.45	7.35	10,253	11.76	3,406	43,671
Ireland	44.44	6.40	2.66	4.64	6,020	9.62	2,331	102,002
Luxemburg	35.22	14.60	4.87	12.52	2,010	16.97	748	133,712
Netherlands	17.37	2.66	0.86	2.12	2,690	7.00	453	58,728
Cyprus	8.64	5.69	0.68	5.10	1,332	11.40	131	32,746
Greece	2.81	5.37	1.94	4.02	3,386	71.16	88	20,311
Italy	10.57	5.07	1.30	3.74	6,239	12.92	592	36,449
Malta	11.15	4.69	1.99	2.70	1,018	17.82	85	34,881
Portugal	23.73	7.08	1.43	6.41	6,107	9.16	1,189	24,661
Spain	34.39	11.40	5.14	8.58	6,313	14.95	1,856	30,489
Estonia	28.02	7.43	3.36	5.08	2,247	15.05	704	27,944
Croatia	13.82	8.89	2.16	7.53	1,357	24.71	152	17,809
Hungary	n.a.	2.95	n.a.	2.95	6,032	n.a.		18,753
Lithuania	15.04	11.83	5.88	7.57	1,676	47.00	203	23,850
Latvia	21.12	10.65	3.90	8.70	1,219	23.86	292	20,930
Slovenia	12.26	5.25	2.19	3.49	1,951	18.19	225	29,331
Slovakia	15.70	4.73	1.51	3.86	2,174	10.93	208	21,768

Notes: data weighted by probability sampling weights. Data from implicate 1 only. # obs for Italy for discorej3=5903. Pan3_w4_im1_np2_means_4.log.

Table 4
Probability of making an application for credit in the last 3 years
Average Marginal Effects

Dependent variable: <i>apcr</i>	All Countries	Austria	Belgium	Germany	Estonia	Finland	France	Spain
net wealth (ln)	-0.0057**	-0.0033**	0.0024	-0.0096**	-0.0062*	-0.0083**	-0.0103**	-0.0442**
gross income (ln) splines								
under €12,701	0.0075	0.5259	n.a.	-0.0380	0.0997*	0.0161	-0.0216	-0.0284*
€12,702-€22,661	0.0922**	-0.0411	0.0855	0.2220*	0.2162**	0.0801	0.2332**	0.4174**
€22,662-€35,141	0.0707**	0.0950*	0.1515	-0.0048	0.1843*	0.0325	0.1444**	0.0325
€35,142-€53,254	0.0590**	0.0779	0.0640	0.0952	0.1552	0.1561**	0.0990*	0.0931
€53,255-€88,418	0.0459**	0.0489	0.0725	0.1190**	0.2445**	0.0494	-0.0223	-0.1272
Over €88,418	0.0009	0.0259	-0.0131	0.0285	-0.2064*	0.0291	-0.0084	-0.0186
income-perm.inc (ln)	-0.66x10 ⁻⁴	-0.0025**	-0.0012	0.71x10 ⁻⁴	-0.0018	-0.0004	-0.0003	0.0033
age splines								
age < 30	0.0036**	0.0031	0.0173	0.0201**	0.0036	-0.0010	0.0046	-0.0072
age 30-39	-0.0060**	-0.0040	-0.0070	-0.0062	-0.0082	-0.0052*	-0.0080**	0.0022
age 40-49	-0.0040**	-0.0007	-0.0052	-0.0014	-0.0084*	-0.0066**	-0.0066**	-0.0383**
age 50-64	-0.0068**	-0.0053**	-0.0076*	-0.0044*	-0.0128**	-0.0057*	-0.082**	-0.0243**
age 65 +	-0.0198**	-0.0027	-0.0090**	-0.0090**	-0.0114**	-0.0081**	-0.0129**	-0.0533**
no kids <=6 yrs	0.0161**	0.0170	-0.0399*	0.0496*	-0.0107	0.0271**	0.0029	-0.0406
no kids 7-13	0.0028	0.0060	0.0089	0.0205	-0.0487**	-0.0013	-0.0066	-0.0532
no kids 14-15	0.0009	-0.0190	-0.0229	-0.0535*	-0.0110	0.0138	-0.0016	0.0200
no kids 16-19	0.0041	-0.0380**	0.0472*	-0.0039	-0.0425	0.0101	0.0180	0.0629
no kids >=20	0.0161**	-0.0189	0.0194	0.0084	-0.0020	0.0151	-0.0215*	0.1457**

primary education	-0.0017	0.6396	-0.0438	0.2236	0.0554	- 0.0060	0.0843**	0.0223
secondary education	0.0041	0.3003	0.0123	0.2572*	0.0619	0.0419	0.0397*	-0.0127
tertiary education	-0.0017	0.6324	0.0160	0.2240	0.0311	0.0550	0.0304	-0.1181
unemployed	-0.0511**	0.0185	-0.0373	-0.0366	-0.0147	-0.0830**	-0.1147**	-0.1803**
retired	-0.0071	0.0173	-0.0006	-0.0257	0.0170	-0.0073	-0.0227	0.0762
self_empl with employees.	0.0274**	0.0468	0.0556	-0.0362	0.0335	0.0872**	0.0395	0.1297
self_empl no employees.	0.0180**	-0.0238	0.0823	-0.0024	0.0431	0.0724**	0.0184	0.0067
male	0.0091**	0.0061	0.0044	0.0110	- 0.0533**	0.0141	0.0137	-0.0104
single	-0.0511**	-0.0543**	-0.0138	-0.0439*	-0.1322**	-0.0677**	-0.0658**	-0.3023**
married/partner	-0.0114**	-0.0548**	0.0094	-0.0033	-0.0787**	-0.0168	0.0168	0.0582
born in country	0.0298**	-0.0044	0.0108	-0.0015	0.0210	0.0496*	0.0711**	n.a.
No of observations	62,088	2,289	2,049	4,044	2,179	9,457	10,027	6,212
Pseudo R2	0.184	0.185	0.134	0.119	0.201	0.114	0.109	0.115
Prob> chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 4 (Continued)
Probability of making an application for credit in the last 3 years
Average Marginal Effects

