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Abstract

In this study we disentangle the effect of roots from other confounding factors to explain differences in immigrants' outcomes in the mortgage market. Using loan-level data from the Spanish Credit Register complemented with data on securitized mortgages over a complete financial cycle, we identify that foreign-born borrowers with shallow roots to the host country pay higher mortgage rates at origination than similar debtors that are better-settled. We also find that weak roots are associated with higher default rates and with greater incentives to go into default in negative equity situations. Overall, we show that rootedness explains differential loan conditions at origination and default behavior in mortgages. From a policy perspective, our results have important implications for understanding the potential consequences of moving away from recourse mortgage regimes, and for the effectiveness of macroprudential policy.

Keywords: immigrants, mortgage terms, recourse mortgages, roots, strategic default.

JEL classification: C25, J15, G21, R20, R30.

Resumen

En este estudio identificamos diferencias en las condiciones de las hipotecas asociadas al arraigo de los prestatarios tras separar este efecto de otros factores que explican dichas condiciones. Para esto usamos datos de préstamos hipotecarios en España de la Central de Información de Riesgos, complementados con datos de hipotecas titulizadas para un ciclo financiero completo. Identificamos que los prestatarios extranjeros con poco arraigo pagan tipos de interés más altos que aquellos con mayores vínculos en el país. También encontramos que un bajo nivel de arraigo está asociado con tasas más altas de impago y con mayores incentivos a no continuar pagando la deuda hipotecaria ante situaciones de patrimonio neto negativo. En general, identificamos que el arraigo es un factor muy relevante que explica las diferencias en las condiciones de las hipotecas en el momento de su concesión, así como las decisiones de impago. Desde el punto de vista de la política, nuestros resultados tienen importantes implicaciones para el entendimiento de las consecuencias de transitar hacia un régimen de dación en pago, y para la efectividad de la política macroprudencial.

Palabras clave: arraigo, dación en pago, hipotecas, inmigrantes, impago estratégico.

Códigos JEL: C25, J15, G21, R20, R30.

I. Introduction

Rootedness, defined as the integration and attachment of citizens in a society, has been identified to reduce the gaps between native- and foreign-born residents in host countries in terms of financial vulnerability, labor conditions, education level, economic stability and credit scores (Clark and Blue, 2004; Duleep and Regets, 1999; Osili and Xie, 2009). Although these factors are very likely to be related to default risk and mortgage pricing, rootedness has been ignored in previous studies identifying differences in the mortgage conditions faced by immigrants among other minorities (Cheng et al., 2015; Bayer et al., 2016, 2018). This leads some authors to interpret any difference in mortgage terms between foreign- and native-born borrowers as discrimination (Bartlett et al., 2022; Diaz-Serrano and Raya, 2014).

Against this background, we show that rootedness is a relevant factor that explains outcomes in the mortgage market. In particular, we identify that mortgage conditions and default propensity are not the same among groups of foreign debtors that are only different in terms of their roots to the host country. We derive two relevant results from this finding. First, well-settled foreign borrowers pay lower rates at origination than similar debtors with shallow roots to the country. Second, weak roots are associated with higher default rates and with a change in the incentives to go into default in the group of high-income foreigners, who we find to be more prone to default than high-income nationals in negative equity situations (i.e. when the value of the house drops below the mortgage balance). We take this result as indicative of the presence of a strategic component in the default decisions of these debtors.

To investigate how rootedness affects mortgage pricing, we use loan-level data from the Spanish Credit Register covering a complete financial cycle between 2004 and 2019. We complement this database with a large repository of securitized mortgages in order to explore the effect of roots on the incentives to go into default.[1] Spain represents an ideal "laboratory" for testing the role of rootedness in mortgage outcomes for two reasons. On the one hand, and unlike other countries, the history of immigration in Spain is relatively recent, as the country started to experience large immigration flows in the decade prior to the global financial crisis. The vast majority of foreigners in Spain were newcomers in that period, so at that time they had little ties to the country.[2] On the other hand, the real estate crisis in Spain (2008-2013), in which house prices dropped around 40% from the peak, provides a good testing ground to examine how rootedness is linked to defaults and borrowers' strategic behavior. In fact, the crisis evidenced large outflows of migrants, mostly composed by immigrants going back to their home countries. Izquierdo et al. (2016) document that 6% of foreigners left Spain during that period compared to only 0.1% of Spaniards, which is

[1] This is because the credit register does not contain reliable information on the LTV at origination of mortgages extended in the boom years, which are key to study defaults during the housing burst, when negative equity arose in some segments of the mortgage market, potentially changing incentives to default.

[2] According to the National Statistic Office, from 1999 to 2007 the number of foreigners increased by six times, from 2% to 11% of total population.

mainly attributed by the authors to the higher costs of moving abroad that the latter group faced. Finally, the fact that in Spain mortgages are, with few exceptions, full recourse (i.e. the lender may go after the borrower's other assets or income to collect the debt due in case of default) adds interest to the study of the default behavior of borrowers, as incentives to go into default are in theory lower for these loans.[3]

Our results suggest that roots are a key determinant of the differences in mortgage pricing and risk between foreign- and native-born borrowers. We find that foreigners face higher costs in mortgages at origination, and more importantly, that the strength of roots is a key factor that explains differences in mortgage conditions among these borrowers. In particular, non-resident foreigners, who are less attached to the country than resident foreigners, are charged with the highest spread with respect to natives; while foreign-born borrowers granted with the citizenship or that have co-signed a mortgage with a national citizen, which are clear signs of deeper roots, are charged with the lowest spread against natives.

Moreover, we identify not only that foreign borrowers are more prone to default, a result in line with findings in other papers (Lin et al., 2016), but also that negative equity is a key trigger for defaults in high-income foreign borrowers. Certainly, this group of borrowers may share certain socioeconomic characteristics typically associated with strategic defaults, such as lower mobility costs, lower utility from home ownership, and less concerns about losing access to bank credit in the future or social stigma (Ghent and Kudlyak, 2011; Bhutta et al., 2017). We also document that defaults in high-income foreigners are only triggered when negative equity reaches certain levels, which is consistent with findings in previous studies (see Foote et al., 2008). Finally, we show that borrowers may internalize the degree of effectiveness of recourse of banks, and that they adjust their default decisions accordingly.[4] On the lenders side, this result may also explain the higher costs of mortgages charged to foreigners, even to those wealthier.

The contribution of our study is twofold. First, we bridge the literature on discrimination as one of the main factors explaining the higher cost of mortgages faced by minorities and foreign-born borrowers (Bayer et al. 2018; Bartlett et al., 2022; Cheng et al, 2015; Diaz-Serrano and Raya, 2014), and studies identifying that deeper roots of immigrants attenuate segregation and lead to greater economic stability, better credit scores and lower default propensity (Duleep and Regets, 1999; Lin et al., 2016). In this context, we point out that rootedness is a very relevant driver of the interest rates spreads between nationals and non-nationals.[5] We also expand this literature by

[3] The principle of personal and unlimited liability of the mortgage debtor is well-stablished in Spain by the Civil Code (SCC, art. 1911) and by the Spanish mortgage law (SML, art. 105). While the SML recognizes (art. 140) that lenders and borrowers can reach an agreement to limit the personal liability of the latter, non-recourse loans are quite uncommon in practice. Royal Decree Law 6/2012, on urgent protection measures for mortgage debtors without resources, introduced several initiatives aimed at avoiding the foreclose sale in case of default. Law 1/2013 introduced some measures to strengthen the protection of mortgage debtors too. These measures, however, are exceptions to "recourse" and do not involve a change in the mortgage legal regime in place.

[4] This result should be taken with caution as we do not have much heterogeneity regarding banks' effective recourse in the sample.

[5] In this regard, Bartlett et al. (2022) argue that minorities pay higher spreads in the U.S. no matter whether lending materializes in face-to-face decisions or in algorithmic scoring albeit algorithmic scoring reduces discriminatory lending practices, according to the authors. However, the paper gives no consideration to borrowers' rootedness, which may explain part of the differences in lending conditions between minorities and other groups.

explicitly accounting for different measures of rootedness related to the legal, sentimental and residence status of foreigners, which allows us to isolate the strength of their roots to the host country from other features that drive debtors' creditworthiness.

Second, we are the first study to uncover the role of rootedness in incentives to default and strategic behavior. The literature on strategic defaults has identified that relocation costs, social stigma, fears of reduced access to credit in the future, and emotional attachment to their own homes prevent borrowers from defaulting strategically (Guiso et al., 2013; Bhutta et al., 2017; Foote and Willen, 2018). Other papers also show that the propensity to default strategically under recourse regimes is higher for borrowers with lower transaction costs and lower utility from home ownership (Ghent and Kudlyak, 2011; Rhee, 2018). However, none of these studies have explicitly accounted for the strength of borrowers' roots as a determinant of default decisions. In this context, we account not only for rootedness but also for its relation with income to identify differences between native- and foreign-born borrowers in terms of strategic default decisions, which can also be linked to differences in socioeconomic factors typically associated with strategic defaults.

Overall, our findings have relevant implications for policy and financial stability. First, enhancing immigrants' rootedness could reduce credit risk in these borrowers, which would help to close the gap with respect to natives in terms of mortgage conditions and to increase their accessibility to credit, while improving the stability in the financial system. Second, we prove that weak roots may lead to strategic default behavior even in a recourse mortgage regime, where usually the incidence of this type of defaults is much lower (Moody´s, 2013). This could have implications for the effectiveness of macroprudential policy, especially for borrower-based tools such as loan-to-value limits, which may work differently for distinct types of borrowers on the basis of their roots. Relatedly, our results shed light on the implications of moving away from recourse regimes and adopting features of non-recourse frameworks.[6] Since we find that wealthy borrowers with shallow roots are more prone to default strategically, the adoption of a non-recourse regime may extend this behavior to other debtors by lowering default costs. This in turn may lead to higher rates at mortgage origination, should this behavior is internalized by lenders, a conclusion aligned with some previous studies (Ghent and Kudlyak, 2011; Li and Oswald, 2019). Finally, our paper warns on the risk of misinterpreting the informational content of the spread of foreigners against nationals, which may capture risk factors of borrowers embedded in rootedness. This is important in light of the ample literature on discrimination in the mortgage market (see, Bartlett et al., 2022).

The remainder of this article is organized in 7 sections. In Section 2 we provide a brief literature review. In Section 3 we describe the databases used. In Section 4, we present our hypothesis on the relation between rootedness and mortgage pricing, and outline the identification strategy. In

[6] Since the global financial crisis, there has been a vivid public debate on the possibility of introducing core aspects of non-recourse regimes in the legal framework of mortgages in Spain and other European countries, where the vast majority of mortgages are recourse (Andritzky (2014))

Section 5, we develop our hypotheses on the effects of roots on default risk and strategic default decisions, and present the empirical strategy for the identification of these effects. In section 6, we analyze the main results. In Section 7 we provide some robustness exercises. Finally, we conclude and discuss some policy implications in Section 8.

II. Literature Review

2.1. Discrimination and rootedness in the mortgage market

A branch of recent research on mortgage conditions has focused on the identification of discrimination of minorities in the credit market. Most of these studies focus on the US mortgage market where data on the ethnicity of borrowers is available. In general, they find that minorities face higher rates in mortgages. Using data from the U.S. Survey of Consumer Finance, Cheng et al. (2015) find that black borrowers pay, on average, 29 basis points (bps) more than comparable white borrowers. Ghent et al. (2014) study discrimination in the US subprime market and find that Blacks and Hispanics are subject to adverse pricing. Although discrimination cannot be excluded, they argue that this is mainly due to the fact that these groups live in low-income neighborhoods, which lead lenders to internalize the financial vulnerabilities of these groups. They also mention other factors such as lack of competition in the mortgage market in certain minority neighborhoods, segmentation of the mortgage market, and lower ability of minorities to compare across sets of loan terms. Bayer et al. (2018) study racial and ethnic differences in high-cost mortgage lending in diverse US metropolitan areas. The authors identify that Blacks and Hispanics are between 78% and 103% more likely to receive high-cost mortgages than white borrowers after controlling for credit score and other risk factors. However, they argue that these higher costs are explained by the lender risk profile. That is, minorities tend to do business with lenders who specialize in providing high-risk loans in terms of both observable risk factors and unobserved foreclosure risk. Focusing on immigrants, Diaz-Serrano and Raya (2014) identify that foreign borrowers in Spain face higher spreads in mortgages with respect to nationals after controlling for borrowers' characteristics, and that those differences are explained by unobserved factors attributable to discrimination.

Certainly, several studies have found not only that minorities face higher costs but also that these borrowers present higher default rates. Gerardi and Willen (2008) identify that African American and Latino households in the US are 3 and 2 times more likely to experience a foreclosure compared to whites, respectively. Bayer et al. (2016) also find that these two minority groups are more likely to experience delinquencies and foreclosures due to their higher vulnerability to adverse shocks. The few studies trying to separate immigrants from other racial minorities have found that although both groups have higher default risk than white native borrowers, there are significant differences between them. Allen (2011) finds that the odds of native-born minority

households experiencing a foreclosure are 5 times the odds of native-born white households in the US, while for Hispanic foreign-born households the odds are 3 times larger than those of native-born white households. Interestingly, the authors find that when the sample is restricted to refinanced mortgages, the odds move in the opposite direction only for Hispanic households. The authors identify that foreign-born households within this group are those with the longest time of residence in the US.

Certainly, the duration of residence in a host country has been identified to be a key variable explaining the size of gaps between natives and immigrants. In particular, time of residence in the US has been found to be positively associated to higher investment in human capital and higher earnings (Duleep and Regets, 1999; Hu, 2000). Differences between immigrants and natives in monetary and time contribution toward the private provision of public goods and in the reception of benefits from nongovernment sources have also been found to decrease significantly with the time of stay in the US (Osili and Xie, 2009). Clark and Blue (2004) also find that the time of residence is positively correlated with greater economic stability and better credit scores.

In this context, to the best of our knowledge, Lin et al. (2016) is the only study explicitly modeling duration of residence as a variable that may explain mortgage default risk of immigrants. The authors find that the time of residence of immigrants in the US has a significant relationship to mortgage defaults. In particular, default risk decreases significantly for immigrants with the longest time of residence, being similar to that of native borrowers for immigrants with more than 20 years of residence. However, they don't analyze whether the time of residence is also reflected in mortgage conditions at origination or to the triggers for default. Although the authors argue that integration is a key driver behind this result, they don't study roots explicitly, which goes beyond the time of residence and is closely related to how strong are the ties of immigrants and how well-settled they are in the host country. In this context, we identify factors such as the residence status, having obtained the citizenship, and co-signing the mortgage with a native-born citizen, which reflects the existence of personal ties in the host country.

2.2. Negative equity and strategic default

Early theoretical work on mortgage defaults grew out of the Black–Scholes–Merton model of derivatives pricing, where a borrower decides to default when the value of the property falls below the outstanding debt amount, leading to a negative equity situation (Vandell, 1995). This is referred as strategic default because a borrower with positive equity could always avoid defaulting by selling the property and paying off the mortgage. However, empirical work has evidenced that negative equity is not a sufficient condition to default, and that adverse life events such as job loss or negative income shocks are a necessary condition in most cases of defaults. This idea is reflected in the double-trigger model of default, which stresses the relevance of adverse life events

besides negative equity to explain defaults (Deng et al. 2000; Foote et al., 2008; Campbell and Cocco, 2015).

