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## ABSTRACT

### **Is there Discriminatory Mortgage Pricing against Immigrants in the Spanish Lending Market?\***

In this paper, we investigate whether evidence of discriminatory treatment against immigrants in the Spanish mortgage market exists. More specifically, we test whether, *ceteris paribus*, immigrant borrowers tend to be charged with higher interest rates on their mortgages than their Spanish born counterparts. To do so, we use a unique dataset on granted mortgages that contains information not only regarding the conditions of the loan but also the socio-economic characteristics of the mortgagors. We observe that immigrants are systematically charged with higher interest rates. We apply the well known Oaxaca-Blinder decomposition to measure the extent to which this disparate treatment of lenders in mortgage pricing against immigrants is due to discrimination. Our results indicate that approximately two thirds of the gap in the interest rate between Spanish born and immigrant borrowers can be attributed to discriminatory treatment.

JEL Classification: R21, G21, J14

Keywords: immigration, discrimination, mortgage pricing, housing market

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## 1. Introduction

Discrimination against minorities has been an issue in the lending industry for decades. Consequently, mortgage lending has attracted the attention of politicians and researchers in recent years. US legislators have tried to protect minorities from discrimination in the mortgage and housing markets by means of certain statutes.<sup>1,2</sup> Although the issue of discrimination against minorities has also attracted the attention of legislators in Europe, as yet there has been no legislation regarding the specific context of housing and lending markets. Neither Spain nor the rest of Europe has specific laws to protect minorities from discrimination in housing and lending markets. However, in Spain, the 2001 Immigration Law (art. 23) explicitly defines discrimination as the act of: “... *imposing more expensive (tax/fee) conditions on foreigners than on Spaniards, or the act of refusing to facilitate goods or services to foreigners, just because they pertain to a specific race, religion, ethnicity or nationality*”. According to this article, unfair discretionary behaviour by Spanish lending institutions against immigrants is illegal.

Discrimination against minority borrowers can take many forms. A mortgage loan application can be turned down by a lending company on the grounds that the mortgagor belongs to an ethnic minority or holds immigrant status. Even if the loan application is accepted, mortgages for minority homebuyers can be priced at a higher interest rate. In this paper, we test for the first time the existence of discrimination outside the US in mortgage pricing against minorities. More specifically, using unusually rich Spanish data on accepted loans, we test: i) whether immigrants are

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<sup>1</sup> These are the Fair Housing Act (1968), the Equal Credits Opportunity Act (1974), the Home Mortgage Disclosure Act (1975), the Community Reinvestment Act (1977) and the Financial Institutions Reform, Reregulation, and Enforcement Act (1989).

<sup>2</sup> See LaCour-Little (1999) for an overview of the key features of US federal housing legislation.

systematically charged with larger interest rates on their mortgages, and; ii) if this disparate treatment exists, to what extent such treatment is due to market forces or to discrimination.

Our empirical test on discrimination in the Spanish mortgage market is straightforward and robust. The method we use allows us to test in a simple way whether identical borrowers with identical mortgages differing only in their minority status are subject to different interest rates on their mortgages. We control for a large set of household, mortgage and market characteristics, and use the well known Oaxaca-Blinder decomposition to decompose the gap in average mortgage interest rate between immigrant and native borrowers.<sup>3</sup> Our results indicate that, on average, immigrants pay significantly larger annual interest rates than a native-Spanish equivalent borrower, and that between 2/3 and 3/4 of this gap can be attributed to discrimination.

The paper is structured as follows. In section two we describe the conceptual framework and overview the existing literature on discrimination in mortgage markets. Section three describes the empirical framework. In section four we describe the dataset. In section five, we carry out the econometric analysis. Finally, in section six we summarize and conclude.