Dependent variable: <i>apcr</i>	Italy	NL	Portugal
net wealth (ln)	-0.0406**	0.0049**	-0.0092**
gross income (ln) splines			
under €12,701	0.2938	0.0378	0.0075
€12,702-€22,661	0.3471	-0.2243*	0.1202**
€22,662-€35,141	0.0937	0.3488**	0.0879
€35,142-€53,254)	0.1007	-0.0273	-0.1227*
€53,255-€88,418	0.1158	0.1434*	0.0269
over €88,418	-0.0036	0.0057	-0.0730
income-perm.inc (ln)	0.0059	-0.0005	0.0015
age splines			
age < 30	0.0921	0.0245*	0.0126
age 30-39	-0.0374*	-0.0096*	-0.0183*
age 40-49	-0.0232	-0.0063	-0.0033
age 50-64	-0.0227**	-0.0030	-0.0059**
age 65 +	-0.0390**	-0.0052*	-0.0097**
no kids <=6 yrs	-0.0091	-0.0019	0.0041
no kids 7-13	-0.0269	-0.0043	0.0148
no kids 14-15	0.0859	0.0628	0.0230
no kids 16-19	0.0492	0.0070	0.0020
no kids >=20	0.0548	-0.0234	0.0355**

primary education	0.0439	-0.0052	0.0011
secondary education	-0.0274	0.0397	0.0109
tertiary education	-0.0057	0.0593	-0.0079
unemployed	-0.1080	0.0007	-0.0856**
retired	0.0287	-0.0221	-0.0152
self_empl with employees	0.3101**	-0.0969	0.0055
self_empl no employees	0.1134	0.0526	-0.0283
male	0.1511**	-0.0004	0.0042
single	-0.2346*	-0.0396	-0.0415*
married/partner	-0.0742	0.0135	-0.0205
born in country	-0.0305	-0.0202	-0.0138
No of observations	6,097	2,026	5,971
Pseudo R2	0.097	0.131	0.103
Prob> chi2	0.000	0.000	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia, Czechia. Constant included. For aggregate model country dummies included, the excluded country dummy is Belgium. Countries not included: Spain, Hungary, Ireland, Malta, Poland.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced.

For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on imprecise 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Indicator=1 if member of household has applied for a loan. Indicator=0 if member of household has not applied for a loan or credit in the last 3 years.

(apcr) Eq12npm_w4_im1_6marg.log

Table 5
Rejected or gained only part of amount applied for or discouraged in last 3 years (Constrained)
Average Marginal Effects

Dependent variable: <i>discorej</i>	All Countries	Austria	Belgium	Germany	Estonia	Spain	Finland
net wealth (ln)	-0.0032**	-0.0027**	-0.0030**	-0.0028**	-0.0035**	-0.0061**	-0.0028**
gross income(ln) splines							
under €12,701	0.0086**	0.0473	0.0671	0.0066	-0.0094	0.0059	0.0862*
€12,702-€22,661	-0.0071	-0.0516	0.0258	-0.0692*	0.0501	-0.0907**	-0.0047
€22,662-€35,141	-0.0333**	0.0030	-0.0562	0.0607	-0.0201	-0.0558	-0.0382
€35,142-€53,254	-0.0277**	-0.0214	0.0841	-0.0488	-0.0558	0.0333	-0.0170
€53,255-€88,418	-0.0464**	-0.0088	-0.0942*	-0.0203	-0.0424	-0.0314	-0.0498**
over €88,418	-0.0155**	0.0100	-0.0335	-0.0309	0.0253	0.0063	-0.0441*
income-perm.inc (ln)	0.0006**	0.0001	-0.0012	0.0008	0.0014	-0.0005	0.0002
age splines							
age < 30	0.0028**	0.0070	-0.0003	0.0013	-0.0027	-0.0025	0.0033**
age 30-39	-0.0017**	-0.0033	0.41x10 ⁻⁴	-0.0037*	-0.0023	0.0005	-0.0009
age 40-49	-0.0009*	0.0015	-0.0012	-0.0009	-0.0001	-0.0049**	0.0012
age 50-64	-0.0018**	-0.0023	-0.0022	0.0013	-0.0051*	-0.0018	-0.0037**
age 65 +	-0.0024**	-0.0025*	-0.0050*	-0.0021*	-0.0009	-0.0023*	-0.0035**
no kids <=6 yrs	0.0091**	0.0123	0.0045	0.0172**	0.0159	-0.0029	0.0155**
no kids 7-13	0.0077**	0.0072	0.0184*	0.0156*	0.0130	-0.0055	0.0066
no kids 14-15	-0.0021	0.0120	-0.0246	-0.0145	-0.0047	0.0082	-0.0124
no kids 16-19	0.0002	-0.0096	-0.0119	0.0071	0.0023	0.0091	0.0068
no kids >=20	0.0130**	0.0111	-0.0040	-0.0005	0.0422**	0.0263**	0.0077
primary education	-0.0044	0.7522	-0.0030	-0.0004	-0.0569**	-0.0094	0.0455