This would explain why empirically it has been found that most of defaults are observed in borrowers with barely negative equity (Foote and Willen, 2018). Bhutta et al. (2010) study securitized non-prime mortgages with negative equity and identify that 80% of defaults are caused by a double trigger situation. Likewise, by using information on consumption, Gerardi et al. (2018) identify that households experiencing a double trigger situation present default rates between 3 and 5 times higher than those experiencing only either a negative equity or a "can't pay" situation. They also find that the default rate for households that can pay down their mortgage and experience negative equity is very low (about 4%). In this regard, Bhutta et al. (2010) identify that transaction costs may prevent borrowers from defaulting strategically. Moreover, Bhutta et al. (2017) study strategic defaults during the last global financial crisis in the US and conclude that, beyond purely economic transaction costs, nonfinancial costs derived from emotional and behavioral factors explain why borrowers decide not to walk away in deep negative equity situations, even under nonrecourse regimes. After studying household surveys, Guiso et al. (2013) also identify that social attitudes are a relevant factor explaining strategic default decisions. In this context, Foote and Willen (2018) argue that moving costs, fears of reduced access to credit in the future, sentimental attachment to their homes, and social stigma prevent borrowers from defaulting strategically, and explain why a large portion of borrowers with deep negative equity decide not to default. The authors argue that the concept of transaction costs may also encompass these socioeconomic factors. All these factors may be related to rootedness in the specific case of immigrants, thereby affecting their risk profile and their default decisions.

Some other studies have tried to identify specific groups of borrowers that are more prone to default strategically. Ghent and Kudlyak (2011) compare borrowers in recourse and non-recourse states in the US and find that wealthy borrowers in non-recourse states are the most likely group to default in response to negative equity. Under a theoretical framework, Rhee (2018) identify that borrowers with low surplus from home ownership face a high value of their default options, thereby obtaining large benefits from defaulting strategically in non-recourse regimes. The authors further suggest that high-income borrowers are those more likely to face low surplus from home ownership. Nonetheless, besides income, some specific characteristics associated to rootedness may make immigrants that are not well-settled in the host country to get low utility from home ownership, suggesting that this group of borrowers may be more prone to default strategically.

Finally, given that strategic default is linked to the ability of lenders to pursue a deficiency judgment in recourse regimes, some literature has focused on differences in mortgage conditions between recourse and non-recourse regimes. In this regard, Ambrose and Sanders (2005) find that, in non-recourse states in the US, high-LTV mortgages are charged 33 bps higher than those

of similar characteristics in recourse states. Woodward (2008) find that the spread may reach 74 bps when comparing mortgages in recourse and non-recourse states. These results suggest that the tighter conditions of mortgages under non-recourse regimes may incorporate the higher risk of these mortgages due to the strategic default decisions.

III. Data

3.1. Central Credit Register

The Spanish Central Credit Register (*Central de Información de Riesgos*, CIR hereinafter) is a confidential register owned and managed by the Bank of Spain, which contains in-depth information collected by financial intermediaries about their customers. This information is reported on a monthly basis to the Bank of Spain at the loan level, and without any declaration threshold since 2013.[7] CIR reports information of all loan incumbents, their nature (borrowers, guarantors, etc.), and their corresponding risks.

Specifically, CIR provides information relative to the bank that granted the loan, the origination date, the amount drawn and other credit commitments (if any), loan conditions at origination (maturity, loan amount, type of interest rate –adjustable, fixed- and its level), the purpose of the loan, the number of borrowers, the number of guarantors, the type of loan collateral (if any), and the default status of the loan, among others. CIR also provides information about borrowers' credit risk history (from its previous credit records, if any) and the number of bank relationships of borrowers.

CIR also covers some borrower's characteristics, such as date of birth, gender, labor status, and legal status (natural or legal person).[8] Moreover, information about the postal code where the credit is granted is also available in CIR. This allows us to proxy for some information not available in this dataset such as borrowers' income (which is a very important source of borrowers' risk variability), by matching the postal code of each mortgage with data on average income by census tract, as reported by the Spanish Tax Agency. Borrowers' nationality and country of birth are also reported in CIR. These last two variables are crucial for our identification strategy, as we will show in the next section.

Our working hypothesis is based on the idea that differences in borrowers' roots could involve differences in credit risk. Indeed, we hypothesize that credit institutions internalize information on how well-settled borrowers are when pricing mortgages. To test the validity of this hypothesis, we need to identify borrowers' rootedness and analyze how it affects mortgage pricing.

[7] Before that year the declaration threshold was EUR 6,000 for Spanish residents and EUR 300,000 for non-residents.

[8] Labor status is not updated every month by credit institutions when reporting to CIR. It is considered a variable inherent to the borrower and it can change over time based on the declarations made by banks when receiving new information from their costumers regarding this feature. Since this variable is not reported on a regular basis it gives us only accurate information about the labor status of the borrower at origination.

We consider mortgages originated between 2004 and 2019 to encompass a complete financial cycle.[9] Moreover, to ensure homogeneity in terms of credit risks determinants, we only include mortgages granted to individuals to purchase their main residence, and we exclude novation agreements and refinanced mortgages from the analysis. We also disregard mortgages

Table 1. Descriptive Statistics – CIR database

	# Obs	mean			
Foreign share =1	3,171,667	4.4%			
	Non foreigners		**Foreigners**		
Borrower characteristics	*N*	*mean*	*N*	*mean*	t-test Pr(t)>|t|
Job Status					
Wage earner=1	3,033,133	68.5%	138,534	73.0%	0.000
Bank Employee=1	3,033,133	3.0%	138,534	0.5%	0.000
Civil Servant=1	3,033,133	13.1%	138,534	2.4%	0.000
Self employed=1	3,033,133	3.0%	138,534	4.5%	0.000
Retired =1	3,033,133	4.4%	138,534	2.7%	0.000
Unemployed=1	3,033,133	3.6%	138,534	4.1%	0.000
Others=1	3,033,133	4.5%	138,534	12.9%	0.000
Age	3,033,133	35.69	138,534	37.09	0.000
Income per household	2,324,886	31298.64	97,357	28867.74	0.000
Loan characteristics at origination					
Number of Borrowers	3,033,133	1.61	138,534	1.63	0.004
Variable Interest rate=1	3,033,133	0.70	138,534	0.66	0.000
Guaranteed loan=1	3,033,133	0.92	138,534	0.95	0.000
Interest rate at origination	3,033,133	2.94	138,534	3.56	0.000
Ln(Principal of the mortgage loan)	3,033,133	11.62	138,534	11.54	0.000
Ln(Maturity of the mortgage loan)	3,033,133	3.26	138,534	3.19	0.000
Credit history characteristics					
Credit records seniority (in years)	3,033,133	5.00	138,534	1.86	0.000
Number of Bank relations	3,033,133	0.88	138,534	0.48	0.000
Credit worthiness =1	3,033,133	19.5%	138,534	11.7%	0.000
Credit worthiness: by years of credit seniority					
0	1,222,509	10.6%	97,680	6.7%	0.000
1	107,965	19.0%	4,991	23.4%	0.000
2	124,530	19.7%	4,704	24.7%	0.000
3	112,741	18.7%	4,381	23.9%	0.000
4	111,852	18.8%	3,441	24.6%	0.000
5	108,883	20.3%	2,561	24.0%	0.000
6	120,832	21.3%	2,416	23.8%	0.000
7	129,364	22.8%	2,525	24.9%	0.000
[8,15)	784,104	29.5%	14,508	21.5%	0.000
>=15	210,353	31.9%	1,327	35.9%	0.000

Note. The table shows descriptive statistics for mortgages originated between 2004 and 2019, using information from the Spanish Credit Register (CIR). Foreign share refers to the percentage of mortgages to foreigners, being a dummy variable that takes the value one if all mortgagors in the loan are foreigners, and being zero otherwise. Non foreigners are mortgages in which at least one of the debtors is a national. Borrowers' characteristics include, on one hand, *Job status*, a set of seven dummies that describe the labor status of the main mortgagor in the loan (Wage-earner, Bank employee, Civil servant, Self-employed, Retired, Unemployed and Other -any other employment status different from the previous ones: students, housewives, etc.). Each dummy takes the value one if the main borrower´s labor status is that of the corresponding job category, otherwise this dummy variable equals zero. Age refers to the average age of mortgagors. Income per household refers to the average income per household in the zip code where the mortgage is located, according to the Spanish Tax Agency. Loan characteristics at origination include the number of borrowers, information about the interest rate (a dummy variable that takes the value one if the loan is an adjustable-rate mortgage and that it is zero otherwise), information about the mortgage collateral (a dummy variable that takes the value one if more than one collateral was pledged, and it is zero otherwise), the interest rate of the mortgage (%), the natural logarithm of the principal amount of the mortgage, the natural logarithm of the maturity of the loan (originally expressed in years. Regarding credit history, the table contains information about the credit records seniority, defined as the number of years in the CIR credit records before mortgage origination (computed as the difference between the origination year and the first year the mortgagor was recorded in CIR); the number of bank relationships the last month of the year prior to mortgage origination (data refers to the main borrower in the loan) and information about mortgagors´ creditworthiness (a dummy variable that takes the value one if any mortgagor in the loan had defaulted before mortgage origination). A detailed breakdown of this variable by years of credit seniority is also included in the table.

[9] We work with outstanding mortgages as of 2019. While we lose information on mortgages already cancelled (or defaulted), in robustness and using a more comprehensive set of mortgages, namely those originated in recent years, for which we have the whole picture, we have checked that the main results of the paper hold.

denominated in a currency different from the euro to get rid of other possible sources of risk (e.g., currency risk) that could affect mortgage pricing. After applying these filters, the sample contains more than 3 million mortgages (3,171,667) whose main characteristics are reported in Table 1.

Around 4.5% of mortgages are loans extended to foreign citizens. These mortgages bear (on average) higher interest rates at origination than mortgages to nationals.[10] Foreign borrowers present some differences compared to nationals in terms of job status, age, income and credit history. The share of bank employees (0.5% vs 3.0%) and civil servants (2.4% vs 13.1%) is much lower for foreigners than for nationals, while it is higher for wage-earners (73.0% vs 68.5%) and unemployed workers (4.1% vs 3.6%).[11] Regarding age (computed as the average age of all borrowers in the mortgage), foreigners are slightly older (37.1- vs 35.7-year-old). On the other hand, income of foreigners (proxied by the average income in the postal code matched with the census tract where the property is located) is lower (around 2,400 euros). Regarding credit history, it is longer for nationals (5.0 vs 1.9 years) once we consider mortgages with more than one year of credit records and the same lifespan. On the other hand, for credit histories of similar duration, foreigners maintain worst credit records. Finally, nationals have on average more banks relationships than foreigners (0.9 vs 0.5) at origination.

3.2. European DataWarehouse (EDW)

To study the default implications of rootedness we use the European DataWarehouse (EDW). The EDW is a large repository of data for securitizations issued by European banks. Information is submitted regularly by credit institutions following the guidelines of the European Central Bank ABS loan-level initiative, which aims to increase transparency in securitization markets.[12] Banks' reports include characteristics of securitizations as well as of the collateral pool of these instruments, i.e., loans. This information is available at loan-level as in CIR. Our main interest is in the pool of residential mortgage-backed securities of Spanish banks, namely residential mortgages.

The EDW is ideal for testing how roots affect defaults, including default behavior in negative equity situations, which we think is closely connected to the strength of borrowers' roots. As in CIR, we identify loans extended to nationals and foreigners. CIR and EDW share other covariates of interest, but only in EDW we observe the loan-to-value at origination (LTV-O) of pre-crisis loans, and can calculate, under certain assumptions, its evolution (current LTV or LTV-C) going

[10] We refer to mortgages to foreigners as those in which all borrowers are foreigners. We refer to mortgages to nationals as those in which at least one borrower is a national. In the empirical part we will break down the latter group of loans to enrich our analysis.

[11] Data on job positions refers to the main borrower in the mortgage. The main borrower is the one with a more stable job, who presumably pay lower rates. If debtors have the same job position, the main borrower is the oldest one. We assume this sequential order: bank employees (who usually receive favorable conditions from their bank when signing the mortgage), civil servants, other wage earners, self-employed, retired, unemployed and others (rentiers, housewives, students). For instance, if in a mortgage with two debtors one of them is a wage earner, and the other borrower is a civil servant, the latter would be the main borrower, and "civil servant" would be the job status associated with that loan.

[12] See https://www.ecb.europa.eu/paym/coll/loanlevel/html/index.en.html for more details.

forward (for details, see section 5.1). This is not possible in CIR as the reporting of the LTV-O is not reliable for these mortgages. On the other hand, in EDW banks report the income of the primary borrower in the loan, which is also available using CIR but only at the zip code level.

We focus on mortgages originated ahead of the global financial crisis, when the Spanish housing market was booming, since these loans are more likely to have undergone negative equity during the crisis period.[13] This is because many of these mortgages were generated with too elevated LTV-O (above 80%), as we detail below in the descriptive statistics. Since the cumulative decline in house prices reached 40% during the crisis (2008 to 2013), negative equity was not uncommon in this period (we provide more details on this in the empirical section).[14] This situation provides a good testing ground to evaluate whether incentives to default change with borrowers´ roots.

Table 2. Descriptive Statistics – EDW database

	Nationals		**Foreigners**		
	N	mean	N	mean	*t test Pr(t)>t*
Dependent variable					
DEFAULT	234,245	0.01	10,663	0.04	*0.00*
Borrower characteristics					
income	226,858	26,655	9,882	27,367	*0.00*
job status: wage_earner	234,034	0.72	10,646	0.78	*0.00*
job status: civil_servant	234,034	0.06	10,646	0.02	*0.00*
job status: selfemployed	234,034	0.10	10,646	0.09	*0.08*
job status: unemployed	234,034	0.02	10,646	0.02	*0.02*
job status: other	234,034	0.10	10,646	0.09	*0.00*
Loan characteristics (at origination)					
principal amount	234,180	166,957	10,663	173,315	*0.00*
appraisal value	231,486	220,460	10,423	204,455	*0.00*
spread	231,714	69.85	10,537	83.24	*0.00*
LTV < 60	233,433	0.17	10,586	0.10	*0.00*
LTV [60,75]	233,433	0.18	10,586	0.16	*0.00*
LTV (75,80]	233,433	0.22	10,586	0.16	*0.00*
LTV 80+	233,433	0.43	10,586	0.59	*0.00*
maturity < 25	234,245	0.13	10,663	0.14	*0.00*
maturity [25,30]	234,245	0.37	10,663	0.43	*0.00*
maturity 30+	234,245	0.50	10,663	0.43	*0.00*
LTI	221,065	7.31	9,640	7.58	*0.00*
LSTI	210,167	43.36	9,233	44.96	*0.00*
I_variable	225,367	0.99	10,377	0.99	*0.82*

The table shows descriptive statistics for the variables of interest in the European DataWarehouse (EDW). DEFAULT is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower in the EDW is usually the borrower with the higher income in the loan). job status is a categorical variable grouping wage_earner (wage earners), civil_servant (civil servants), self-employed (self-employed), unemployed (unemployed) and other (capturing any other employment status, e.g., students, pensioners). Loan characteristics at origination include the principal amount of the loan (in euros), the appraisal value of the dwelling (in euros) and the spread or the difference between the interest rate in the loan and the benchmark rate, which is expressed in basis points. LTV is the loan-to-value ratio (in %). We consider four buckets (LTV < 60%, 60% < LTV < 75%, 75 < LTV < 80%, LTV > 80%). maturity is the duration of the mortgage at origination (in years), considering three buckets (maturity < 25, 25 < maturity < 30, maturity > 30). LTI is the loan-to-income ratio and LSTI is the loan service-to-income ratio (in %). I _variable is a dummy equal to one for adjustable-rate mortgages, and it is equal to zero for fixed-rate mortgages.