## **2. Conceptual framework and literature**

### *2.1. Mortgage pricing in Spain*

In the US, most of the few papers testing for discrimination in mortgage pricing use the concept of overage. An overage is the difference between the price at which a loan closes and the minimum price acceptable to the lending institution as quoted on the

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<sup>3</sup> See Oaxaca (1973) and Blinder (1973)

lender's rate sheet. Overages exist because the reference interest rate is not necessarily the minimum price acceptable to the bank. In the Spanish mortgage market, the concept of *overage* as such does not exist. The nearest equivalent term is the *annual differential interest rate* (hereafter ADIR). The ADIR is defined as the amount that financial institutions add to the benchmark interest rate. In Spain, the most common benchmark interest rate is the EURIBOR,<sup>4</sup> which is used for pricing almost 99% of mortgage loans. Although overages and ADIR seem to be identical concepts, Black et al. (2003) found that in their sample only 16% of the mortgages were charged an overage. In contrast, in our sample 95% of the homebuyers were charged the ADIR. Since the benchmark interest rate is fixed to all banks and determined by the European Central Bank, it is in the ADIR where discrimination may appear.

As in the case of overages, larger ADIRs may appear because of the behaviour of both borrowers and lenders. For the borrower, a lack of financial information, a severe liquidity constraint, risk aversion, or the unwillingness to pursue negotiations for a better deal could lead to a major differential. According to Spanish legislation, a mortgage operation is a civil contract; therefore, governing rules are based on the freedom of the contracting parties. Hence, Spanish mortgage legislation does not set upper bounds for differential interest rates.<sup>5</sup> Despite this state of affairs, the Central Bank of Spain has a monitoring protocol whereby each lending institution has the obligation to report the maximum interest rate charged on any type of loan to the Central Bank. Thus, each institution sets its own maximum differentials which vary according to the loan type (mortgage, consumption loan, etc.) .

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<sup>4</sup> The EURIBOR is the rate at which lending institutions borrow and lend to themselves in the European Union (EU). This interest rate is determined by the European Central Bank, therefore, it applies to the EU countries that use the Euro as currency and cannot be modified at a country level.

<sup>5</sup> The only limitation aimed at preventing abusive interest rates can be found in the Anti Usury Law 1908.

In the Spanish housing market, the price of a mortgage also includes two other components in addition to the ADIR: the mortgage opening fee and the cancellation fee. The mortgage opening fee is a percentage of the total amount of the loan and is paid by borrowers to the lending institution in the moment when the mortgage contract is signed. The cancellation fee is the penalty that borrowers have to pay to the lending institution if they pay off the mortgage early, either partially or totally. These fees are also subject to discriminatory practices. Of these, the total cancellation fee is the only one for which the Central Bank of Spain sets a maximum rate. Interestingly, as we will see in the descriptive statistics, the total cancellation fee is the only component of the price of the mortgage for which we do not observe any differences between immigrants and natives.

## *2.2. Theoretical models on discrimination*

Economic theory has determined different ways in which discrimination may arise. In the literature we can find two main theories. The first states that discrimination is driven by prejudices against a certain minority (Becker, 1971). In Becker's model agents without prejudices may also discriminate in response to the prejudice of others. The second theory is the model of statistical discrimination (Phelps, 1972), where unbiased individuals use race or ethnicity as a screening mechanism in a situation where there is asymmetric information. According to Becker's theory, individuals on the receiving end of discrimination pay for this through higher equilibrium prices, while minority outcomes are affected by statistical discrimination because lenders or firms use aggregated objective information regarding minorities. In the latter case, if part of the relevant information regarding particular individuals belonging to those minorities is

unobserved, they are penalized because of their race or ethnicity.<sup>6</sup> When discrimination occurs, it is not feasible to test whether it is prejudiced discrimination or statistical discrimination. The information needed to disentangle the nature of the discrimination in an economic transaction is generally unavailable. However, it seems clear that because of the characteristics of lending markets, it is unlikely to be prejudiced discrimination. We should not expect all or most loan officers to have personal prejudices against a certain minority, or that non-minority customers of a lending institution will move to a different one just because the institutions engages in economic transactions with minority customers. The equilibrium effects of statistical discrimination are expected to be different from those derived from prejudiced discrimination (Lundberg, 1991; Coate and Lowry, 1993). However, in our case we think that the type of discrimination is not relevant to the outcome because either way it will put discriminated borrowers in the same position.