secondary education	-0.0120**	0.3374	-0.0235	-0.0138	-0.0632	-0.0071	0.0115
tertiary education	-0.0177**	0.6959	-0.0175	-0.0270	-0.0755	-0.0305**	-0.0037
unemployed	0.0281**	0.0137	0.0760*	0.0323	0.0139	0.0556**	0.0532**
retired	-0.0072*	0.0097	0.0206	-0.0075	-0.0324	0.0179	-0.0110
self_employ with employees.	0.0275**	0.0057	0.0651	0.0271	0.0606	0.0269	0.0479**
self_employ no employees.	0.0153**	-0.0059	0.0070	0.0148	0.0735	0.0151	0.0099
male	0.0030	0.0183*	-0.0083	0.0076	0.0017	0.0135	0.0011
single	-0.0093**	-0.0239**	-0.0040	-0.0147	-0.0484**	-0.0290**	-0.0145*
married/partner	-0.0084**	-0.0184	-0.0148	-0.0075	-0.0358*	-0.0491**	-0.0159*
born in country	-0.0116**	-0.0235	-0.0130	-0.0132	0.0036	n.a.	-0.0226*
No of observations	58,641	2,289	2089	4,044	2,179	6,212	9,457
Pseudo R2	0.111	0.208	0.174	0.139	0.121	0.163	0.174
Prob> chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 5 (continued)
Rejected or gained only part of amount applied for or discouraged in last 3 years (Constrained)
Average Marginal Effects

Dependent variable: <i>discorej</i>	France	Greece	Italy	Netherlands	Portugal
net wealth (ln)	-0.0038**	-0.0029**	-0.0026**	0.0004	-0.0047**
gross income (ln) splines					
under €12,701	0.0054	- 0.0016	-0.0003	0.0084	-0.0108*
€12,702-€22,661	-0.0613**	-0.0516	-0.0084	- 0.0692*	0.0220
€22,622-€35,141	-0.0227	-0.0342	-0.0562	0.1035*	-0.0560*
€35,142-€53,254	-0.1040**	-0.0499	-0.0242	-0.0441	0.0156
€53,255-€88,418	-0.0302	-0.1227	-0.0183	0.0093	-0.0656
Over €88,418	-0.0065	0.0302	-0.0070	0.0069	0.0306
income-perm.inc (ln)	0.0009*	0.0013	-0.0002	-1.29x10 ⁻⁸	-0.0001
age splines					
age < 30	-0.85x10 ⁻⁴	0.0091**	0.0090	0.0018	0.0063
age 30-39	-0.0006	-0.0036*	0.0010	-0.0008	-0.0071*
age 40-49	-0.0032*	0.0019	-0.0017	-0.0018	0.0019
age 50-64	-0.0009	-0.0033*	-0.0009	-0.0006	-0.0028**
age 65 +	-0.0012	-0.0042	-0.0026**	-0.0015	-0.0014*
no kids <=6 yrs	0.0110*	0.0119	-0.0115	-0.0047	0.0103
no kids 7-13	0.0087*	0.0125	-0.0122	0.0083	0.0015
no kids 14-15	0.0076	-0.0153	-0.0021	-0.0151	-0.0104
no kids 16-19	0.0075	-0.0202	-0.0071	-0.0050	-0.0006
no kids >=20	0.0229**	0.0165*	0.0064	0.0004	0.0155**

primary education	0.0001	0.0086	0.0014	-0.0058	-0.0033
secondary education	-0.0039	0.0039	-0.0044	-0.0100	-0.0106
tertiary education	-0.0156*	-0.0138	-0.0061	-0.0107	0.0021
unemployed	0.0051	0.0189	0.0027	0.0835	0.0292
retired	-0.0093	-0.0086	0.0039	-0.0007	0.0009
self_empl with employees.	-0.0019	0.0041	0.0525**	n.a.	0.0082
self_empl no employees.	0.0125	0.0062	0.0095	0.0211	0.0191
male	0.0028	0.0103	-0.0027	0.0090	0.0062
single	0.0027	-0.0152	-0.0078	0.0143	-0.0088
married/partner	-0.0022	0.0065	-0.0046	0.0143	-0.0124
born in country	-0.0154*	0.0265**	-0.0005	-0.0209	-0.0025
No of observations	10,027	3,310	5,771	2,017	5,971
Pseudo R2	0.125	0.208	0.078	0.170	0.093
Prob> chi2	0.000	0.000	0.000	0.000	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia. Constant included. For aggregate model country dummies included, the excluded country dummy is Belgium. Countries not included: Spain, Hungary, Ireland, Malta, Poland, Chechia.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced. For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on implicate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Indicator=1 if household applied for credit, were turned down and no evidence could get full amount on reapplication or applied and were not given as much as asked for or was discouraged. Indicator=0 otherwise.