[13] In particular, we focus on mortgages originated between 2006 and 2007, when house prices peaked. For these loans we calculate the current loan-to-value ratio, which allows us to evaluate whether the mortgage entered or not into negative equity territory during the crisis period. For details, see section 5.1.

[14] These dates are similar to those identified in Lo Duca et al. (2017), and Laeven and Valencia (2020).

After removing observations with poor reporting (e.g., principal amount unreported) and outliers, our final sample consists of 244,908 loans, which corresponds to 5,148,385 loan-quarter observations. In Table 2 we report the summary statistics for this set of loans. As before, we present loan attributes of nationals (234,245 loans) and foreigners (10,663 loans), and compute t-tests for differences in means. We also present default rates for each type of household.[15]

Three elements merit attention. First, contrary to CIR, foreigners do not appear to be more financially constrained than nationals. For instance, while LTV is higher for foreigners, their income is a bit greater in this dataset. In spite of this, default frequencies for foreigners are much higher than for nationals (four times). This suggests that lending standards at origination may not be the only driver of defaults, and that roots can play an important role in default decisions. In this vein, and consistently with CIR, we note that foreigners pay higher interest rates (spreads) in their mortgages, which suggests that borrowers' nationality may be a key determinant in the pricing of these loans, and possibly in their *ex-ante* risk.

IV. Roots and mortgage terms

As we mentioned in the introduction and the literature review, socioeconomic and behavioral factors associated with rootedness may drive default risk. In particular, lower relocation costs, lower attachment to their own homes and greater financial vulnerabilities may affect the risk profile of foreign-born borrowers that are not well-settled in the host country. These factors may impact on the perceived riskiness/vulnerability of debtors, which may in turn affect the cost of mortgages and explain, at least in part, the interest rate spread of foreigners versus nationals at the moment of loan origination.

Moreover, lenders might internalize that borrowers not well-settled in the host country are more prone to leave the country after an adverse life event (e.g., job loss). If this happens, these debtors may be less likely to honor their debt commitments, either because they face liquidity constraints, because they have more incentives to strategically default, or for both reasons. This should translate into worse loan terms at origination for these debtors (e.g., higher rates), in comparison with borrowers with deeper roots, should lenders anticipate these potential outcomes. At the extreme, if a bank expects that in the event of default it will not be possible to recover the deficiency balance (or a part of it), either because the lender cannot go after debtor´s assets in other jurisdictions or because the foreseeable costs of doing so are very high, the riskiness of this type of mortgages would indeed be very similar to that of non-recourse loans, where the liability of the debtor is limited (we cover incentives to default in the following sections). This implies that the strength of borrowers' roots and, in particular, the degree of effective recourse may be internalized by lenders when setting mortgage terms.

[15] We only cover defaults during the crisis period, from 2008 to 2013, when negative equity situations are more likely. Considering the performance of loans after 2013 increases the number of defaults but creates uncertainty regarding the equity position of debtors.

4.1 Identification strategy

In order to analyze how rootedness can be seen as a source of variability in mortgage credit risk, and to what extent differences in the strength of borrowers' roots are reflected in mortgages pricing, we use the CIR database, which offers granular data on mortgage and mortgagor's characteristics.

As stated before, to assess the importance of borrowers' roots in mortgage pricing, we need to identify differences in rootedness and separate this effect from other sources of borrowers' risk/pricing variation. To this end, we firstly propose the following specification:

$$IR_{irbT}=\alpha + \beta_1 * foreigner_{irbT} + \boldsymbol{\Omega}_2 X'_{irbT} + \boldsymbol{\Omega}_3 Z'_{irbT} + \rho_b + \sigma_r + \omega_T + c_i + \varepsilon_{irbT}, \quad (1)$$

where the dependent variable (IR_{irbt}) represents the interest rate at the origination of the mortgage i, in location r, granted by bank b in period T. *foreigner*, which is our variable of interest, is a dummy variable that takes the value one if all borrowers in the loan are foreigners, namely foreign citizens, and zero otherwise. Given the controls that we detail below this variable would capture ideally the effect of rootedness on mortgage pricing.

The vector of borrower's characteristics $\mathbf{X}_{irbT}$ includes the logarithm of the average age of all borrowers in the mortgage, the employment status of the main borrower (a set of seven dummy variables that takes the value one if the main borrower is a bank employee, a civil servant, a wage-earner, a self-employed, an unemployed, a retired, a housewife, a student, or has any other labor status, respectively), and the credit history in the mortgage. The latter includes a dummy variable that takes the value one if at least one borrower had had a loan classified as delinquent or in default in her credit records before mortgage origination, as well as a set of three additional dummies identifying whether that previous problematic loan was observed one, two, or three years before the mortgage was extended. Additionally, we include a variable that indicates the number of banking relationships of the main borrower before loan origination.

On the other hand, the vector of mortgage characteristics $\mathbf{Z}_{irbT}$ includes the type of mortgage interest rate (a dummy variable that takes the value one if the interest rate is variable, and zero otherwise), information about the number of additional collaterals in the mortgage (a dummy variable that takes the value one if more than one collateral was pledged, and zero otherwise), the logarithm of the mortgage loan amount, and the logarithm of the mortgage maturity.

We also account for a set of fixed effects ($\rho_b, \sigma_r, \omega_T, c_i$) for bank, location (postal code), time (year and month), and country of birth, respectively. Bank and time fixed-effects are intended to capture supply and cyclical factors that could be relevant for mortgage pricing. Further, bank fixed-effects should control for the special conditions that lenders specialized in high-risk loans offer to their customers, including foreigners. Location effects would capture differences related to borrowers' financial strength (given that borrowers' income is not directly observed in CIR

data, and property prices and potentially other components of wealth are highly correlated with income data by postal code) and the possibility that mortgage conditions are tighter in low-income neighborhoods (Ghent et al., 2014). Finally, fixed effects for the country of birth of the main borrower aim to control for characteristics that are common to all debtors that were born in the same country.

The biggest challenge for the analysis is to disentangle the effect of rootedness from other potential sources of variability in mortgage pricing. To do this, we take advantage of the rich set of controls in our dataset. On one hand, we control for observable risk as we take into account measures of borrowers' financial position and loan characteristics, as well as for some sources of unobservable risk (credit history). Additionally, the country of birth fixed-effect would absorb other factors that might explain the spread between foreign- and native-born borrowers. In particular, borrowers' features embedded in the fixed effect include their ethnicity, race, language skills, accent, among others, which may translate into higher mortgage rates for foreigners in the presence of discrimination or adverse pricing. Against this backdrop, our specification allows us to compare borrowers that are identical regarding their mortgage characteristics and that share certain common features related to their country of origin, but that differ in their nationality or citizenship, which we use as a rough initial measure of rootedness. Therefore, the effect of roots in interest rates would be captured by β_1.

To further improve the measurement of the effect of rootedness, we propose a second specification using additional information available in CIR about borrowers' ties to the country, where we consider not only legal but also subjective ties to the territory. To this end, we define additional categories of mortgages that provide a parsimonious measurement of borrowers' roots. Specifically, we add a dummy variable, *nationalized*, that takes the value one if at least one mortgagor is a foreign-born borrower who obtained the Spanish citizenship, and zero otherwise. We also include a dummy variable, *mixed*, that takes the value one if the mortgage is signed by at least one foreign borrower and one national borrower. Thus, *foreigner*, *nationalized* and *mixed* are mutually excluding (see Table 3). Finally, we include an additional dummy, *nonresident*, that takes the value one when at least one borrower in the mortgage (national or not) does not reside in Spain, and it is zero otherwise, in order to capture rootedness variability derived from the place of residence of the borrowers.[16]

$$IR_{irbT} = \alpha + \beta_1\, foreigner_{irbT} + \beta_2\, nationalized_{irbT} + \beta_3\, mixed_{irbT} + \beta_4\, non\, resident_{irbT} + \beta_5 * foreigner_{irbT} * non\, resident_{irbT} + \boldsymbol{\Omega}_3 X'_{irbT} + \boldsymbol{\Omega}_4 Z'_{irbT} + \rho_b + \sigma_r + \omega_T + ci + \varepsilon_{irbT}, \quad (2)$$

This second specification presumes a differential impact of rootedness contingent on how the attachment of borrowers to the host country evolves over time. Specifically, the estimated

[16] The share of foreign mortgages in the data is 4.4%, the share of nationalized mortgages is 4.3%, the share of mixed mortgages is 1.8% and the share of nonresident mortgages is 0.8%.

Table 3. Definition of the rootedness variables

	Unit	Definition
foreigner	0/1	A dummy variable that takes the value one if *all* borrowers in the loan are foreigners, namely foreign citizens, and zero otherwise
nationalized	0/1	A dummy variable that takes the value one if at least one debtor is a foreign-born borrower who obtained the Spanish citizenship, and zero otherwise[17]
mixed[18]	0/1	A dummy variable that takes the value one if at least one debtor in the mortgage is a foreign borrower and the other debtor/s are nationals
nonresident	0/1	A dummy variable that takes the value one when at least one borrower in the mortgage does not reside in Spain, and it is zero otherwise

coefficients for each dummy variable would capture how banks internalize borrowers' roots for each category of mortgagors. If roots have an impact on mortgage pricing, banks would charge higher rates to borrowers that are not well-settled in the host country ($\beta_1 > \beta_2$; $\beta_1 > \beta_3$; $\beta_2, \beta_3 \geq 0$). That is, foreigners with stronger ties to the country, such as those in a mortgage with nationals or those nationalized, would be less risky (given other covariates) and would benefit from lower spreads (given other covariates). On the contrary, non-resident foreigners would be less attached to the country than resident foreigners, and would bear higher interest rates at origination ($\beta_5 > \beta_1 > 0$), as they are riskier. In the specification, β_4 captures the effect on rates in mortgages extended to non-resident *nationals*.

Finally, in order to analyze the degree of heterogeneity of our results by income level, we will estimate equation (2) for the quartiles of the distribution of income in the country. We will do this by using public information from the Spanish Tax Agency on the average income in the postal code (census tract) where the mortgage is located. We present the results of all these specifications in Section 6.

V. Default implications of rootedness

As we described in the literature review, some studies find that factors associated to rootedness may weigh on borrowers' default decisions. On the whole, immigrants with weak links to the host society have been found to face more financial constraints and larger vulnerabilities than those better-settled and nationals (Hu, 2000; Clark and Blue, 2004). This situation may lead to more defaults in debtors with few ties to the host country during shocks. Certainly, delinquency rates have been identified to be larger for foreign- than for native-born borrowers, but also to decrease with the time of residence in the host country (Lin et al., 2016).

[17] To be more specific, borrowers that present their national identification number when signing the mortgage (i.e., national borrowers), but that were born abroad, are assumed to be foreigners that acquired the Spanish citizenship ("nationalized"). While, from a legal perspective, nationality is not always linked to country of birth, we hypothesize that debtors who born abroad have lower roots than national debtors that were born in Spain.

[18] This category (mixed) prevails over the others. For instance, if a mortgage is "mixed" and at the same time "nationalized", it is classified as "mixed".

Besides repayment capacity, default decisions of nationals and foreigners might depend on whether mortgages undergo or not negative equity, a special situation in which the value of the mortgage collateral falls below the mortgage balance (LTV-C above 100%). A negative equity situation provides incentives to default as the present value of mortgage payments may be higher than the value of the house. That being said, certain deterrents make the default decision costly. Foote and Willen (2018) note that mortgagors are reluctant to go into default even with negative equity as they weigh "transaction costs", which include factors such as moving costs or the degree of attachment to their homes/neighborhood. Besides, mortgages in Spain are (with some exceptions) recourse loans, which means that after the foreclosure sale, the bank can go after the other borrowers' assets to recover any amounts due. There is evidence that recourse lowers mortgagors' sensitivity to default under negative equity (Ghent and Kudlyak, 2011).

In this section we hypothesize that deterrents that usually prevent borrowers from defaulting in negative equity situations may be less important for foreigners or debtors with feebler connections to the host society. This happens because these mortgagors have, on average, lower transaction costs and are, among other aspects, more prone to leave the country (e.g., returning to their country of origin) when shocks arise. Thus, for these borrowers, failing to meet mortgage payments may be less of a direct concern as the negative consequences of defaults are potentially less severe. This includes aspects such as losing access to bank credit in the host country or even recourse, as it may be more difficult/costly for banks to go after the other assets of borrowers in other jurisdictions.

Therefore, we argue that foreigners are, on average, borrowers with lower transaction costs than nationals. As a consequence, they are more likely to default, and also more likely to behave strategically in situations of negative equity. It is important to note that during the boom years, and unlike in other countries, foreign population in Spain was made up essentially of newcomers with few ties to the country, namely few roots. This implies that transaction costs could be particularly low for many households in this group.

5.1 Identification strategy

Since foreigners are more financially constrained, we expect more failures in mortgages extended to this group of borrowers, even after controlling for loan/borrower´s characteristics and other observables. Moreover, under negative equity default probabilities could also be higher for foreigners since they have more incentives to default / potentially deal with lower default costs. To test these hypotheses, we take loans originated before the Spanish banking crisis in the EDW and study whether defaults in the crisis period (2008-2013) depend on rootedness. In particular, we estimate the following probit specification, which is similar to the one proposed by Ghent and Kudlyak (2011) to analyze incentives to default under negative equity for recourse and non-recourse mortgages in the US.

$$\Pr(\text{DEFAULT} = 1|\text{X}) = \Phi\,(\alpha + \beta_1\, foreigner_{irbT} + \beta_2\, negative\ equity_{irbT} + \beta_3\, foreigner_{irbT} * negative\ equity_{irbT} + \mu\, X'_{irbT} + \rho_b + \sigma_r + \omega_T), \quad (3)$$

where Pr denotes probability and Φ represents the Cumulative Distribution Function of the standard normal distribution.[19] The dependent variable (DEFAULT) is a dummy variable equal to 1 if the mortgage has failed, and equal to 0 for performing operations.[20] In this equation the subscript *i* indicates the loan, *r* denotes the location (province) where the mortgage was originated, *b* refers to the bank that extended the loan, and *T* represents the year-quarter period.