It is economically rational for lenders to apply tighter credit restrictions if they are objectively sure that belonging to a specific group of borrowers is a significant indicator of repayment risk, and this risk cannot be fully observed by other characteristics of the borrower (Canner 1981; Stiglitz and Weiss 1981). However, although statistical discrimination in this situation seems reasonable, this behavior is still supposed to be illegal. There is conflicting empirical evidence as to whether minority borrowers are more likely to experience a mortgage default and therefore be more risk prone. Berkovec et al. (1994) observed that minority borrower default rates are higher and minority loans are less profitable. Berkovec et al. (1996) reached the same conclusion regarding black mortgagors in the US, while Freddie Mac showed that

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<sup>6</sup> See Ross (2005) for an extensive overview.

black and Hispanic borrowers have worse credit records than white borrowers. Anderson and Van der Hoff (1999) found that after controlling for differences in borrower and property characteristics, black households still had higher marginal default rates. These results contrast with those obtained by Mills and Lubuele (1994), who empirically proved that skilled minority households in the US performed equally as well as their non-minority counterparts with regard to loan repayment. Peter and Peter (2006) observed that immigrant borrowers are not more likely to experience a mortgage default than their native counterparts in Australia.

In Spain, raw statistics produced by the Central Bank of Spain based on aggregated data showed that in 2008, just after the burst of the housing bubble, 12.5% of non-Spanish born mortgagors became mortgage defaulters, while this only happened to about 1.6% of native Spanish mortgagors.<sup>7</sup> This figure suggests that immigrants are riskier borrowers, and hence statistical discrimination seems justifiable for the sake of “business necessity”. However, according to the 1991 Spanish Immigration Law (art 31), any form of discrimination, either prejudiced or statistical is illegal.

Some of the literature suggests that observed differences in outcomes between minority and non-minority individuals are attributable to non observed characteristics (Heckman and Siegelman, 1993). In such a situation, disentangling the role of discrimination in these differentials becomes a difficult task. The role of unobservable characteristics in economic outcomes is a well developed conceptual and empirical framework in labour economics. One paradigm of this area of research is the link between returns to schooling and unobserved heterogeneity due for example to differences in cognitive or non-cognitive skills, etc. There are at least two clear

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<sup>7</sup> Report on Financial Stability (Bank of Spain, May 2009).

extensions of this problem in context of our research. On the one hand, one could argue that mortgage pricing differentials may be attributed to potential unobserved differences in bargaining skills between minority and non-minority borrowers. On the other hand, another potential source of mortgage pricing differentials may arise because of asymmetries in the amount of information that both population groups possess; that is, better informed native borrowers may negotiate better mortgage conditions than immigrants. Unfortunately, suitable data for testing the effect of bargaining skills and information on differentials in loan conditions is not generally available. There is no doubt that unobserved factors may introduce some bias in our estimates; however, in our case, this problem is minimized because we control for a large set of individual and mortgage characteristics. For instance, we think the level of education is a good proxy to control both for bargaining skills and the level of information that a borrower may possess.

### *2.3. Empirical evidence on discrimination in mortgage markets*

The literature regarding discrimination in mortgage markets can be divided into three big groups of studies. The first and most abundant group studies the effect of race/ethnicity on the probability that a loan application is turned down.<sup>8</sup> The second group, also widely studied, focuses on “redlining”; that is, geographical discrimination against minority neighbourhoods. And the third group, which includes this paper, studies disparate treatment in mortgage pricing between minority and non-minority borrowers. Research in the latter area is remarkably scarce because data for this type of analysis is rarely available. All the empirical evidence regarding the three types of

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<sup>8</sup> See Lacour-Little (1999) for an extensive overview.

discrimination mentioned above contains two common features. First, all the studies are based on US data. Second, they are not unequivocal in their conclusions regarding the existence of discrimination.