(discorej3)Eq12npm_w4_im1_6marg.log

Table 6
Rejected or gained only part of amount applied for in last 3 years (Rejected or rationed)
Average Marginal Effects

Dependent variable: <i>rejrpt</i>	All Countries	Germany	Spain	Finland	France	Greece	Italy
net wealth (ln)	-0.0010**	-0.0010**	-0.0034**	-0.0009**	-0.0008**	-0.0014*	-0.0007**
gross income (ln) splines							
under €12,701	0.00063	0.0402	0.0075	0.5604	-0.0002	-0.0011	-0.0021
€12,702-€22,661	-0.0047	-0.0272	-0.0027	-0.0016	0.0115	-0.0080	-0.0094
€22,662-€35,141	-0.0062	0.0370	-0.0278	-0.0043	-0.0194	0.0055	-0.0124
€35,142-€53,254	-0.0048	-0.0102	0.0113	-0.0115	-0.0293*	0.0034	-0.0008
€53,255-€88,418	-0.0149**	0.0146	0.0189	0.0023	-0.0284*	-0.0417	-0.0270
over €88,418	-0.0056	-0.0123	0.0070	-0.0232*	-0.0009	0.0103	0.0005
income-perm.inc (ln)	0.0004**	0.21x10 ⁻⁴	-0.0004	-0.47x10 ⁻⁴	0.0008*	0.0006	0.0002
age splines							
age < 30	0.0010**	0.0043	-0.0004	0.0009	0.0003	0.0067	0.0013
age 30-39	-0.0006*	-0.0002	0.0001	-0.0008	0.0003	-0.0012	0.0007
age 40-49	-0.0004	-0.0017	-0.0040**	0.0004	-0.0019**	0.0007	-0.0002
age 50-64	-0.0008**	0.0012	-0.0013	-0.0015**	-0.69x10 ⁻⁴	-0.0012	-0.0005
age 65 +	-0.0007**	-0.0015*	-0.0031**	-0.0018	-0.71x10 ⁻⁴	-0.0004	-0.0002
no kids <=6 yrs	0.0042**	0.0045	-0.0054	0.0034	0.0018	0.0085	0.0021
no kids 7-13	0.0017	0.0032	-0.0122*	-0.0012	0.0022	-0.0047	-0.0018
no kids 14-15	-0.0007	-0.0140	0.0086	-0.0069	0.0028	-0.0057	-0.0009
no kids 16-19	0.0026	0.0032	0.0036	0.0041	0.0036	-0.0053	0.0042
no kids >=20	0.0036**	0.0004	0.0138**	0.0055	0.0052	0.0095*	0.0029

primary education	-0.0011	-0.0107	0.0008	0.0037	0.0017	-0.0042	0.0066
secondary education	-0.0039	-0.0074	0.0020	-0.0043	0.0025	-0.0005	0.26x10 ⁻⁴
tertiary education	-0.0041	0.0139	-0.0155	-0.0063	0.0052	0.0004	-0.0027
unemployed	-0.80x10 ⁻⁴	0.0146	0.0152	0.0022	-0.0076	-0.0025	0.0043
retired	-0.0027	-0.0021	0.0168	-0.0003	-0.0047	-0.0130*	0.0040
self_empl with employees.	0.0103**	0.0101	0.0307*	0.0268*	-0.0077	0.0110	0.0320*
self_empl no employees.	0.0081**	0.0068	-0.0008	0.0135*	0.0084	-0.0005	0.0082
male	0.0035**	0.0077*	0.0125*	0.0058*	0.0072**	0.0089	-0.0034
single	-0.0039*	0.0005	-0.0214**	-0.0116*	0.0034	-0.0089	-0.0007
married/partner	-0.0013	-0.0003	-0.0257**	-0.0061	0.0033	-0.0035	0.0049
born in country	-0.0054**	-0.0040	n.a.	-0.0149*	-0.0105*	0.0070	-0.0030
No of observations	58,967	4,044	6,212	9,457	10,027	3,310	6,097
Pseudo R2	0.092	0.093	0.138	0.130	0.103	0.072	0.135
Prob> chi2	0.000	0.002	0.000	0.000	0.000	0.033	0.000

Table 6 (continued)
Rejected or gained only part of amount applied for in last 3 years (Rejected or rationed)
Average Marginal Effects

Dependent variable: <i>rejourpt</i> Portugal	
net wealth (ln)	-0.0008*
gross income(ln) splines	
under €12,701	0.0040*
€12,702-€22,661	-0.0138
€22,662-€35,141	0.0024
€35,142-€53,254	0.0014
€53,255-€88,418	0.0304
Over €88,418	-0.0105
income-perm.inc (ln)	0.0005*
age splines	
age < 30	-0.0005
age 30-39	-0.0019
age 40-49	0.0006
age 50-64	-0.0008
age 65 +	0.67x10 ⁻⁴
no kids <=6 yrs	0.0059
no kids 7-13	-0.0017
no kids 14-15	0.0038
no kids 16-19	0.0078*
no kids >=20	0.0042
primary education	-0.0015

secondary education	-0.0011
tertiary education	0.0111
unemployed	-0.0031
retired	-0.0021
self_empl with empees.	0.52x10 ⁻⁴
self_empl no empees.	0.0078
male	0.0021
single	0.0057
married/partner	0.0024
born in country	0.0061
No of observations	5,971
Pseudo R2	0.106
Prob> chi2	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia. Constant included. For aggregate model country dummies included, the excluded country dummy is Belgium. Countries not included: Spain, Hungary, Ireland, Malta, Poland, Chechia.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced.