The explanatory variables include *foreigner*, which is a dummy equal to one if the borrower is a foreigner, and equal to 0 for nationals.[21] In this context, *foreigner* proxies for loans in which the effective recourse of the bank would be lower, while nationals (the benchmark category) are assumed to take out loans in which the effective recourse would be greater (from a legal perspective, both loans are recourse). *negative equity* is a dummy that takes the value one if the LTV-C of the loan is above 100%, and 0 otherwise. However, since banks in the EDW do not report the LTV-C for the whole period of analysis, we compute this variable for each loan as in Ghent and Kudlyak (2011).[22] We observe that approximately 50% of loans ended up in negative equity as of the last data point (2013Q4), while this percentage was almost negligible at the beginning of the crisis (2008Q1; see Figure 1).

The specification also includes the standard controls in the literature of defaults, in vector **X**. Covariates include borrowers' characteristics and loan conditions at the origination of the loan. In particular, we control for the income of borrowers, the LTV-O of the loan (we consider four buckets: <60%, 60-75%, 75-80% and >80%), its maturity (three buckets: <25 years, 25-30 years, >30 years) and the spread over the risk-free rate. The equation also includes the age (in quarters) of the loan.[23] We further saturate the model with bank (ρ_b), region (σ_r) and year-quarter (ω_T) fixed effects to control for other non-observable drivers of defaults.[24] In particular, time fixed effects allow us to take on board aggregate shocks to borrowers including changes in economic conditions. Importantly, since all loans in the dataset are adjustable-rate mortgages, time fixed effects also absorb shocks to the mortgage contract rate in each loan.[25]

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[19] In annex A2.5. we show the outcome of some alternative specifications, including region-time fixed effects and a standard logistic CDF instead of a standard normal distribution CDF.

[20] Failures include foreclosures and defaults, provided that in the latter case the loan defaulted during the crisis period (2008-2013) and that it has continued under this situation the last time the bank reported the status of this operation.

[21] In this dataset we do not see the residence of borrowers or their country of origin, just whether they are Spaniards or foreigners.

[22] LTV-C data is incomplete for pre-crisis loans. To obtain the LTV-C, we first calculate loan amortization rates using mortgage contract characteristics (principal amount, maturity and interest rate of the loan at origination). With this, we can estimate the numerator of LTV-C. To compute the denominator, we update the original appraisal value of the dwelling using regional price indices from the National Statistic Office.

[23] In the LTV-O, the bucket 75-80% is constructed to take into account chances that appraisals in these loans are "inflated" (and thus to control for the possibility that leverage may be higher in these operations). There are some regulatory motives that may push banks to grant loans with LTV < 80 % (see Galán and Lamas, 2019, for a discussion on these motivations and their implications)

[24] We omit LTI and LSTI as they are highly correlated with income.

[25] We drop fixed-rate mortgages from the sample considered as they represent less than 1% of securitized credit (see Table 2).

The coefficients of interest in Equation (3) are those associated with foreigner (β_1) and the interaction foreigner-negative equity (β_3). Provided that rootedness plays a role in defaults we expect β_1 to be positive. Moreover, since default costs may be lower for borrowers with shallow roots, β_3 could also be positive. If foreigners or borrowers with low transaction costs are more sensitive to negative equity, they would behave in practice as if they were extended non-recourse mortgages, in which defaults increase with negative equity when compared to recourse loans of analogous characteristics (Ghent and Kudlyak, 2011). We present the outcome of this specification in the next section.

VI. Results

6.1. The role of rootedness in the cost of mortgages

In this section we show the results for the specifications outlined in section 4, in which we aim to study whether mortgage rates are sensitive to rootedness. In particular, in Table 4 we show the estimated coefficients for Equation (1). In Table 5 we do the same for the more comprehensive specification in Equation (2). Finally, in Table 6 we explore whether the estimated coefficients in Equation (2) depend on the income level of the mortgagors. In these tables we only report the coefficients of interest and enumerate the controls used. In the annex we provide a more granular view of these estimates.

In Table 4 we report seven different columns, by progressively saturating the specification, ending with the full specification in Equation (1). We start from a reduced specification with bank and time fixed effects only, and progressively include additional fixed effects and the vectors of borrowers' and mortgage characteristics (**X** and **Z**, respectively). For comparison purposes, we restrict the sample to the set of observations for which all the fixed effects are included (Column (4)). In Column (1) we only include bank and time (year) fixed effects. In Column (2) we add province fixed effects as well as month fixed effects to account for possible seasonality. In Column (3) we replace province fixed effects by more granular postal-code fixed effects. In order to fine tune the estimation of the effect of rootedness in pricing, in Column (4) we add fixed effects relative to the country of birth. In Column (5) we include the vector of borrower's characteristics, in Column (6) we add the vector of mortgage characteristics and in Column (7) we include information about borrowers' credit records.

As we show in Column (1), the estimated coefficient of *foreigner* is 0.39, meaning that foreigners pay 39 basis points more than nationals in new mortgages. This spread remains relatively unchanged until Column (4), when we add the country-of-birth fixed-effect. When this fixed effect is included, this coefficient lowers to 0.21. This result is expected since this specification effectively restricts variation in spreads to foreign borrowers of the same country of birth, thereby separating the effect of rootedness from other potential determinants of the spread, such as

Table 4. The role of rootedness in the cost of mortgages

Dependent variable: interest rate i_{rbt} at origination.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Foreigner	0.399***	0.385***	0.351***	0.209***	0.192***	0.181***	0.184***
	(0.062)	(0.058)	(0.056)	(0.022)	(0.021)	(0.030)	(0.030)
Borrowers characteristics	No	No	No	No	Yes	Yes	Yes
Mortgage characteristics	No	No	No	No	No	Yes	Yes
Borrowers credit history	No	No	No	No	No	No	Yes
Observations	2,608,774	2,608,774	2,608,774	2,608,774	2,608,774	2,607,556	2,607,556
R-squared	0.532	0.540	0.550	0.551	0.560	0.571	0.571
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes
Province F.E.	No	Yes	No	No	No	No	No
Zip Code F.E.	No	No	Yes	Yes	Yes	Yes	Yes
Country of Birth F.E.	No	No	No	Yes	Yes	Yes	Yes

Note: This table shows results for specification in Equation (1). The dependent variable is the interest rate at origination for mortgages originated from 2004 to 2019. Foreigner is a dummy equal to one if all mortgagors in the loan are foreigners (shallow roots), and is equal to 0 otherwise (deep roots). The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effect; location (province or zip code) fixed effects; and region of birth fixed effects). It is further enriched to control for Borrower characteristics, Mortgage characteristics and Borrowers Credit history. Borrowers' characteristics include a set of dummy variables for employment status; the natural logarithm of the average age of the mortgagors, and a set of dummies regarding the number of mortgagors. Loan characteristics include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Results are restricted to the specification that includes the complete set of fixed effects considered in column (4). Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

individual features of the mortgagor that may result in adverse pricing (ethnicity, race, language skills, etc.).[26] This spread is quite similar in Columns (5), (6) and (7), when other borrower's and mortgage characteristics are included. This suggests that roots play a relevant role in mortgage pricing.

Moving to our more refined strategies for identifying rootedness, we show in Table 5 the results for specification (2), where we consider borrower's citizenship (*foreigner*), and other subjective and physical ties to the territory (*nationalized, mixed* and *nonresident*). For comparison purposes, in Column (1) we show the results for the most saturated specification in Equation (1), where the foreigner variable is our only single measure of rootedness (Column (6) in Table 4, which excludes borrowers´ credit history). In columns (2) and (3) we add more categories of borrowers' rootedness, *nationalized* and *mixed,* which stands for mortgages to debtors that have gained citizenship or that have co-signed the mortgage with a Spanish debtor, respectively. In Column (4) we include an additional dummy, *non-resident,* for mortgages extended to non-residents, as well as its interaction with *foreigner* in Column (5). Finally, we add borrowers' credit history in Column (6).

These results show that mortgage pricing is sensitive to the strength of borrowers' roots. Specifically, the coefficient for *mixed* is slightly smaller than the one for *nationalized* and these two coefficients are substantially lower than the one for *foreigner*. On the other hand, the residence of the borrower does not seem to be a determining factor for mortgage pricing in

[26] While we are aware that borrowers' characteristics are heterogeneous within the same country (of birth), the coefficient β1 for foreigner is, after the inclusion of country of birth fixed effects, much more likely to capture the effect of rootedness on mortgage interest rates.

nationals (the coefficient for *non-resident* in Column (5) and (6) is not statistically significant). This is reasonable given the nature of the mortgages we are considering (i.e., mortgages for purchasing main residence). However, non-resident foreigners are charged higher interest rates than resident foreigners, as the interaction term *foreign – nonresident* is positive and statistically significant. This is expected as these borrowers are either newcomers or plan to move to Spain following the acquisition of the dwelling, exhibiting as a consequence weaker roots than foreigners already living in the country.[27] We note that the spread of the latter groups edges up (from 0.18 in the first Column to 0.22) as we further disentangle households' rootedness by including the other mortgages categories (nationalized, mixed and non-resident).

Table 5. The role of rootedness in the cost of mortgages. Degrees of rootedness.

Dependent variable: Mortgage interest rate at origination Ir_{irbt}

	(1)	(2)	(3)	(4)	(5)	(6)
Foreigner	0.181***	0.220***	0.245***	0.225***	0.222***	0.224***
	(0.030)	(0.038)	(0.040)	(0.048)	(0.049)	(0.049)
Nationalized		0.067**	0.085***	0.080**	0.080**	0.082**
		(0.029)	(0.032)	(0.032)	(0.032)	(0.032)
Mixed			0.063***	0.058***	0.061***	0.062***
			(0.010)	(0.011)	(0.012)	(0.011)
Non resident				0.106	-0.010	-0.003
				(0.070)	(0.029)	(0.030)
Foreign*Non resident					0.134*	0.147**
					(0.073)	(0.073)
Borrowers characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Mortgage characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Borrowers credit history	No	No	No	No	No	Yes
Observations	2,607,556	2,607,556	2,607,556	2,607,556	2,607,556	2,607,556
R-squared	0.571	0.571	0.571	0.571	0.571	0.571
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Province F.E.	No	No	No	No	No	No
Zip Code F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country of Birth F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows results for specification in Equation (2). The dependent variable is the interest rate at origination for mortgages originated from 2004 to 2019. Foreigner is a dummy equal to one if all mortgagors in the loan are foreigners (shallow roots), and is equal to 0 otherwise (deep roots). *Nationalized* is a dummy variable that takes the value 1 if all borrowers (in the loan) are Spanish citizens, but at least one of them is a former foreigner that has been nationalized, and zero otherwise. *Mixed* is a dummy variable that takes the value 1 if at least one borrower (in the loan) is not a Spanish citizen; zero otherwise. *Non resident* is a dummy variable that takes the value 1 if at least one debtor in the mortgage is a non-resident; zero otherwise. The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effects; location (province or zip code) fixed effect; and region of birth fixed effects). It is further enriched to control for Borrower characteristics, Mortgage characteristics and Borrowers Credit history. Borrowers' characteristics include a set of dummy variables for employment status; the natural logarithm of the average age of the mortgagors, and a set of dummies regarding the number of mortgagors. Loan characteristics include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Results are restricted to the specification that includes the complete set of fixed effects considered in column (4) of Table 4. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Finally, in Table 6 we re-estimate Equation (2) by quartiles of the income distribution (inferred from the postal code where the mortgage collateral is located). Each Column shows the results for the corresponding quartile. We observe an increase in the estimates of the coefficients for *foreigner, mixed* and *nationalized* from Column (1) to (3), which suggests that the relevance of

[27] When a borrower identifies herself using a document in which the domicile is said to be located abroad, she is mechanically classified in CIR registers as a non-resident. In any case these borrowers are likely to be newcomers or debtors with shallow roots in the host country.

roots on mortgage pricing might increase with borrowers' wealth, albeit these effects fade away somewhat for top income debtors (Column (4)).

Table 6. The role of rootedness in the cost of mortgages. Degrees of rootedness and income level.

Dependent variable: Mortgage interest rate at origination lr_{irbt}				
	(1) [0,p25th]	(2) (p25th,p50th]	(3) (p50th,p75th]	(4) (p75th, p100th]
Foreigner	0.163***	0.255***	0.278***	0.180***
	(0.043)	(0.053)	(0.054)	(0.042)
Nationalized	0.044	0.095***	0.101***	0.076*
	(0.027)	(0.032)	(0.028)	(0.040)
Mixed	0.041***	0.080***	0.094***	0.026***
	(0.012)	(0.021)	(0.014)	(0.007)
Non resident	0.027	-0.092*	-0.153*	0.089
	(0.048)	(0.048)	(0.085)	(0.062)
Foreign*Non resident	0.210**	0.207**	0.203***	-0.030
	(0.091)	(0.095)	(0.076)	(0.072)
Borrowers characteristics	Yes	Yes	Yes	Yes
Mortgage characteristics	Yes	Yes	Yes	Yes
Borrowers credit history	Yes	Yes	Yes	Yes
Observations	604,802	604,963	609,241	601,116
R-squared	0.545	0.571	0.570	0.563
Bank F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes
Zip Code F.E.	Yes	Yes	Yes	Yes
Country of birth F.E.	Yes	Yes	Yes	Yes

Note: This table shows results for specification in Equation (2) for different subsets of borrowers, classified by their income levels (Column (1) refers to borrowers in the first quartile of the distribution of income, Column (2) includes those in the second quartile, Column (3) those in the third quartile, and Column (4) those in the top quartile. The dependent variable is the interest rate at origination for mortgages originated from 2004 to 2019. Foreigner is a dummy equal to one if all mortgagors in the loan are foreigners (shallow roots), and is equal to 0 otherwise (deep roots). *Nationalized* is a dummy variable that takes the value 1 if all borrowers (in the loan) are Spanish citizens, but at least one of them is a former foreigner that has been nationalized, and zero otherwise. *Mixed* is a dummy variable that takes the value 1 if at least one borrower (in the loan) is not a Spanish citizen; zero otherwise. *Non resident* is a dummy variable that takes the value 1 if at least one debtor in the mortgage is a non-resident; zero otherwise. The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effects; location (province or zip code) fixed effect; and region of birth fixed effects). It is further enriched to control for Borrower characteristics, Mortgage characteristics and Borrowers Credit history. Borrowers' characteristics include a set of dummy variables for employment status; the natural logarithm of the average age of the mortgagors, and a set of dummies regarding the number of mortgagors. Loan characteristics include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Results are restricted to the specification that includes the complete set of fixed effects considered in column (4) of Table 4. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

More interestingly, Column (4) shows that being (or not) resident is no longer a relevant factor on the pricing of mortgages for the wealthiest foreign borrowers. This might reflect differences in transaction costs by income level, operating in conjunction with rootedness. In particular, moving costs and other transaction costs could be lower (on average) for high-income foreigners versus other groups. Since transaction costs are lower for these mortgagors, default costs should be lower too (Foote et al, 2008). For instance, with low moving costs these individuals may find it easier to leave the country in the event of an adverse shock, regardless of whether they are resident or not. We think this explains why borrowers´ rootedness appears less important for the pricing of mortgages in these debtors. We note that spreads of *nationalized* and *mixed* are closer to those paid by *foreigner* (i.e. resident foreigners in this specification) in this group too.