The first attempts to study the relationship between mortgage lending and racial discrimination used rejection rates. Some econometric studies in the US used unpublished data on loan and individual characteristics and showed that in many of the metropolitan areas they investigated, race had modest statistical significance in explaining rejection rates when other legitimate financial characteristics were controlled for. Black et al, (1978), using HMDA data from New York, observed weak evidence that black borrowers had a larger probability of having a mortgage application rejected compared to white applicants, while Miller (1982) found that after controlling for credit history, the racial effect was not significant. In order to correct the bias in single-equation models, Maddala and Trost (1982) used a two-equation model but did not find evidence of racial discrimination. Rachlis and Yezer (1993) and Yezer et al (1994), reached the same conclusions as Maddala and Trost (1982). Horne (1997) analyzed Boston Fed data and concluded that there is no difference in approval rates between racial groups.

There are numerous other studies, however, that do find evidence of higher denial rates for minority borrowers. Using HDMA data, Canner and Smith (1991) found that black applicants were denied at least twice as frequently as white applicants of the same income and gender. Fix and Struyk (1993) also reached the same conclusion. However, the HMDA data do not contain enough variables to allow researchers to disentangle which part of this gap can be attributed to discrimination and which part to market forces. Munnell et al (1996) used HMDA data augmented with very rich data

from 1991 regarding Boston-area banks, savings and loans companies, mortgage companies, and credit unions. They used three different measures of borrower credit history as regressors and found that the probability of having a mortgage application turned down was almost three times higher for black and Hispanic applicants than for their white counterparts. After controlling for a large set of borrower and market variables, they observed that minority applications were still 60% more likely to be denied. Using Boston Federal Study (BFS) data, Carr and Megbolugbe (1993) observed that race exerted a significant effect on mortgage application rejections.

Avery et al. (1994) found racial differences in the probability of rejection/approval and that these persisted for the different loan types, while Horne (1994) did not find evidence of discrimination. However, using information regarding lender credit standards, Horne (1997) observed that race effects were highly sensitive to model specification.

The empirical literature regarding redlining is also abundant, but again inconclusive. Ahlbrandt (1977), Bentston (1981) and Bentston and Horsky (1991) did not find evidence of redlining, while Hutchinson et al (1977), Bradbury et al. (1989), Hunter and Walker (1996) did. In a more recent study using Boston data, Tootell (1996) observed that once the effect of race and geography are disentangled, the evidence of redlining is weak. That is, discrimination is not against neighbourhoods but against the minorities living there. Using Houston data, Holmes and Horvitz (1994) did not find evidence that racial composition or changes in the racial composition of the neighbourhood affected the flow of mortgage credit. That is, there was no racially based mortgage redlining.

Finally, as in the two other types of studies cited above that deal with the issue of discrimination, the literature regarding discrimination in mortgage pricing is again inconclusive. A descriptive analysis of the raw data coming from the 2004 and 2005 Home Mortgage Disclosure Act (HMDA) revealed that minority borrowers in the US are on average charged a substantially higher annual percentage rate on their mortgages than non-minority mortgagors. Boehm and Schlottmann (2007) found that black and Hispanic borrowers (particularly non-white Hispanics) are charged significantly higher interest rates than their white counterparts. However, in relation to overages, Courchane and Nickerson (1997) found differences according to race for both the size of overage and the likelihood of being charged an overage, although they concluded that no consistent pattern was evident and suggest that this disparate treatment was due to differences in the bargaining or negotiating power of whites and minorities. However, their data did not allow them to test this hypothesis. Black et al. (2001) studied overages from an area with a high Hispanic and African American population. They found that the yield spreads of Hispanic mortgagors are larger than those of whites; however, they did not find differences in overages between black and white applicants. Black et al (2003) controlled for numerous borrower and lender characteristics not available in previous studies and observed that minority mortgage borrowers who purchase homes pay larger overages than whites.

Courchane (2007) used data provided by lenders and used an endogenous switching regression model to estimate the determinants of the mortgage annual percentage rate (APR) conditional on whether minority and non-minority borrowers would be given either a subprime or prime mortgage. She observed that after controlling for individual and market characteristics, little of the APR gap between the two types of

borrowers could be attributed to discriminatory treatment. Finally, Boehm and Schlottmann (2007) focus their study on examining the extent to which differences in the interest rates obtained by homeowners of different ethnicity and income levels can be explained by differences in characteristics of the borrowers, the property, and the loan itself. The results show that blacks and Hispanics (particularly non-white Hispanics) were charged with significantly higher interest rates than comparable white households. All these results taken together suggest that once relevant variables are controlled for, evidence of discrimination against minorities in mortgage markets emerges.