For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on implicate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Indicator=1 if applied, were turned down and no evidence was able to get full amount on later application or applied and not given as much as applied for. Indicator=0 if {[did not apply) or (applied and was not turned down)] or [applied , was turned down and could the amount requested on later application]} and {did not apply or applied and was turned down or applied and was not turned down}

(rejrpt4)Eq12npm_w4_im1_6marg.log

Table 7
Discouraged from applying at least once in last 3 years
Average Marginal Effects

Dependent variable: <i>disc</i>	All Countries	Austria	Belgium	Germany	Estonia	Spain	Finland
net wealth (ln)	-0.0026**	-0.0022**	-0.0023**	-0.0019**	-0.0028**	-0.0041**	-0.0023**
gross income (ln) splines							
under €12,701	0.0073*	0.0325	0.0299	0.0015	-0.0040	0.0043	0.0541*
€12,702-€22,661	-0.0030	-0.0319	0.0416	-0.0488*	0.0094	-0.0858**	-0.0069
€22,662-€35,141	-0.0310**	0.0207	-0.0334	0.0226	0.0384	-0.0007**	-0.0406
€35,142-€53,254	-0.0307**	0.0055	0.0483	-0.0384	-0.0817	0.0364	-0.0072
€53,255-€88,418	-0.0405**	-0.0669	-0.0972*	-0.0141	-0.0212	-0.0823*	-0.0618*
Over €88,419	-0.0120*	0.0068	0.0112	-0.0235	-0.0166	0.0038	-0.0290
income-perm.inc (ln)	0.0004**	0.0002	-0.0016*	0.0011*	0.0007	0.87x10 ⁻⁴	0.0005
age splines							
age < 30	0.0021**	0.0054	0.0006	0.0005	-0.0019	-0.0011	0.0021*
age 30-39	-0.0012**	-0.0029	-0.0009	-0.0008	0.0003	0.0002	0.0003
age 40-49	-0.0007	0.0019	-0.0021	-0.0038**	-0.0019**	-0.0032*	0.0004
age 50-64	-0.0014**	-0.0022	-0.0013	0.0001	-0.0033	-0.0005	-0.0032**
age 65 +	-0.0019**	-0.0019*	-0.0037*	-0.0009	-0.0008	-0.0012	-0.0027*
no kids ≤6 yrs	0.0066**	0.0108	-0.0012	0.0138*	0.0059	-0.0064	0.0127**
no kids 7-13	0.0063	0.0055	0.0116	0.0119*	0.0165	0.0050	0.0063
no kids 14-15	0.0002	0.0088	0.0074	0.0024	0.0050	0.0119	-0.0104
no kids 16-19	-0.0026	-0.0033	-0.0266	0.0049	-0.0036	0.0059	0.0035
no kids ≥20	0.0111**	0.0113	-0.0039	0.0003	0.0374**	0.0136*	0.0154

primary education	-0.0035	0.7401	0.0072	0.0209	0.0421*	-0.0121	0.0612*
secondary education	-0.0083**	0.3285	-0.0059	0.0041	-0.0473	-0.0054	0.0225
tertiary education	-0.0136**	0.6971	-0.0115	-0.0018	-0.0642	-0.0214*	-0.0098
unemployed	0.0293**	0.0179	0.0957*	0.0238	0.0287	0.0384**	0.0467**
retired	-0.0054	0.0136	0.0251	-0.0062	-0.0221	0.0073	-0.0050
self_empl with employees.	0.0249**	n.a.	0.0061	0.0176	0.0564	-0.0010	0.0431**
self_empl no employees.	0.0110**	0.0019	0.0113	0.0206	0.0571	0.0244	0.0004
male	0.0013	0.0101	-0.0059	0.0015	0.0036	0.0098	-0.0037
single	-0.0076**	-0.0164	-0.0092	-0.0131	-0.0424**	-0.0112	-0.0106
married/partner	-0.0087**	-0.0071	-0.0089	-0.0047	-0.0315*	-0.0235**	-0.0143*
born in country	-0.0092**	-0.0115	-0.0029	-0.0129	0.0065	n.a.	-0.0155
No of observations	58,585	2,256	2,089	4,044	2,179	6,212	9,457
Pseudo R2	0.113	0.210	0.214	0.179	0.120	0.179	0.185
Prob> chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 7 (continued)
Discouraged at least once in last 3 years
Average Marginal Effects

Dependent variable: <i>disc</i>	France	Greece	Italy	Portugal
net wealth (ln)	-0.0033**	-0.0026**	-0.0015*	-0.0043**
gross income (ln) splines				
under €12,701	0.0068	- 0.0020	0.0013	-0.0093
€12,702-€22,661	-0.0547**	-0.0111	-0.0007	0.0271
€22,662-€35,141	-0.0160	-0.0844*	-0.0151	-0.0672**
€35,142-€53,254	-0.1009**	0.0295	-0.0333	-0.0014
€53,255-€88,418	-0.0149	-0.0904	-0.0002	-0.0383
Over €88,418	0.0115	n.a.	-0.0069	0.0274
income-perm.inc (ln)	0.0004	0.0005	-0.0003	-0.0002
age splines				
age < 30	0.0005	0.0064*	0.0079	0.0156
age 30-39	0.0009	-0.0032*	0.0001	-0.0067*
age 40-49	-0.0023*	0.0024	-0.0013	0.0015
age 50-64	-0.0009	-0.0030*	-0.0002	-0.0026**
age 65 +	-0.0013	-0.0053*	-0.0023**	-0.0012
no kids <=6 yrs	0.0099*	0.0067	-0.0149	0.0062
no kids 7-13	0.0079*	0.0125	-0.0112	-0.0006
no kids 14-15	0.0043	-0.0057	-0.0009	-0.0176
no kids 16-19	0.0047	-0.0169	-0.0160*	-0.0075
no kids >=20	0.0197**	0.0104	0.0034	0.0133**
primary education	-0.0045	0.0017	0.0051	-0.0039