6.2. Default implications of rootedness

In this section we evaluate whether rootedness is a driver of defaults and whether it changes incentives to default in a negative equity situation, i.e., when the value of the collateral in the loan falls below the outstanding balance of the mortgage. As we argued before, debtors with shallow roots to the host country may be more prone to settle in other places when a crisis hits and in general would face lower default costs. This, in turn, would augment incentives to default. As a result, foreigners or borrowers with weak ties to the host country are expected to default more during shocks and may also behave more strategically in negative equity situations. This is because they potentially fear less the negative consequences of defaulting on their obligations; for instance, banks' recourse.

To test the previous hypotheses, we estimate the probit model in Equation (3). Results are shown in Table 7. As before, in the main body of the paper we present the estimates of interest, while in the Annex we reproduce the estimates of all coefficients.

In the first column of Table 7, the coefficient associated with *foreigner* is positive and highly significant, both statistically and economically (the probability of default of foreigners is near 4 times higher than that of nationals). Since shallow roots are linked to tighter financial constraints (Lin et al., 2016), it is not a surprise to see more defaults in this segment of borrowers. We note that this result holds even when we account for the usual controls in the literature of defaults, including borrowers' conditions and loans characteristics at the origination of mortgages, which all have the expected signs (see the complete table in the Annex).

The impact of negative equity and the impact of the interaction foreigner - negative equity on defaults are both positive but not statistically significant (see again Column (1)). Thus, on average, negative equity does not translate into more defaults, neither in nationals nor in foreigners, who are our proxy for lower effective recourse.

To explore further the latter result, we split the sample into four groups on the basis of the quartiles of the distribution of the original appraisal value of dwellings, following the strategy proposed by Ghent and Kudlyak (2011).[28] We show the new results in Columns (2)-(5) of the same table. For borrowers in mortgages with appraisal values below the 75th percentile, Columns (2)-(4), default behavior is quite similar to the general results in Column (1). That is, foreigners default more than nationals and the interaction foreigner - negative equity lacks statistical significance. However, for borrowers in loans with collateral valuations above the 75th percentile, or for wealthy borrowers (Column (5)), the picture is rather different. In particular, in this subsample foreigners no longer default more than nationals when equity is positive. But with negative equity default propensities increase for foreigners but not for nationals. This effect is strong in statistical and

[28] All results in the paper remain the same if we use the distribution of income instead as a proxy for households' wealth. Annex A2.6. reports these results.

economic terms, as the probability of default under negative equity is 3.5 times higher for rich foreigners compared to rich nationals.[29]

Table 7. Defaults and rootedness

Dependent variable: DEFAULT (=1 if the loan has failed)					
	full sample	Subsamples of borrowers according to the appraisal value of mortgages collateral			
		<p25	p25-p50	p50-p75	>p75
	(1)	(2)	(3)	(4)	(5)
Foreigner and negative equity					
foreigner	0.424***	0.504***	0.450***	0.443***	0.0999
	(0.0609)	(0.0542)	(0.102)	(0.0887)	(0.118)
negative equity	0.0210	-0.00396	0.0556	0.0307	-0.0436
	(0.0270)	(0.0434)	(0.0523)	(0.0677)	(0.0565)
foreigner x negative equity	0.0534	0.0871	0.0495	-0.0125	0.323***
	(0.0719)	(0.0847)	(0.116)	(0.100)	(0.117)
Pseudo R2	0.163	0.154	0.174	0.163	0.176
Observations	4,623,978	1,142,876	1,183,263	1,121,556	1,176,283
Controls					
Loan & borrower characteristics	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to 1 if the LTV-C of the loan is above 100% (0 otherwise). The specification includes a complete set of fixed effects (bank, region and time fixed effects). It is further enriched to control for borrower characteristics and mortgage characteristics at origination, including the gross annual income of the main borrower in each loan, his job status, the spread of the mortgage rate over the risk free-rate, LTV at origination, the maturity of the loan and the age of the loan. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

These results confirm our hypothesis that default costs vary with roots and fit in well with factors previously linked to strategic default decisions in the literature, which are closely related to roots. Moreover, they are consistent with previous findings evidencing that these costs may be particularly important for high-income borrowers (Ghent and Kudlyak, 2011). Certainly, the group of wealthy nationals may face more severe consequences when defaulting as these mortgagors are likely to hold other assets apart from the collateral of the mortgage (including future cash flows), which can be the target of the bank under a recourse regime. Hence, recourse would represent a "real threat" for these borrowers, preventing them from behaving opportunistically in the face of negative equity.[30]

Conditions are nevertheless quite different for rich foreigners or wealthy borrowers with few roots, as they would deal with lower default costs than rich nationals. For some of these debtors defaulting under negative equity might be appealing in the presence of very low transaction costs,

[29] We have also split the data into four groups considering borrowers' income. See results in the Annex.

[30] There are other potential negative consequences of defaulting that may affect wealthy borrowers more than non-wealthy debtors. For instance, in the event of default borrowers lose access to bank credit. This is more likely to be an issue for rich borrowers who benefit from easier access to banks' financial services.

including reduced moving costs. This explains higher default probabilities in this particular group of debtors. Interestingly, we note that the default behavior in these loans is observationally equivalent to that of debtors in non-recourse loans, in which strategic defaults are more common. In particular, Ghent and Kudlyak (2011) find that for rich individuals with non-recourse loans default probabilities increase with negative equity, while this is not a relevant factor for rich individuals with recourse loans.

We realize that defaults under negative equity are not necessarily evidencing that borrowers behave strategically. The literature argues that defaults should be more frequent with negative than with positive equity, as in the latter situation borrowers can sell the house and use the proceeds to cancel the loan (Foote and Willen, 2018). Moreover, with positive equity, mortgagors might find it easier to gain access to refinancing (Beraja et al., 2019) and meet mortgage payments even if an adverse life event arises (e.g., job loss). Thus, default probability could rise with negative equity with strategic motivations being absent.

While in our database we cannot identify shocks to borrowers, we note that we are evaluating default probabilities under negative equity for two sets of debtors with very similar characteristics in terms of observable risk (leverage, income level), but with very different roots. This is especially true when we compare wealthy nationals and wealthy foreigners who, on average, are likely to undergo very similar shocks during their lifetimes. Crucially, we have documented that in the crisis the probability of default for this particular set of borrowers is the same under positive equity, and that it only becomes different when high-income foreigners enter into negative equity territory. These developments are difficult to conciliate with the hypothesis that both groups of borrowers go through different shocks. Rather, our results suggest that under certain conditions, namely negative equity, default decisions made by households with low transaction costs or wealthy foreigners are driven, at least in part, by strategic motivations.

VII. Extensions and robustness exercises

7.1. Balance covariates between nationals and foreigners. Coarsened Exact Matching

As described in section 3, there are some differences in the characteristics of nationals and foreigners that might be relevant to explain the rough differences observed in terms of interest rates and default behavior. While we incorporate a large set of controls in our specifications to account for such differences, including measures to proxy for unobservable risk, such as credit history, there could be still place for differences between treatment and control groups that would imply an inadequacy of the data for estimating causal effects. To address this concern, and to find "statistical twins", we apply a Coarsened Exact Matching (CEM) method (Iacus et al., 2012), that make covariates in controls and treated more balanced. For the application of CEM we follow a three-step procedure: 1) we coarsen covariates into representative bins/cells (we use controls in

regressions as well as other variables that characterize the two types of borrowers); 2) we assign treated (foreigners) and non-treated (nationals) observations to each cell; and 3) we estimate average treatment effects (e.g., effect on interest rates of being national versus being nationalized), using weighted-regressions to account for the fact that some cells are more representative of the characteristics of foreigners, being others less representative (this ensures that we are producing an "apples with apples" comparison). Borrowers in the control group that are considered dissimilar by the coarsening algorithm have a weight equal to zero, and therefore are excluded from the estimation.

Tables 8 and 9 show the results of the CEM method, which are fully aligned with the evidence presented throughout the paper. In particular, lower roots are associated with greater interest rates in the mortgage at origination (Table 8, which replicates the exercises in Table 5 above), and with higher conditional default rates and strategic default behavior in high-income foreigners (Table 9, in which we carry out the same exercises of Table 7).[31]

Table 8. Coarsened Exact Matching. Interest rates at origination

	Dependent variable: Interest rate i_{rbt} at origination.					
	(1)	(2)	(3)	(4)	(5)	(6)
Foreigner	0.162***	0.197***	0.212***	0.180***	0.175***	0.174***
	(0.029)	(0.031)	(0.031)	(0.038)	(0.038)	(0.038)
Nationalized		0.061***	0.071***	0.063***	0.063***	0.061***
		(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
Mixed			0.036***	0.028***	0.033***	0.032***
			(0.006)	(0.007)	(0.006)	(0.006)
Non resident				0.165**	-0.003	0.002
				(0.076)	(0.034)	(0.035)
Foreign*Non resident					0.195**	0.203**
					(0.088)	(0.088)
Borrowers characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Mortgage characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Borrowers credit history	No	No	No	No	No	Yes
Observations	2,551,452	2,551,452	2,551,452	2,551,452	2,551,452	2,551,452
R-squared	0.540	0.540	0.540	0.540	0.540	0.540
Bank F.E.	Yes	yes	yes	yes	yes	yes
Year F.E.	Yes	yes	yes	yes	yes	yes
Month F.E.	Yes	yes	yes	yes	yes	yes
Province F.E.	No	No	No	No	No	No
Zip Code F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country of birth F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table replicates estimations in Table 5 using a coarsening matching procedure to weight untreated observations. Untreated individuals that are not matched by the coarsening algorithm are excluded from the estimation. We compute coarsening matching weights using information available in CIRBE on borrowers´ credit history, number of borrowers in the mortgage, the type of interest rate in the mortgage (whether variable or fixed interest rate), the availability of mortgage guarantees, the number of banking relationships of the main borrowers when the mortgage was granted, the employment status of the main borrower (grouped in three categories: employed, self-employed, other), the price of the dwelling (grouped in quartiles for the period considered), the mortgage term (grouped in quartiles for the period considered), total amount of mortgage granted (grouped in quartiles for the period considered) and the value of the LTP ratio (grouped in quartiles for the period considered). Untreated observations that are not matched by the coarsening algorithm are excluded from the estimation. We use the aweights obtained through the coarsening algorithm to weight the multiple fixed effects regressions estimated using Correia (2014) procedure. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

[31] The CEM method helps to choose the relevant comparison group and reduces differences between controls and treated, considering not only the mean but also other moments of the covariates distribution. Formal tests are not shown in the paper but are available upon request. Similarly, and for the sake of brevity, we only reproduce the coefficients of interest in Tables 8 and 9, being the complete results of the models available upon request.

Table 9. Coarsened Exact Matching. Conditional default rates

Dependent variable: DEFAULT (=1 if the loan has failed)					
	full sample	Subsamples of borrowers according to the appraisal value of mortgages collateral			
		<p25	p25-p50	p50-p75	>p75
	(1)	(2)	(3)	(4)	(5)
Foreigner and negative equity					
foreigner	0.323***	0.418***	0.308***	0.372***	-0.0380
	(0.0586)	(0.0548)	(0.107)	(0.0928)	(0.110)
negative equity	0.0223	0.00626	0.0944	0.0318	-0.0408
	(0.0318)	(0.0535)	(0.0575)	(0.0598)	(0.0713)
foreigner x negative equity	0.0839	0.117	0.132	-0.00430	0.373***
	(0.0670)	(0.0818)	(0.125)	(0.100)	(0.120)
Pseudo R2	0.159	0.133	0.180	0.163	0.191
Observations	4467636	950440	998191	942447	982821
Controls					
Loan & borrower characteristics	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y

Note: This table replicates estimates in Table 7 using a coarsening matching procedure to weight untreated observations. We compute coarsening matching weights using information available in EDW on the mortgage spread, LTV, loan maturity, the employment status of the main borrower (grouped in three categories: employed, self-employed, other) and borrowers´ income. Untreated individuals that are not matched by the coarsening algorithm are excluded from the estimation. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

7.2. Uncertainty regarding the estimation of the LTV-C

In this section we consider the issue that our estimates for the LTV-C might be noisy, as the value of the mortgage collateral (denominator of the LTV-C) is updated using regional price indices. Thus, within the same region collateral values are assumed to depreciate at the same rate in the crisis period. If this is not the case, we could wrongly assign loans to the negative or positive equity category when the opposite holds true.

To address this potential bias, we replace the negative equity dummy with a categorical variable that distinguishes five buckets of the LTV-C (<90%, 90-100%, 100-110%, 110-120% and >120%). The idea is that for loans with large negative equity (e.g., those with LTV-C > 120%), we are less likely to classify incorrectly loans as having negative equity. In these mortgages we would expect more defaults for foreigners, particularly if they are wealthy. Conversely, loans with LTV-C below 100% are less likely to have entered into negative equity zone. Thus, strategic decisions should be absent for mortgages in this situation.

We present the results of the new specification in Table 10. We group borrowers in two segments, those that have taken out mortgages with appraisal values below the 75th percentile (non-rich, Column (1)), and those above this threshold (rich, Column (2)), as we have already documented that default behavior is different between these debtors. In line with previous findings, non-rich foreigners have higher default probabilities than non-rich nationals (Column (1)), but the level of the LTV-C seems to be non-relevant in defaults, even when LTV-C is well above 100% (negative

equity). On the other hand, for rich borrowers the probability of default is the same for nationals and foreigners under positive equity, while it increases significantly for foreigners in the presence of negative equity. We do not observe this additional effect on defaults in loans with LTV-C slightly above 100% but only for mortgages that are well "underwater" (Column (2)). In particular, in loans with LTV-C above 110%, the probability of default is between 4 and 5.5 times higher for wealthy foreigners than for their national counterparts. This suggests that the effect of negative equity is non-linear, as defaults are only triggered when negative equity reaches certain levels, which is consistent with findings in previous studies (see Foote et al., 2008).

Table 10. Defaults and roots. Buckets of the current LTV ratio

Dependent variable: DEFAULT (=1 if the loan has failed)		
	non-wealthy	wealthy
	(1)	(2)
Foreigner and negative equity		
foreigner	0.436***	0.105
	(0.0787)	(0.158)
C-LTV [90,100]	-0.0222	0.0593
	(0.0573)	(0.0824)
C-LTV (100,110]	0.0359	-0.00920
	(0.0483)	(0.0956)
C-LTV (110,120]	0.00597	0.0285
	(0.0521)	(0.103)
C-LTV 120+	0.0972	-0.000400
	(0.0800)	(0.118)
foreigner x C-LTV [90,100]	0.108	-0.0240
	(0.0888)	(0.316)
foreigner x C-LTV (100,110]	-0.0579	-0.139
	(0.130)	(0.284)
foreigner x C-LTV (110,120]	0.134	0.461***
	(0.114)	(0.163)
foreigner x C-LTV 120+	0.0699	0.349**
	(0.0993)	(0.152)
Pseudo R2	0.164	0.177
Observations	3574945	1049033
Controls		
Loan & borrower characteristics	Y	Y
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). C-LTV is categorical variable with five buckets (C-LTV < 90%, 90% < C-LTV < 100%, 100% < C-LTV < 110%, 110% < C-LTV < 120%, C-LTV > 120%). The specification includes a complete set of fixed effects (bank, region and time fixed effects). It is further enriched to control for borrower characteristics and mortgage characteristics at origination, including the gross annual income of the main borrower in each loan, his job status, the spread of the mortgage rate over the risk free-rate, LTV at origination, the maturity of the loan and the age of the loan. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

7.3. Types of foreigners and defaults

Foreigners are heterogeneous, and incentives to go into default may be different among them. In particular, transaction costs could be particularly weak for non-resident foreigners in comparison to resident foreigners, as roots are especially weak in the first group of mortgagors. Therefore, one would expect a stronger strategic component in default decisions by non-residents.