### 3. Empirical framework

Our empirical strategy consists of estimating reduced form linear equations on the determinants of the annual differential interest rates (ADIR). We estimate separate equations for immigrants and natives. Thus, our empirical model reads as follows:

$$Y_{its} = \beta'_s X_{its} + u_t + \varepsilon_{its}, \quad (1)$$

where the outcome  $Y_{its}$  is the ADIR for individual  $i$  at period  $t$ , and the subscript  $s$  indicates whether the individual  $i$  is immigrant ( $s=m$ ) or native ( $s=n$ ),  $X_{its}$  is a set of individual and market (mortgage/property) characteristics,  $u_t$  are time-specific effects, and  $\varepsilon_{it}$  is a random error term. It is important to remark that equation (1) is not a panel data model, but a set of cross-sections pooled throughout time. That is, individuals are observed only once throughout the sample period.

With the estimated coefficients of model (1), we apply the conventional Oaxaca-Blinder decomposition method to decompose the gap between immigrants and natives in the outcome variable as follows:

$$Y_m - Y_n = (\bar{X}_m - \bar{X}_n)\hat{\beta}_n + \bar{X}_n(\hat{\beta}_m - \hat{\beta}_n), \quad (2)$$

where  $Y$  is the outcome variable, as defined in equation (1), and the subscripts  $m$  and  $n$  refer to immigrants and natives, respectively. The left-hand side measures the estimated gap of  $Y$  between both population groups. The first term of the right-hand side represents the part of the gap attributed to differences in observed individual and market characteristics (*endowments*), and the second term shows the part of the gap that is caused by lenders treating immigrants and natives differently (*discrimination*).<sup>9</sup>

#### 4. Data

The dataset used in this paper refers to mortgages granted between 2004 and 2008. The data were collected each semester and pooled in a unique dataset. The data run from the first semester in 2004 to the first semester in 2008. Our sample is composed of roughly 49,000 observations, from which about 20,000 observations provide full information about all variables. These are the set of observations used in the econometric analysis. The data is provided by a mortgage brokerage company that mediates between homebuyers and banks. It is important to remark that borrowers do not deal directly with the financial institutions; therefore, the bargaining capacity of potential borrowers is somewhat limited. This company operates in a specific segment of the housing market, and its mortgage applicants generally acquire low-medium and

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<sup>9</sup> The commonest application of the Oaxaca-Blinder decomposition is to measure wage gaps. Originally, the method was created to study the level of discrimination in gender wage gaps.

medium rank dwellings. This means that our sample of mortgagors is quite homogeneous in terms of their socio-economic and dwelling characteristics. The dataset not only provides information regarding the conditions of the loan, but also a set of socioeconomic and demographic characteristics regarding the borrowers.

We distinguish six different population groups according to their birthplace: Spanish, Latin American, African, Eastern European, Asian and EU-15.<sup>10</sup> In our sample, the frequency distribution of observations of birthplace that have reported a positive value in the mortgage and income variables is the following: 12,641 observations (66.1%) correspond to Spanish born borrowers, 3,569 observations (18.7%) correspond to Latin American borrowers and 1,347 observations (7%) correspond to African borrowers. The rest of the sample is composed of 898 Eastern European born individuals (4.6%), 376 Asians (2%) and 281 EU15 born individuals (1.5%). Given that we also carry out separate estimates according to birthplace, we exclude Asians and EU15 born individuals from the sample of immigrants, because they are not representative samples. In Table 1, we show a list of the variables used in this study and their definitions.