secondary education	-0.0037	0.0103	-0.0044	-0.0078
tertiary education	-0.0150*	-0.0111	-0.0045	0.0034
unemployed	0.0119	0.0196	-0.0024	0.0339*
retired	-0.0048	0.0054	0.0002	0.0010
self_empl with employees.	0.0029	-0.0168	0.0293*	0.0119
self_empl no employees	0.0051	0.0157	0.0027	0.0143
male	0.0011	0.0005	-0.0002	0.0081
single	0.0028	-0.0096	-0.0073	0.0125
married/partner	-0.0026	0.0064	-0.0082	-0.0132
born in country	-0.0119	0.0278**	0.0045	-0.0056
No of observations	10,027	3,269	5,715	5,971
Pseudo R2	0.124	0.090	0.065	0.100
Prob> chi2	0.000	0.000	0.000	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia. Constant included. For aggregate model country dummies included, the excluded country dummy is Belgium. Countries not included: Spain, Hungary, Ireland, Malta, Poland, Chechia.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced. For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on implicate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Indicator=1 if in last three years household considered applying but decided not to thinking application would be rejected. Indicator=0 if in last three years household did not consider applying but decided not to because thought application would be rejected.

(disc) Eq12npm_w4_im1_6marg

Table 8
Rejected or gained only part of amount applied for, conditional on making an application in last 3 years
Average Marginal Effects

Dependent variable <i>rejless</i>	All Countries
net wealth (ln)	-0.0037**
gross income (ln) splines	
under €12,701	-0.0010
€12,702-€22,661	-0.0703**
€22,662-€35,141	-0.0566
€35,142-€53,254	-0.0576*
€53,255-€88,418	-0.0828**
over €88,418	-0.0376**
income-perm.inc (ln)	0.0018**
age splines	
age < 30	0.0032
age 30-39	-0.0007
age 40-49	-0.0019
age 50-64	-0.0012
age 65 +	0.0027*
no kids <=6 yrs	0.0199**
no kids 7-13	0.0177**
no kids 14-15	-0.0036
no kids 16-19	-0.0111

no kids >=20	0.0120
edu2	-0.0022
edu3	-0.0313**
edu5	-0.0259*
unemployed	0.0539**
retired	-0.0128
self_empl with employees	0.0283*
self_empl no employees	0.0306**
gender	0.0181**
single	-0.0094
married/partner	-0.0123
born in country	-0.0502**
No of observations	12,481
Pseudo R2	0.112
Prob> chi2	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia. Constant included. For aggregate model country dummies included, the excluded country dummy is Belgium. Countries not included: Spain, Hungary, Ireland, Malta, Poland, Chechia.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced.

For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on impecate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Indicator=1 if applied and turned down or did not get as much as applied for. Indicator =0 if applied and was not turned down and did get what applied for. Sample: HHs that applied in last 3 years.

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Table 9 Regional Differences

Average Marginal Effects

	Made an application for credit in the last 3 years (a)			Rejected or gained only part of amount applied for, or discouraged (Constrained) (b)		
	Northern	Mediterranean	Eastern	Northern	Mediterranean	Eastern
net wealth (ln)	-0.0071**	-0.0045**	-0.0063**	-0.0330**	-0.0029**	-0.0039**
gross income (ln) splines						
under €12,701	-0.0066	0.0083	0.0311*	0.1604*	-0.0052	0.0164*
€12,702-€22,661	0.1378**	0.0573**	0.0887**	-0.3081*	0.0024	-0.0224
€22,662-€35,141	0.1077**	0.0524*	0.0268	-0.2020	-0.0403*	-0.0568*
€35,142-€53,254	0.0940**	-0.0308	0.1263**	-0.4273**	-0.0109	-0.0074
€53,255-€88,418	0.0550**	0.0007	0.0797	-0.3374**	-0.0474*	-0.0844*
Over €88,418	0.0017	0.0040	-0.0474	-0.2242**	0.0020	0.0626*
income-perm.inc (ln)	-0.0007	0.0010*	0.0004	0.0045	0.0001	0.0017**
age splines						
age < 30	0.0014	0.0145**	0.0066**	0.0391**	0.0069**	-0.0006
age 30-39	-0.0060**	-0.0052**	-0.0083**	-0.0189**	-0.0026*	-0.0011
age 40-49	-0.0048**	-0.0022	-0.0039*	-0.0117	0.0006	-0.0023*
age 50-64	-0.0085**	-0.0046**	-0.0066**	-0.0163**	-0.0020**	-0.0028**
age 65 +	-0.0104**	-0.0065**	-0.0095**	-0.0242**	-0.0021**	-0.0032**
no kids <=6 yrs	0.0246**	0.0087	0.0043	0.1208**	0.0065	0.0029
no kids 7-13	0.0048	0.0037	-0.0035	0.0907**	0.0019	0.0119*