While in the EDW we cannot distinguish directly between loans to residents and non-residents, we address this limitation by combining EDW and CIR.[32] In particular, we take advantage of CIR to split the sample into regions on the basis of the share of mortgages to non-residents in lending to foreigners. Regions with a share above the median are labelled as "non-resident" areas and include popular touristic destinations such as the Canary Islands or the Balearic Islands, where foreign borrowers tend to acquire holiday homes. On the other hand, "resident areas" apply to regions in which this share stands below the median. We then evaluate whether defaults in EDW depend on negative equity in each area separately. We show the results in Table 11.

Table 11. Defaults and roots. Non-residents and residents

Dependent variable: DEFAULT (=1 if the loan has failed)		
	non-residents	residents
	(1)	(2)
Foreigner, negative equity and wealthy		
foreigner	0.423***	0.533***
	(0.0731)	(0.0941)
negative equity	0.0715***	-0.0946**
	(0.0249)	(0.0420)
foreigner x negative equity	0.0645	-0.0776
	(0.0859)	(0.143)
wealthy	0.0219	-0.0793
	(0.0378)	(0.0489)
negative equity x wealthy	-0.0726	0.000796
	(0.0513)	(0.0526)
foreigner x wealthy	-0.246***	-0.0865
	(0.0933)	(0.194)
foreigner x negative equity x wealthy	0.229*	0.0839
	(0.132)	(0.212)
Pseudo R2	0.160	0.173
Observations	3292800	1331178
Controls		
Loan & borrower characteristics	Y	Y
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to 1 if the LTV-C of the loan is above 100% (0 otherwise). *wealthy* is a dummy equal to one for borrowers with original appraisal values above the 75th percentile value of the distribution. The specification includes a complete set of fixed effects (bank, region and time fixed effects). It is further enriched to control for borrower characteristics and mortgage characteristics at origination, including the gross annual income of the main borrower in each loan, his job status, the spread of the mortgage rate over the risk free-rate, LTV at origination, the maturity of the loan and the age of the loan. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

[32] In EDW templates used by banks there exists a field that refers to the residence of the borrower, but is barely populated.

The coefficient of interest is that associated with the triple interaction foreigner - negative equity - wealthy, where wealthy takes the value one for loans to borrowers whose appraisal value is above the 75th percentile of the distribution. The estimate of the coefficient of the triple interaction is positive and significant in non-resident areas (Column (1)), while it is not statistically different from zero in resident-areas (Column (2)). This implies that our main results may be driven by default decisions of non-residents, which fits in well with the idea that these borrowers have more incentives to behave strategically, due to their lower roots.

7.4. Spanish lenders versus foreign lender

So far, our exercises regarding defaults have focused on the performance of loans to foreigners and nationals in the mortgage portfolio of domestic banks. Nonetheless, in the EDW there is also one foreign lender with lending activity in Spain before the crisis. The composition of securitized mortgages of this lender is especial. First, its loans portfolio is highly concentrated in the segment of foreigners (there are almost no securitized operations in the segment of nationals); and, second, we have indications that within this set of loans, credit is further concentrated in foreigners whose nationality coincides with that of the country-domicile where the bank is based.[33]

The latter point is important since it may have implications for the effective recourse of banks. Certainly, foreigners may have lower transactions costs, which make them more prone to settle abroad or return to their country of origin during shocks. This characteristic may limit the effectiveness of recourse for Spanish lenders as they might find it more difficult/costly to go after the borrowers' other assets abroad. However, for lenders that operate in the same jurisdiction where the foreigner resides, or in the same country-domicile of origin of the borrower, recourse should be less costly for the bank. Therefore, we would expect strategic defaults to be less important in this type of lending relationship.

We present the results to test the previous hypothesis in Table 12. The sample is restricted to loans granted to foreigners as the foreign lender barely reports mortgages to nationals in the EDW. The specification adds a new dummy, named *foreign bank*, which is equal to one for the foreign lender and zero for Spanish banks. The coefficients of interest are those associated with negative equity and the interaction negative equity - foreign bank (we do not show the estimate of the coefficient of foreign bank, which is absorbed by the bank fixed effects).

We illustrate that for non-wealthy borrowers (again, loans in which the appraisal value of the collateral is below the 75th percentile value), negative equity does not play a significant role in defaults regardless of the bank type (Column (1)). On the other hand, for wealthy borrowers,

[33] According to supervisory information, before the crisis 80% of loans to the non-resident non-financial private sector of this bank was concentrated in borrowers whose residence coincided with the domicile of banks' headquarters, or with countries where the bank had active branches/subsidiaries. Two clarifications regarding supervisory data. First, we focus on credit to the non-financial private sector as no other breakdowns are available in the supervisory dataset. On the other hand, we look at the residence of the borrower rather than to her nationality as in this data we cannot see the latter attribute.

negative equity becomes an important driver of defaults when the mortgage is granted by Spanish banks (in line with previous results), but it is not relevant when the mortgage is extended by the foreign lender. Specifically, in Column (2) the interaction *negative equity*foreign bank* is negative and the size of the estimated coefficient is similar to that of *negative equity*, which captures the impact of negative equity on defaults for domestic banks. Although these results should be taken with caution as we only have data for one foreign bank, they suggest that borrowers may be able to internalize the degree of effectiveness of recourse of lenders and adjust their default decisions accordingly.

Table 12. Defaults and roots. Spanish lenders versus foreign lender

Dependent variable: DEFAULT (=1 if the loan has failed)		
	sample: only foreigners	
	non-wealthy	wealthy
	(1)	(2)
Foreigner and negative equity		
negative equity	0.00864	0.543***
	(0.0931)	(0.165)
negative equity x foreign bank	-0.205	-0.699***
	(0.128)	(0.158)
Pseudo R2	0.151	0.123
Observations	281536	155427
Controls		
Loan & borrower characteristics	Y	Y
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Negative equity* is a dummy equal to 1 if the LTV-C of the loan is above 100% (0 otherwise). *foreign bank* is a dummy equal to 1 when the lender is a foreign bank. The specification includes a complete set of fixed effects (bank, region and time fixed effects). It is further enriched to control for borrower characteristics and mortgage characteristics at origination, including the gross annual income of the main borrower in each loan, his job status, the spread of the mortgage rate over the risk free-rate, LTV at origination, the maturity of the loan and the age of the loan. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

VIII. Conclusions

In this study we bring together the literature on the role of rootedness in explaining socioeconomic outcomes of immigrants (Clark and Blue, 2004; Duleep and Regets, 1999; Osili and Xie, 2009) and recent studies identifying discrimination as one of the main factors explaining the higher cost of mortgages faced by minorities and foreign-born debtors (Bayer et al. 2018; Bartlett et al., 2022; Cheng et al, 2015; Diaz-Serrano and Raya, 2014). On the one hand, the former literature has identified immigrants' rootedness in host countries as a key determinant of the gaps with respect to natives in terms of financial vulnerability, labor conditions, education and social integration,

among others. However, despite of these factors are very likely to be related to default risk and mortgage pricing, rootedness has not been explicitly accounted for as a factor explaining differences in mortgage conditions before. On the other hand, studies comparing mortgage conditions and default rates between minorities, including immigrants, and other groups, identify significant differences that are mostly attributed to discrimination. We bridge these two branches of literature by identifying that the strength of borrowers' roots plays a relevant role in explaining mortgage pricing after controlling for a rich set of mortgage and borrower characteristics including their country of birth, which embeds unobservable information about ethnicity, race and language skills of borrowers that could be associated to discriminatory lending practices.

We also build on the literature on strategic defaults, which has identified that key unobserved factors, such as relocation costs, social stigma, fears of reduced access to credit in the future, or emotional attachment to their own homes, affect the utility from home ownership, and thereby prevent borrowers from defaulting strategically (Guiso et al., 2013; Bhuta et al., 2017; Foote and Willen, 2018). Certainly, although these factors are all related to rootedness, the link between the strength of borrowers' roots and strategic default has not been explicitly studied before. In this context, we are the first study to uncover the role of rootedness in incentives to default and strategic behavior.

Against this background, we study how rootedness explains differences in the pricing of mortgages at origination, default risk, and strategic default decisions by using two loan-level databases of mortgages granted in Spain over a complete financial cycle. Overall, we identify that rootedness plays a relevant role in explaining differences in mortgage conditions and default triggers between foreign- and native-born borrowers. In particular, we find that foreign-born borrowers face higher mortgage rates but that this spread is lower for foreigners with deep roots or better-settled in the host country. Nationalized foreign-born borrowers and those co-signing the loan with natives obtain the lowest spreads, while non-resident foreigners are charged with the highest rates. The strength of roots seems to be a relevant factor of mortgage pricing for high income borrowers as well, which suggests that rootedness may capture not only financial vulnerabilities but also behavioral and social factors of foreign-born households.

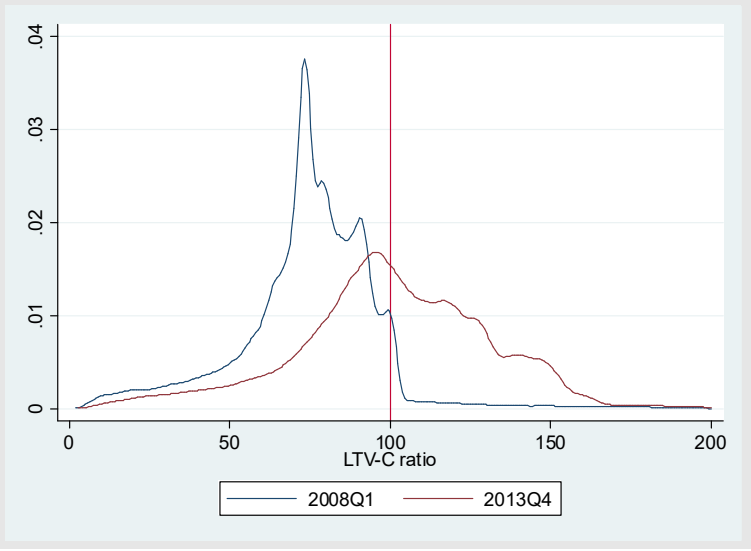
We also find that foreign-born borrowers are more prone to default after controlling for different mortgage and borrower characteristics. Moreover, we identify that negative equity is a key trigger for defaults for high-income foreign borrowers. This is consistent with the characteristics of borrowers more prone to default strategically identified before (Ghent and Kudlyak, 2011; Bhutta et al., 2016; Rhee, 2018). These results suggest that the characteristics of mortgage conditions of this group of borrowers can be linked to the ability of the lender to pursue a deficiency judgment in recourse mortgages. That is, shallow-rooted high-income borrowers not only get lower utility from home ownership, but also have lower relocation costs and greater facilities to move back to their home or other country. These two conditions make this particular group of households to

behave as if they were granted non-recourse loans, in which strategic defaults are more frequent (Ghent and Kudlyak, 2011). Our results suggest that this can be internalized by lenders, who charge these borrowers with higher spreads at loan origination.

Our results have important implications for policy and financial stability. First, enhancing immigrants' rootedness could reduce credit risk in these borrowers, which would help to close the gap with respect to natives in terms of mortgage conditions and to increase their accessibility to credit, while improving the stability in the financial system. Second, we shed light on the consequences of moving away from recourse regimes and adopting features of non-recourse mortgage frameworks. In particular, in the event of a regime shift, the lower default costs may induce borrowers to behave similarly to those debtors with shallow roots and wealthy in situations of negative equity. This in turn may lead to higher rates at mortgage origination, should this behavior is internalized by lenders. Finally, the fact that feeble roots may lead to strategic default behavior even in a recourse mortgage regime, where usually the incidence of this type of defaults is lower, could have implications for the effectiveness of macroprudential policy. In particular, for borrower-based tools, such as loan-to-value limits, which may work differently for distinct types of borrowers on the basis of their roots.

Figures

Figure 1. Distribution of the LTV-C. 2008Q1 versus 2013Q4



The figure shows kernel density estimates for the distribution of LTV-C (in %) of mortgages in Spanish RMBS in 2008Q1 and in 2013Q4, using data from the EDW repository. LTV-C is estimated taking into account mortgage characteristics at origination. We obtain the numerator of this ratio by calculating its amortization rate, which is easy to estimate since we have access to the characteristics of the contract mortgage. For the denominator we take changes in the original appraisal value of the mortgage collateral. The vertical axis represents LTV-C at 100%.