[Table 1, around here]

#### *4.1. The determinants of mortgage pricing*

The factors that determine the price of a mortgage can be divided into two main groups: market and demand. Market determinants are undoubtedly lead by movements in the interest rate over time. Depending on the direction of these movements, both lenders

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<sup>10</sup> The EU-15 group comprises the fifteen EU countries before the 2004 EU enlargement, plus a set of rich non EU countries such as the US, Canada, Australia, Switzerland, Norway, etc...

and borrowers may find their bargaining position strengthened. In our empirical model, we will control for this by including a set of *time dummies*, one per semester. We also include *province dummies* on the assumption that the mortgage broker will search for a loan in the same geographical area (province) as the one in which the dwelling is bought. Finally, the other relevant set of market factor variables concerns the characteristics of the mortgage. In our case, the dataset allows us to control for the *repayment mortgage term*, the *size of the mortgage*, and more importantly, for the *loan-to-value ratio*. One interesting feature of our dataset is that it tells us which bank grants each mortgage to each borrower. We think this is better than having data from a single lending institution. This information makes it possible to include *bank fixed-effects* in our empirical model and thus to control for the fact that some lenders may have more market power than others, and hence more bargaining power.

The second group of variables deals with the demand factors and is mainly composed of the set of borrower characteristics. The first important factor to be considered is *bargaining skills*, which are usually an unobservable trait of the individual. However, as we mention in the previous section, we use the *education level* as proxy in place of *bargaining skills*. We expect more educated individuals to possess better bargaining skills than less educated individuals. Lower *language skills* is also a potential handicap for immigrants when they bargain the conditions of their mortgages. In Spain, the largest immigrant community is the Latin American community, whose members use Spanish as their mother tongue. We can expect Spanish speakers to exhibit better negotiating skills than those who come from non-Spanish speaking countries. Thus, in addition to education, we consider the *place of birth of the immigrant* (Latin America, Africa or Eastern Europe) as an additional proxy of

*bargaining skills*. We also include a set of borrower's socio-demographic characteristics, i.e. *age, marital status, type of labour contract, household income and occupation*.

#### 4.2. Descriptive statistics

In Table 2 we show descriptive statistics of the variables used in our analysis divided according to place of birth of the mortgagor. Raw comparisons of the summary statistics in Table 2 show that, on average, Latin American, African and Eastern European borrowers are charged with a substantially larger ADIR than Spanish born mortgagors. For Spaniards, the ADIR added to the benchmark annual rate is about 0.84 percentage points, while for Latin Americans, Africans and Eastern Europeans the ADIR is 1.04%, 1.02% and 1.06% percentage points, respectively. A comparison of the average values for opening commissions reveals a similar state of affairs; Latin Americans (1.083%) and Africans (1.154%) are, on average, charged with higher opening commissions than Spanish born mortgagors (1.044%). However, no differences are observed regarding Eastern Europeans (1.046%).

The descriptive statistics reported in Table 2 also show some interesting patterns. Debt-to-income and loan-to-value ratios reveal quite significant differences between Spanish borrowers and the other immigrant population groups. It is quite striking that the mortgages granted to Spaniards are significantly more conservative in terms of risk than for immigrant borrowers. For instance, for Spanish mortgagors, the average loan-to-value ratio is 81.5%, while for African and Latin American borrowers these ratios are 87.7 to 90.7%, respectively. Debt-to-income ratios are also significantly

smaller for Spanish borrowers (56.1%), whereas these ratios are 75.3% for Latin Americans, 61.6% for Africans, and 66.2% for Eastern Europeans.

The data also reveal socio-demographic differences between Spanish and immigrant borrowers: on average immigrant borrowers are less educated and are employed in less qualified jobs. However, we do not observe remarkable differentials regarding income among population groups. Spanish mortgagors report an average monthly income of 1447€, while Latin American, African and Eastern European borrowers report an average monthly income of 1398, 1331 and 1455€, respectively. Another key variable that determines the potential risk is the borrower's type of labour contract. Our data reveal that with the exception of African borrowers (37.7%), the share of mortgagors with an indefinite contract is similar across population groups; that is, 57.3% for Spaniards, 52.5% for Latin Americans and 51.4% for Eastern Europeans. These statistics suggest that immigrant mortgagors do not report significantly worse economic conditions than Spanish born borrowers.