no kids 14-15	-0.0084	0.0140	0.0010	0.0035	-0.0050	-0.0054
no kids 16-19	0.0095	0.0008	0.0007	0.0279	-0.0051	0.0012
no kids >=20	0.0178**	0.0187**	0.0208**	0.0987*	0.0103**	0.0239**
edu2	0.0104	0.0008	-0.0276	0.0146	-0.0010	-0.0213
edu3	0.0302**	-0.0037	-0.0134	-0.1077*	-0.0012	-0.0306
edu5	0.0217	-0.0026	-0.0244	-0.2455**	-0.0023	-0.0242
unemployed	-0.0621**	-0.0346**	-0.0379**	0.3415**	0.0190*	0.0027
retired	0.0129	-0.0053	0.0104	-0.0659	-0.0037	0.0152
self_empl with employees.	0.0377**	0.0273**	0.0162	0.2492**	0.0178*	0.0360*
self_empl no employees.	0.0360**	-0.0011	0.0177	0.1520**	0.0070	0.0330*
gender	0.0117*	0.0161**	-0.0029	0.0160	0.0031	0.0070
single	-0.0645**	-0.0279**	-0.0510**	-0.0957*	-0.0104*	-0.0178*
married/partner	-0.0066	-0.0154*	-0.0311**	-0.1246**	-0.0074	-0.0003
born in country	0.0445**	0.0006	0.0104	-0.1921**	0.0048	-0.0043
No of observations	31,935	16,696	10,336	31,935	16,370	10,336
Pseudo R2	0.138	0.141	0.181	0.140	0.068	0.102
Prob> chi2	0.000	0.000	0.000	0.000	0.000	0.000

Table 9 Regional Differences (contd)

	Rejected or gained only part of amount applied for in last 3 years (Rejected or rationed) (c)			Discouraged at least once in last 3 years (d)		
	Northern	Mediterranean	Eastern	Northern	Mediterranean	Eastern
net wealth (ln)	-0.0009**	-0.0008**	-0.0018**	-0.0025**	-0.0024**	-0.0029**
gross income (ln) splines						
under €12,701	0.0061	-0.0022	0.0034	0.0117	-0.0048	0.0149*
€12,702-€22,661	-0.0021	-0.0104	-0.0112	-0.0226*	0.0126	-0.0252
€22,662-€35,141	-0.0076	-0.0024	-0.0148	-0.0171	-0.0489**	-0.0340
€35,142-€53,254	-0.0116	-0.0017	0.0192	-0.0350**	-0.0119	-0.0469
€53,255-€88,418	-0.0053	0.0367	-0.0378	-0.0350**	-0.0198	-0.0580
over €88,418	-0.0072*	-0.0011	0.0394*	-0.0167**	-0.0012	0.0507
income-perm.inc (ln)	0.0003*	0.0004	0.0007*	0.0002	-0.0001	0.0014**
age splines						
age < 30	0.0011**	0.0026	0.0004	0.0026**	0.0055**	0.58x10 ⁻⁴
age 30-39	-0.0004	-0.0007	-0.0012	-0.0011**	-0.0020*	-0.0011
age 40-49	-0.0008*	0.0015	-0.0004	-0.0008	-0.0005	-0.0018
age 50-64	-0.0005	-0.0007**	-0.0018**	-0.0014**	-0.0016**	-0.0017*
age 65 +	-0.0009**	-0.0001	-0.0012	-0.0017**	-0.0019**	-0.0022**
no kids <=6 yrs	0.0034*	0.0065**	0.0040	0.0087**	0.0003	0.0032
no kids 7-13	0.0011	0.0006	0.0061	0.0070**	0.0013	0.0078
no kids 14-15	-0.0011	0.0016	-0.0025	0.0019	-0.0057	0.0035

no kids 16-19	0.0007	0.0049*	0.0056	0.0020	-0.0109*	-0.0021
no kids >=20	0.0002	0.0042**	0.0074*	0.0093**	0.0074**	0.0209**
edu2	-0.0013	0.0049	-0.0174*	0.0043	-0.0043	-0.0179
edu3	-0.0038	0.0016	-0.0193	-0.0061	0.0003	-0.0251
edu5	-0.0063*	0.0060	-0.0181	-0.0162**	-0.0017	-0.0216
unemployed	-0.30x10 ⁻⁴	0.0005	-0.0062	0.0395**	0.0188*	0.0028
retired	-0.0042	-0.0026	0.0023	-0.0008	-0.0022	-0.0214**
self_empl with employees.	0.0110*	0.0091	0.0091	0.0255**	0.0121	0.0377*
self_empl no employees.	0.0107**	0.0022	0.0113	0.0084	0.0071	0.0256
gender	0.0046**	0.0009	0.0051	-0.0008	0.0031	-0.0039
single	-0.0048*	-0.0005	-0.0050	-0.0059	-0.0102*	-0.0176**
married/partner	-0.0021	0.0016	0.0039	-0.0107**	-0.0087*	-0.0021
born in country	-0.0092**	0.0021	0.0039	-0.0158**	0.0052	0.0038
No of observations	31,935	16,696	10,336	31,935	16,314	10,336
Pseudo R2	0.095	0.082	0.100	0.150	0.068	0.100
Prob> chi2	0.000	0.000	0.000	0.000	0.000	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Northern countries are: Austria, Belgium (base), Germany, Finland, France, Luxembourg, Netherlands. Mediterranean countries are: Cyprus (base), Greece, Italy, Portugal. Eastern countries are: Estonia (Base), Croatia, Lithuania, Latvia, Slovenia, Slovakia. Country dummies included. Constant included.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick /maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced.