Annex 1. Cost of mortgages and rootedness

Table A1.1. Detailed results related to Table 4 (equation (1))

Dependent variable: interest rate i_{rbt} at origination.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Foreigner	0.399***	0.385***	0.351***	0.209***	0.192***	0.181***	0.184***
	(0.062)	(0.058)	(0.056)	(0.022)	(0.021)	(0.030)	(0.030)
Bank Employee					-0.804***	-0.767***	-0.764***
					(0.120)	(0.113)	(0.113)
Civil Servant					-0.146***	-0.122***	-0.119***
					(0.033)	(0.029)	(0.029)
Self employed					0.011	0.014	0.005
					(0.033)	(0.024)	(0.022)
Retired					0.064***	0.035**	0.035**
					(0.016)	(0.018)	(0.017)
Unemployed					0.032**	0.014	0.014
					(0.013)	(0.009)	(0.009)
Others: students, housewives and rentiers					0.017	0.013	0.013
					(0.035)	(0.024)	(0.024)
Ln (Age)					0.067***	0.024	0.009
					(0.025)	(0.051)	(0.050)
One Borrower						-0.034***	-0.028***
						(0.009)	(0.009)
>=3 Borrowers						0.138***	0.125***
						(0.020)	(0.019)
Variable interest rate						-0.513	-0.512
						(0.818)	(0.818)
Collateral: Number= 1						0.038	0.038
						(0.023)	(0.023)
Once default or delinquent							0.025***
							(0.007)
In default 12 months before origination							0.015
							(0.012)
In default 24 months before origination							0.021
							(0.020)
In default 36 months before origination							-0.008
							(0.011)
Bank relations at origination							0.016**
							(0.006)
Ln(Principal of the mortgage loan)						-0.181***	-0.184***
						(0.059)	(0.059)
Ln(Maturity)						-0.017	-0.017
						(0.091)	(0.091)
Intercept	2.859***	2.860***	2.861***	2.867***	2.664***	5.328***	5.394***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.091)	(0.994)	(0.999)
Observations	2,608,774	2,608,774	2,608,774	2,608,774	2,608,774	2,607,556	2,607,556
R-squared	0.532	0.540	0.550	0.551	0.560	0.571	0.571
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes
Province F.E.	No	Yes	No	No	No	No	No
Zip Code F.E.	No	No	Yes	Yes	Yes	Yes	Yes
Country of Birth F.E.	No	No	No	Yes	Yes	Yes	Yes
Restricted to specification (4)	Yes	Yes	Yes	-	-	-	-

Robust standard errors clustered at bank level are reported in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows results for specification in Equation (1). The dependent variable is the interest rate at origination mortgages originated from 2004 to 2019. Foreigner is a dummy equal to one if all the mortgagors are foreigners (shallow roots), and is equal to 0 otherwise (deep roots). The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effect; location (province or zip code) fixed effects; and region of birth fixed effects). It is further enriched to control for borrowers´ characteristics, mortgage characteristics and borrowers´ credit history. Borrowers' characteristics include a set of dummy variables for employment status; the natural logarithm of the average age of the mortgagors, and a set of dummies regarding the number of mortgagors. Loan characteristics include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Results in Columns (1) to (3) are restricted to the specification that includes the complete set of fixed effects considered (Column 4), from column (4) onwards the same fixed effects than in Column (4) are included. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A1.2. Detailed results related to Table 5 (equation (2))

Dependent variable: Mortgage interest rate at origination Ir_{irbt}	(1)	(2)	(3)	(4)	(5)	(6)
Foreigner	0.181***	0.220***	0.245***	0.225***	0.222***	0.224***
	(0.030)	(0.038)	(0.040)	(0.048)	(0.049)	(0.049)
Nationalized		0.067**	0.085***	0.080**	0.080**	0.082**
		(0.029)	(0.032)	(0.032)	(0.032)	(0.032)
Mixed			0.063***	0.058***	0.061***	0.062***
			(0.010)	(0.011)	(0.012)	(0.011)
Non resident				0.106	-0.010	-0.003
				(0.070)	(0.029)	(0.030)
Foreign*Non resident					0.134*	0.147**
					(0.073)	(0.073)
Bank Employee	-0.767***	-0.767***	-0.767***	-0.767***	-0.767***	-0.763***
	(0.113)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)
Civil Servant	-0.122***	-0.122***	-0.121***	-0.121***	-0.121***	-0.119***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Self employed	0.014	0.014	0.014	0.014	0.014	0.006
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.022)
Retired	0.035**	0.035**	0.036**	0.036**	0.036**	0.035**
	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Unemployed	0.014	0.014	0.014	0.014	0.014	0.014
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Others: students, housewives and rentiers	0.013	0.013	0.014	0.013	0.013	0.013
	(0.024)	(0.024)	(0.023)	(0.024)	(0.024)	(0.024)
Ln (Age)	0.024	0.023	0.024	0.024	0.024	0.007
	(0.051)	(0.052)	(0.051)	(0.052)	(0.052)	(0.050)
One Borrowers	-0.034***	-0.033***	-0.031***	-0.031***	-0.031***	-0.025***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
>=3 Borrowers	0.138***	0.137***	0.137***	0.137***	0.137***	0.123***
	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)
Variable interest rate	-0.513	-0.513	-0.512	-0.513	-0.513	-0.512
	(0.818)	(0.818)	(0.818)	(0.818)	(0.818)	(0.818)
Collateral: Number= 1	0.038	0.038	0.038	0.038	0.038	0.038
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Once default or delinquent						0.026***
						(0.007)
In default 12 months before origination						0.014
						(0.012)
In default 24 months before origination						0.021
						(0.020)
In default 36 months before origination						-0.008
						(0.011)
Bank relations at origination						0.017***
						(0.006)
Ln(Principal of the mortgage loan)	-0.181***	-0.181***	-0.181***	-0.181***	-0.181***	-0.184***
	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.058)
Ln(Maturity)	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017
	(0.091)	(0.091)	(0.091)	(0.091)	(0.091)	(0.091)
Intercept	5.328***	5.327***	5.322***	5.326***	5.326***	5.395***
	(0.994)	(0.993)	(0.993)	(0.993)	(0.992)	(0.997)
Observations	2,607,556	2,607,556	2,607,556	2,607,556	2,607,556	2,607,556
R-squared	0.571	0.571	0.571	0.571	0.571	0.571
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Province F.E.	No	No	No	No	No	No
Zip Code F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Country of Birth F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows results for specification in Equation (2). The dependent variable is the interest rate at origination for mortgages originated from 2004 to 2019. F*oreigner* is a dummy variable defined at the mortgage level, equal to one if all the mortgagors are foreigners (shallow roots), and is equal to 0 otherwise (deep roots). *Nationalized* is a dummy variable that takes the value 1 if all borrowers are Spanish citizens, but at least one is a former foreigner that has been nationalized, and zero otherwise. *Mixed* is a dummy variable defined at the mortgage level, that takes the value 1 if at least one borrower is not a Spanish citizen, zero otherwise. The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effects; location (province or zip code) fixed effects; and region of birth fixed effects). It is further enriched to control for borrowers´ characteristics, mortgage characteristics and borrowers´ credit history. Borrowers' characteristics include a set of dummy variables for employment status; the natural logarithm of the average age of the mortgagors, and a set of dummies regarding the number of mortgagors. Loan characteristics include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A1.3. Detailed results related to Table 6 (equation (2), estimated by quartile of income)

Dependent variable: Mortgage interest rate at origination Ir_{irbt}

	(1) [0,p25th]	(2) (p25th,p50th]	(3) (p50th,p75th]	(4) (p75th, p100th]
Foreigner	0.163***	0.255***	0.278***	0.180***
	(0.043)	(0.053)	(0.054)	(0.042)
Nationalized	0.044	0.095***	0.101***	0.076*
	(0.027)	(0.032)	(0.028)	(0.040)
Mixed	0.041***	0.080***	0.094***	0.026***
	(0.012)	(0.021)	(0.014)	(0.007)
Non resident	0.027	-0.092*	-0.153*	0.089
	(0.048)	(0.048)	(0.085)	(0.062)
Foreign*Non resident	0.210**	0.207**	0.203***	-0.030
	(0.091)	(0.095)	(0.076)	(0.072)
Bank Employee	-0.877***	-0.829***	-0.791***	-0.794***
	(0.096)	(0.110)	(0.115)	(0.089)
Civil Servant	-0.167***	-0.140***	-0.110***	-0.087***
	(0.045)	(0.035)	(0.026)	(0.023)
Self employed	-0.024	0.006	0.021	0.021
	(0.032)	(0.022)	(0.016)	(0.018)
Retired	0.018	0.044***	0.050***	0.038***
	(0.027)	(0.013)	(0.015)	(0.013)
Unemployed	0.021*	0.019**	0.033**	-0.001
	(0.012)	(0.009)	(0.014)	(0.015)
Others: students, housewives and rentiers	0.024	0.029	0.014	-0.015
	(0.030)	(0.025)	(0.027)	(0.029)
Ln (Age)	-0.008	0.022	0.014	0.019
	(0.066)	(0.058)	(0.041)	(0.046)
Variable interest rate	-0.189	-0.403	-0.587	-0.882
	(0.886)	(0.824)	(0.764)	(0.840)
Collateral: Number= 1	0.032	0.030	0.028	0.071*
	(0.022)	(0.021)	(0.022)	(0.036)
One Borrower	-0.041***	-0.031***	-0.024**	-0.000
	(0.011)	(0.010)	(0.011)	(0.010)
>=3 Borrowers	0.104***	0.113***	0.131***	0.140***
	(0.016)	(0.023)	(0.030)	(0.024)
Once default or delinquent	0.023**	0.026***	0.029***	0.035***
	(0.009)	(0.007)	(0.006)	(0.009)
In default 12 months before origination	0.013	0.023*	0.026**	0.015**
	(0.018)	(0.012)	(0.012)	(0.006)
In default 24 months before origination	0.041**	0.017	0.022	0.014
	(0.020)	(0.015)	(0.028)	(0.015)
In default 36 months before origination	-0.015	-0.006	-0.012	-0.015
	(0.011)	(0.008)	(0.016)	(0.013)
Bank relations at origination	0.017**	0.015***	0.015*	0.013
	(0.007)	(0.006)	(0.009)	(0.009)
Ln(Principal of the mortgage loan)	-0.168**	-0.189***	-0.189***	-0.182***
	(0.077)	(0.068)	(0.056)	(0.046)
Ln(Maturity)	-0.016	-0.009	-0.021	-0.024
	(0.106)	(0.099)	(0.099)	(0.081)
Intercept	5.229***	5.429***	5.479***	5.339***
	(1.122)	(1.068)	(1.006)	(1.013)
Observations	604,802	604,963	609,241	601,116
R-squared	0.545	0.571	0.570	0.563
Bank F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes
Zip Code F.E.	Yes	Yes	Yes	Yes
Country of birth F.E.	Yes	Yes	Yes	Yes

Robust standard errors clustered at bank level are reported in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows results for specification in Equation (2). The dependent variable is the interest rate at origination for all the outstanding mortgages originated from 2004 to 2019. F*oreigner* is a dummy variable defined at the mortgage level, equal to one if all the mortgagors are foreigner (shallow roots), and is equal to 0 otherwise (deep roots). *Nationalized* is a dummy variable that takes the value 1 if all borrowers are Spanish nationality holders, but at least one is a former foreigner that has been nationalized and zero otherwise. *Mixed* is a dummy variable defined at the mortgage level, that takes the value 1 if at least one borrower is not a Spanish nationality holder; zero otherwise. The specification includes a complete set of fixed effects (Bank fixed effect, Time (year and month) fixed effect; location (province or zip code) fixed effect; and region of birth fixed effects). It is further enriched to control for *Borrower characteristics, Mortgage characteristics and Borrowers Credit history*. Borrowers' characteristics is a vector of controls that include a set of dummy variables for employment status; the natural logarithm of the median age of the mortgagors, and a set of dummies regarding the number of mortgagors; Loan characteristics is a vector of controls that include information about the loan collateral, the mortgage principal amount and the mortgage maturity. Results are restricted to the specification that includes the complete set of fixed effects considered (5) and information about credit history. Errors are shown in parentheses and are robust clustered at the bank level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Annex A2. Defaults and rootedness.

Table A2.1. Defaults and rootedness (complete results for Table 7)

Dependent variable: DEFAULT (=1 if the loan has failed)					
	full sample	Subsamples of borrowers according to the appraisal value of mortgages collateral			
		<p25	p25-p50	p50-p75	>p75
	(1)	(2)	(3)	(4)	(5)
Foreigner and negative equity					
foreigner	0.424***	0.504***	0.450***	0.443***	0.0999
	(0.0609)	(0.0542)	(0.102)	(0.0887)	(0.118)
negative equity	0.0210	-0.00396	0.0556	0.0307	-0.0436
	(0.0270)	(0.0434)	(0.0523)	(0.0677)	(0.0565)
foreigner x negative equity	0.0534	0.0871	0.0495	-0.0125	0.323***
	(0.0719)	(0.0847)	(0.116)	(0.100)	(0.117)
Borrower and loan characteristics					
log(income)	0.0209	0.0498	-0.0249	0.0307	0.0545
	(0.0198)	(0.0346)	(0.0223)	(0.0345)	(0.0506)
job status: civil servant	-0.343***	-0.0832	-0.401**	-0.479***	-0.513***
	(0.0660)	(0.0981)	(0.186)	(0.165)	(0.173)
job status: self_employed	0.146***	0.243***	0.144***	0.124***	0.100**
	(0.0301)	(0.0450)	(0.0480)	(0.0395)	(0.0497)
job status: unemployed	0.108	0.0264	0.201*	0.0875	0.0666
	(0.0664)	(0.119)	(0.114)	(0.0973)	(0.129)
job status: other	0.125***	0.129***	0.172***	0.129**	0.0194
	(0.0230)	(0.0456)	(0.0622)	(0.0645)	(0.0334)
loan age	0.0136***	0.0213***	0.00141	0.0140**	0.0153
	(0.00493)	(0.00782)	(0.00606)	(0.00643)	(0.0130)
spread	0.00274***	0.00314***	0.00256***	0.00210***	0.00303***
	(0.000446)	(0.000553)	(0.000793)	(0.000486)	(0.000627)
LTV [60,75]	0.178***	0.00804	0.112	0.303***	0.253***
	(0.0640)	(0.0849)	(0.0964)	(0.0698)	(0.0541)
LTV (75,80]	0.344***	0.153**	0.283***	0.483***	0.437***
	(0.0626)	(0.0680)	(0.102)	(0.0703)	(0.0525)
LTV 80+	0.417***	0.237**	0.286***	0.611***	0.486***
	(0.0752)	(0.0921)	(0.106)	(0.0741)	(0.0421)
maturity [25,30]	0.107***	0.103*	0.145***	0.140**	0.0147
	(0.0267)	(0.0574)	(0.0555)	(0.0646)	(0.0440)
maturity 30+	0.0532**	0.0696	0.0773	0.0613	-0.0139
	(0.0231)	(0.0725)	(0.0752)	(0.0810)	(0.0441)
Pseudo R2	0.163	0.154	0.174	0.163	0.176
Observations	4623978	1,142,876	1,183,263	1,121,556	1,176,283
Controls					
Bank FE	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to one if the LTV-C of the loan is above 100% (0 otherwise). Income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan). Job status represents a set of binary variables identifying if the main borrower is a wage earner (the benchmark category), a civil servant, self-employed, unemployed or have any other employment status. Loan characteristics include the age of the loan (in quarters), the spread of the mortgage rate over the risk free-rate at origination. The LTV at origination is included by distinguishing between four different buckets (LTV < 60%, 60% < LTV < 75%, 75 < LTV < 80%, LTV > 80%). The term of the mortgage is also accounted for by dividing its maturity into three buckets (maturity < 25, 25 < maturity < 30, maturity > 30). maturity is measured in years. The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A2.2. Defaults and rootedness. Buckets of LTV-C (complete results for Table 10)

Dependent variable: DEFAULT (=1 if the loan has failed)		
	non-wealthy	wealthy
	(1)	(2)
Foreigner and negative equity		
foreigner	0.436***	0.105
	(0.0787)	(0.158)
C-LTV [90,100]	-0.0222	0.0593
	(0.0573)	(0.0824)
C-LTV (100,110]	0.0359	-0.00920
	(0.0483)	(0.0956)
C-LTV (110,120]	0.00597	0.0285
	(0.0521)	(0.103)
C-LTV 120+	0.0972	-0.000400
	(0.0800)	(0.118)
foreigner x C-LTV [90,100]	0.108	-0.0240
	(0.0888)	(0.316)
foreigner x C-LTV (100,110]	-0.0579	-0.139
	(0.130)	(0.284)
foreigner x C-LTV (110,120]	0.134	0.461***
	(0.114)	(0.163)
foreigner x C-LTV 120+	0.0699	0.349**
	(0.0993)	(0.152)
Borrower and loan characteristics		
log(income)	0.0200	0.0551
	(0.0156)	(0.0511)
job status: civil servant	-0.304***	-0.513***
	(0.0636)	(0.173)
job status: self_employed	0.168***	0.101**
	(0.0290)	(0.0496)
job status: unemployed	0.112	0.0662
	(0.0760)	(0.130)
job status: other	0.140***	0.0210
	(0.0259)	(0.0343)
loan age	0.0130***	0.0155
	(0.00428)	(0.0129)
spread	0.00262***	0.00303***
	(0.000469)	(0.000638)
LTV [60,75]	0.147**	0.232***
	(0.0686)	(0.0548)
LTV (75,80]	0.304***	0.399***
	(0.0672)	(0.0764)
LTV 80+	0.366***	0.446***
	(0.0766)	(0.0715)
maturity [25,30]	0.137***	0.00783
	(0.0338)	(0.0463)
maturity 30+	0.0695**	-0.0242
	(0.0333)	(0.0482)
Pseudo R2	0.164	0.177
Observations	3574945	1049033
Controls		
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note: The dependent variable is a dummy equal to one for foreclosures or defaulted loans, where a loan is considered as defaulted if it failed in the crisis period (2008-2013) and its situation remains unchanged the last time the bank reported its status (i.e., loans that defaulted during the crisis but that are no longer in default as of the last report date are not considered failed); foreigner is a dummy equal to one if the borrower is a foreigner, and equal to 0 if it is a national citizen. C-LTV is classified in five different buckets (C-LTV<90%, 90%<C-LTV<100%, 100%<C-LTV<110%, 110%<C-LTV<120%, C-LTV>120%); income is the gross annual income of the main borrower in each loan and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan); job status groups a set of dummy variables including wage-earner (the benchmark category), civil servant, self-employed, unemployed and other (other employment status). Loan characteristics include age of the loan (in quarters), spread of the mortgage rate over the risk free-rate at origination. LTV at origination is classified in four different buckets (LTV< 60%, 60%<LTV<75%,75 < LTV < 80%, LTV>80%), and maturity is measured in years and classified in three buckets (maturity< 25, 25<maturity<30, maturity> 30). The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *,**,*** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A2.3. Defaults and rootedness. Non-residents vs residents (complete results for Table 11)

Dependent variable: DEFAULT (=1 if the loan has failed)		
	non-residents	residents
	(1)	(2)
Foreigner, negative equity and wealthy		
foreigner	0.423***	0.533***
	(0.0731)	(0.0941)
negative equity	0.0715***	-0.0946**
	(0.0249)	(0.0420)
foreigner x negative equity	0.0645	-0.0776
	(0.0859)	(0.143)
wealthy	0.0219	-0.0793
	(0.0378)	(0.0489)
negative equity x wealthy	-0.0726	0.000796
	(0.0513)	(0.0526)
foreigner x wealthy	-0.246***	-0.0865
	(0.0933)	(0.194)
foreigner x negative equity x wealthy	0.229*	0.0839
	(0.132)	(0.212)
Borrower and loan characteristics		
log(income)	0.0355*	0.0319
	(0.0204)	(0.0354)
job status: civil servant	-0.342***	-0.342***
	(0.0843)	(0.0978)
job status: self_employed	0.155***	0.146***
	(0.0370)	(0.0433)
job status: unemployed	0.150**	-0.0161
	(0.0662)	(0.116)
job status: other	0.100***	0.153***
	(0.0300)	(0.0405)
loan age	0.0210***	-0.00198
	(0.00577)	(0.00522)
spread	0.00301***	0.00238***
	(0.000443)	(0.000619)
LTV [60,75]	0.122**	0.289***
	(0.0527)	(0.0562)
LTV (75,80]	0.270***	0.497***
	(0.0490)	(0.0493)
LTV 80+	0.328***	0.589***
	(0.0700)	(0.0602)
maturity [25,30]	0.0621**	0.215***
	(0.0273)	(0.0367)
maturity 30+	0.0278	0.144***
	(0.0322)	(0.0464)
Pseudo R2	0.160	0.173
Observations	3292800	1331178
Controls		
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note The dependent variable is a dummy equal to one for foreclosures or defaulted loans. In the latter case, a loan is considered defaulted if it defaulted in the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed); foreigner is a dummy equal to one if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots); negative equity is a dummy equal to one if the LTV-C of the loan is above 100% (0 otherwise); income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan); job status is a categorical variable grouping wage-earner (or wage earners, this is the benchmark category), civil servant (civil servants), self-employed (self-employed), unemployed (unemployed) and other (capturing any other employment status). Loan characteristics include the age of the loan (in quarters), the spread of the mortgage rate over the risk free-rate at origination. LTV at origination is classified in four different buckets (LTV< 60%, 60%<LTV<75%,75 < LTV < 80%, LTV>80%), and maturity is measured in years and classified in three buckets (maturity< 25, 25<maturity<30, maturity> 30). The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A2.4. Defaults and rootedness. Spanish lender versus foreign lender (complete results for Table 12)

Dependent variable: DEFAULT (=1 if the loan has failed)		
	sample: only foreigners	
	non-wealthy	wealthy
	(1)	(2)
Foreigner and negative equity		
negative equity	0.00864	0.543***
	(0.0931)	(0.165)
negative equity x foreign bank	-0.205	-0.699***
	(0.128)	(0.158)
Borrower and loan characteristics		
log(income)	-0.00137	0.0266
	(0.0411)	(0.0726)
job status: civil servant	-0.177	-0.562***
	(0.152)	(0.177)
job status: self_employed	0.0960*	0.225*
	(0.0542)	(0.118)
job status: unemployed	0.312**	0.412**
	(0.151)	(0.208)
job status: other	-0.162	0.0251
	(0.119)	(0.0781)
loan age	0.00120	-0.0157
	(0.00708)	(0.0141)
spread	0.00197***	0.00298*
	(0.000714)	(0.00153)
LTV [60,75]	0.231**	0.216***
	(0.0960)	(0.0658)
LTV (75,80]	0.369***	0.314***
	(0.0935)	(0.0922)
LTV 80+	0.473***	0.355***
	(0.0895)	(0.0987)
maturity [25,30]	-0.0409	-0.116
	(0.104)	(0.0716)
maturity 30+	0.103	0.0873
	(0.109)	(0.129)
Pseudo R2	0.151	0.123
Observations	281536	155427
Controls		
Bank FE	Y	Y
Region FE	Y	Y
Time FE	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to one if the LTV-C of the loan is above 100% (0 otherwise). Income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan). Job status represents a set of binary variables identifying if the main borrower is a wage earner (the benchmark category), a civil servant, self-employed, unemployed or have any other employment status. Loan characteristics include the age of the loan (in quarters), the spread of the mortgage rate over the risk free-rate at origination. The LTV at origination is included by distinguishing between four different buckets (LTV < 60%, 60% < LTV < 75%, 75 < LTV < 80%, LTV > 80%). The term of the mortgage is also accounted for by dividing its maturity into three buckets (maturity < 25, 25 < maturity < 30, maturity > 30). maturity is measured in years. The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A2.5. Alternative model specifications

Dependent variable: DEFAULT (=1 if the loan has failed)						
	probit model		probit model with region x time fixed effects		logit model (odds ratios)	
	non-wealthy	wealthy	non-wealthy	wealthy	non-wealthy	wealthy
	(1)	(2)	(3)	(4)	(5)	(6)
Foreigner and negative equity						
foreigner	0.479***	0.0999	0.493***	0.0814	4.984***	1.315
	(0.0579)	(0.118)	(0.0625)	(0.123)	(0.934)	(0.537)
negative equity	0.0330	-0.0436	0.0538**	-0.0455	1.140	0.890
	(0.0295)	(0.0565)	(0.0273)	(0.0537)	(0.110)	(0.162)
foreigner x negative equity	0.0121	0.323***	0.0114	0.360***	0.948	2.633**
	(0.0715)	(0.117)	(0.0780)	(0.121)	(0.221)	(1.031)
Borrower and loan characteristics						
log(income)	0.0193	0.0545	0.0209	0.0532	1.068	1.179
	(0.0159)	(0.0506)	(0.0162)	(0.0532)	(0.0541)	(0.194)
job status: civil servant	-0.305***	-0.513***	-0.313***	-0.524***	0.324***	0.145***
	(0.0638)	(0.173)	(0.0645)	(0.179)	(0.0742)	(0.100)
job status: self_employed	0.168***	0.100**	0.173***	0.105**	1.674***	1.318*
	(0.0291)	(0.0497)	(0.0302)	(0.0512)	(0.154)	(0.217)
job status: unemployed	0.112	0.0666	0.118	0.0882	1.476	1.221
	(0.0763)	(0.129)	(0.0795)	(0.137)	(0.384)	(0.547)
job status: other	0.141***	0.0194	0.148***	0.0150	1.557***	1.025
	(0.0260)	(0.0334)	(0.0261)	(0.0333)	(0.125)	(0.117)
loan age	0.0127***	0.0153	0.0131***	0.0153	1.037***	1.039
	(0.00424)	(0.0130)	(0.00428)	(0.0139)	(0.0142)	(0.0454)
spread	0.00265***	0.00303***	0.00273***	0.00310***	1.008***	1.010***
	(0.000448)	(0.000627)	(0.000463)	(0.000666)	(0.00152)	(0.00224)
LTV [60,75]	0.146**	0.253***	0.146*	0.267***	1.586*	2.358***
	(0.0743)	(0.0541)	(0.0767)	(0.0562)	(0.380)	(0.400)
LTV (75,80]	0.308***	0.437***	0.311***	0.464***	2.675***	4.274***
	(0.0745)	(0.0525)	(0.0761)	(0.0551)	(0.653)	(0.668)
LTV 80+	0.384***	0.486***	0.385***	0.514***	3.442***	4.606***
	(0.0935)	(0.0421)	(0.0965)	(0.0444)	(1.062)	(0.631)
maturity [25,30]	0.141***	0.0147	0.146***	0.0116	1.612***	1.092
	(0.0374)	(0.0440)	(0.0392)	(0.0462)	(0.199)	(0.168)
maturity 30+	0.0796**	-0.0139	0.0822**	-0.0186	1.361**	0.973
	(0.0378)	(0.0441)	(0.0398)	(0.0450)	(0.175)	(0.153)
Pseudo R2	0.163	0.176	0.204	0.238	0.163	0.177
Observations	3499976	1157362	3499976	1157362	3499976	1157362
Controls						
Bank FE	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	.	.	Y	Y
Time FE	Y	Y	.	.	Y	Y
Region x Time FE	N	N	Y	Y	N	N

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to one if the LTV-C of the loan is above 100% (0 otherwise). Income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan). Job status represents a set of binary variables identifying if the main borrower is a wage earner (the benchmark category), a civil servant, self-employed, unemployed or have any other employment status. Loan characteristics include the age of the loan (in quarters), the spread of the mortgage rate over the risk free-rate at origination. The LTV at origination is included by distinguishing between four different buckets (LTV < 60%, 60% < LTV < 75%, 75 < LTV < 80%, LTV > 80%). The term of the mortgage is also accounted for by dividing its maturity into three buckets (maturity < 25, 25 < maturity < 30, maturity > 30). maturity is measured in years. The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

Table A2.6. Effective recourse and defaults. Results for quartiles of the distribution of income

Dependent variable: DEFAULT (=1 if the loan has failed)				
	Subsamples of borrowers according to borrowers´ income			
	<p25	p25-p50	p50-p75	>p75
	(6)	(7)	(8)	(9)
Foreigner and negative equity				
foreigner	0.530***	0.637***	0.420***	0.0556
	(0.0654)	(0.0658)	(0.0724)	(0.105)
negative equity	0.0713	0.0591	0.0978*	-0.106**
	(0.0493)	(0.0524)	(0.0532)	(0.0524)
foreigner x negative equity	-0.0534	-0.000606	-0.0557	0.304**
	(0.0708)	(0.0917)	(0.0941)	(0.125)
Borrower and loan characteristics				
log(income)	0.107*	-0.158	-0.0445	0.0621
	(0.0590)	(0.161)	(0.163)	(0.0790)
job status: civil servant	-0.318	-0.323***	-0.358***	-0.382**
	(0.200)	(0.124)	(0.0909)	(0.155)
job status: self_employed	0.0812*	0.0538	0.135***	0.163***
	(0.0443)	(0.0597)	(0.0484)	(0.0507)
job status: unemployed	0.0693	-0.0376	0.0671	0.343***
	(0.110)	(0.203)	(0.134)	(0.129)
job status: other	0.138***	0.0728	0.254***	-0.0144
	(0.0374)	(0.0478)	(0.0496)	(0.0497)
loan age	0.0211***	0.00328	0.0223***	0.00921
	(0.00758)	(0.00743)	(0.00835)	(0.00841)
spread	0.00253***	0.00210***	0.00350***	0.00336***
	(0.000542)	(0.000538)	(0.000577)	(0.000660)
LTV [60,75]	0.120	0.177***	0.250***	0.231***
	(0.112)	(0.0629)	(0.0791)	(0.0827)
LTV (75,80]	0.254**	0.296***	0.428***	0.435***
	(0.102)	(0.0814)	(0.0635)	(0.0665)
LTV 80+	0.326**	0.357***	0.509***	0.501***
	(0.132)	(0.0890)	(0.0780)	(0.0785)
maturity [25,30]	0.146**	0.104	-0.0190	0.142**
	(0.0634)	(0.0757)	(0.0487)	(0.0602)
maturity 30+	0.0274	0.0724	0.00439	0.0788*
	(0.0588)	(0.0800)	(0.0488)	(0.0430)
Pseudo R2	0.157	0.172	0.164	0.177
Observations	1,184,561	1,227,988	1,079,394	1,132,035
Controls				
Bank FE	Y	Y	Y	Y
Region FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y

Note: The dependent variable is a dummy equal to 1 if a loan defaulted or ended in a foreclosure during the crisis period (2008-2013) and its status remains unchanged in the last period the bank reported the operation (i.e., loans that defaulted during the crisis but that are no longer in default at the last reporting date are not considered failed). *Foreigner* is a dummy equal to 1 if the borrower is a foreigner (shallow roots), and is equal to 0 for nationals (deep roots). *Negative equity* is a dummy equal to one if the LTV-C of the loan is above 100% (0 otherwise). Income refers to the gross annual income of the main borrower in each loan, and is expressed in euros (the main borrower is usually the borrower with the higher income in the loan). Job status represents a set of binary variables identifying if the main borrower is a wage earner (the benchmark category), a civil servant, self-employed, unemployed or have any other employment status. Loan characteristics include the age of the loan (in quarters), the spread of the mortgage rate over the risk free-rate at origination. The LTV at origination is included by distinguishing between four different buckets (LTV < 60%, 60% < LTV < 75%, 75 < LTV < 80%, LTV > 80%). The term of the mortgage is also accounted for by dividing its maturity into three buckets (maturity < 25, 25 < maturity < 30, maturity > 30). maturity is measured in years. The specification is further saturated with bank, region and time fixed effects. Errors are shown in parentheses and are robust clustered at the region level. *, **, *** represent that the coefficient is statistically significant at 10%, 5% and 1%, respectively.

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