For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on impecate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference.

Table 10
Including Institutional factors (All countries)
Average Marginal Effects

	Made application In last 3 years	Rejected or gained only part or discouraged	Applied, rejected or gained only part	Discouraged	Applied, rejected or gained only pt. vs applied and not rej. and gained. all
net wealth (ln)	-0.0059**	-0.0030**	-0.0009**	-0.0024**	-0.0036**
gross income (ln) splines					
under €12,701	0.0121	0.0079*	0.0003	0.0068*	-0.0027
€12,702-€22,661	0.1105**	-0.0111	-0.0069	-0.0055	-0.0894**
€22,662-€35,141	0.0859**	-0.0349**	-0.0068	-0.0325**	-0.0658*
€35,142-€53,254	0.0787**	-0.0309**	-0.0067	-0.0329**	-0.0709*
€53,255-€88,418	0.0578**	-0.0484**	-0.0163**	-0.0413**	-0.1013**
Over €88,419	0.0115	-0.0083	-0.0032	-0.0061	-0.0379**
income-perm.inc (ln)	-0.0002	0.0005**	0.0003**	0.0003	0.0017**
age splines					
age < 30	0.0031**	0.0029**	0.0010**	0.0022**	0.0036*
age 30-39	-0.0066**	-0.0017**	-0.0006*	-0.0011**	-0.0009
age 40-49	-0.0032**	-0.0009*	-0.0005*	-0.0007	-0.0024*
age 50-64	-0.0065**	-0.0020**	-0.0009**	-0.0015**	-0.0022*
age 65 +	-0.0087**	-0.0024**	-0.0007**	-0.0020**	0.0021
no kids <=6 yrs	0.0210**	0.0084**	0.0038**	0.0061**	0.0168**
no kids 7-13	0.0069*	0.0075**	0.0014	0.0062**	0.0147**
no kids 14-15	0.0039	-0.0024	-0.0013	0.0002	-0.0101
no kids 16-19	0.0042	-0.0017	0.0015	-0.0035	0.0055
no kids >=20	0.0186**	0.0133**	0.0033**	0.0117**	0.0104
primary education	-0.0157*	-0.0073*	-0.0011	-0.0076*	-0.0016

secondary education	-0.0184**	-0.0134**	-0.0022	-0.0117**	-0.0193
tertiary education	-0.0202**	-0.0151**	-0.0009	-0.0135**	-0.0048
unemployed	-0.0543**	0.0271**	-0.0005	0.0283**	0.0570**
retired	-0.0182**	-0.0078*	-0.0025	-0.0063	-0.0086
self_empl with employees.	0.0307**	0.0260**	0.0089*	0.0240**	0.0256
self_empl no employees.	0.0262**	0.0135**	0.0066**	0.0100**	0.0215
male	0.0144**	0.0037*	0.0033**	0.0024	0.0155**
single	-0.0450**	-0.0109**	-0.0047**	-0.0086**	-0.0180*
married/partner	-0.0138**	-0.0082**	-0.0012	-0.0088**	-0.0121
born in country	0.0272**	-0.0132**	-0.0056**	-0.0106**	-0.0483**
time to enforce contracts	-0.0002**	-0.20x10 ⁻⁴ **	-0.61x10 ⁻⁷ **	-0.18x10 ⁻⁴ **	0.62x10 ⁻⁴ **
private bureau coverage	-0.0011**	0.58x10 ⁻⁴ *	0.36x10 ⁻⁴ *	0.13x10 ⁻⁴	0.0005**
public bureau coverage	0.98x10 ⁻⁴ *	0.63x10 ⁻⁴ *	0.26x10 ⁻⁴	0.36x10 ⁻⁴	-0.0001
depth of bureau coverage	0.0041**	-0.0044**	-0.0016**	-0.0034**	-0.0096**
adequacy of benefits	-0.0035**	0.0006**	0.0001	0.0004**	0.0017**
No of observations	58,967	58,641	58.967	58,585	12,481
Pseudo R2	0.156	0.101	0.079	0.104	0.0800
Prob> chi2	0.000	0.000	0.000	0.000	0.000

Figures are average marginal effects from a probit model. Std errors estimated using the delta method.

Countries included in aggregate model: Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Portugal, Slovenia, Slovakia. Constant included. Countries not included: Spain, Hungary, Ireland, Malta, Poland, Chechia.

Constant included in all equations. Age and real income: as gradient splines (same knots for all countries). Knots for income are: (in EURO) 12,701, 22,661, 35,141, 53,254, 88418. Net wealth, gross income and income less permanent income in Euro at current (2021) prices. Excluded categories: Education: Primary or below; Labour Status: doing regular work for pay/self-employed/working in family business, on sick/maternity/other leave planning to return, permanently disabled, student/pupil/unpaid intern, compulsory military or equivalent social service, fulfilling domestic tasks, other not working for pay; employment status: employee and working, unpaid family worker and working; not working; Marital Status: widowed or divorced.

For income-permanent income: $\ln x = \ln(x+1)$ if $(x \geq 0)$; $\ln x = -\ln(-x+1)$ if $(x < 0)$. Results based on impecate 1 only. Marginal effects computed at the means of the covariates: for continuous variables $\frac{\partial y}{\partial x}$; for each dummy variable: discrete first difference. Eq12npm_w4_im1_8marg.log

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