In Table 3, we report the results of the tests of the mean differences in the ADIR between Spanish born and immigrant borrowers. We observe that mean differences in the ADIR between natives and each immigrant group are highly statistically significant. These differences are 0.22, 0.21 and 0.18 percentage points for Eastern European, Latin American and African borrowers, respectively. The mean difference between Spanish born borrowers and the three groups of immigrants taken together is 0.2.

[Table 2, around here]

[Table 3, around here]

Tables 4 and 5 show the results of the tests of mean differences in the ADIR between natives and immigrant borrowers according to city and bank, respectively. In Table 4, we report the tests for cities with a representative sample of individuals. In all the selected cities, average differentials between immigrants and natives in the ADIR have turned out to be statistically significant. This result suggests that there is no geographical pattern to disparate mortgage pricing. However, there are substantial differences across cities, since these differentials range from 0.086 and 0.111 percentage points in Seville and Cordoba to 0.482 and 0.364 percentage points in Valladolid and Huelva, respectively. It is worth noting the fact that the between-cities standard deviation in the ADIR is 0.09 for natives and 0.16 for immigrants, which suggests that across geographical areas the treatment of natives is more homogeneous than the treatment of immigrant borrowers.

In Table 5 we report the tests on mean differences in the ADIR between Spanish and non-Spanish born mortgagors across banks. As before, we only report the results concerning those banks with a representative sample of homebuyers. In only two out of the fourteen banks reported in Table 5 are immigrants not charged higher ADIRs than natives (branches B and Q). In the remaining twelve banks, we observe statistically significant differences in ADIRs in favour of native borrowers. In those banks where differentials in the ADIR are statistically significant, these differentials range from 0.084 in bank G to 0.577 in bank C.

[Table 4, around here]

[Table 5, around here]

## 5. Econometric results

### 5.1. The determinants of mortgage pricing

Final estimates are based on a sample of 18,710 individuals, of whom about 66% are Spanish born and the remaining 34% are immigrant borrowers, more specifically Latin American, African and Eastern European. Table 6 reports the results of the OLS estimation of equation (1) for the full sample of borrowers, i.e. Spanish and immigrants together. In Model 1, we estimate equation 1 including three dummies for immigrant birthplace: that is, Latin American, African and Eastern European. Birth place dummies have turned out to be positive and highly statistically significant. Our results indicate that after controlling for the large set of demand and supply variables, Latin American mortgagors are, *ceteris paribus*, charged 0.146% more than their Spanish born counterparts. These differentials are 0.136% and 0.140% for African and Eastern European borrowers, respectively. These results also indicate that there are no differences in the ADIR across different immigration groups.

Econometric estimates provided by Model 1 reveal that most of the variables behave accordingly. Regarding the loan characteristics included in the empirical model, we observe the expected positive sign for loan-to-value, mortgage term and loan amount, since higher values for these variables increase the loan risk. Furthermore, borrower characteristics also behave according to expectations. Education significantly reduces the ADIR charged on the mortgage. This is not only because better educated individuals theoretically possess a higher income generating capacity, but also because they are more likely to have better bargaining skills. Mortgagors with worse contractual conditions in their jobs are charged significantly higher ADIRs because they are regarded as riskier borrowers. However, we observe that household income does not

show the expected sign. One would expect wealthier families to be charged with a smaller ADIR, since they are supposed to be less likely to default on their mortgages (Diaz-Serrano, 2005). Possible explanations for this striking result could be that natives and immigrants receive disparate treatment in mortgage pricing regarding this variable, or that the effect of education overlaps the effect of income.

In Model 2, we use OLS to estimate again the determinants of the ADIR, but this time we include interactions between a dummy variable for immigrants and certain relevant variables: loan-to-value, mortgage term, mortgage amount, household income, education and labour contract. This model will allow to us disentangle whether lenders treat immigrant and native borrowers differently. We find that most of the covariates interacting with the dummy variable for immigrants are statistically significant at the 1 and 5% levels. These results indicate that borrowers and natives do receive disparate treatment from lenders. For instance, *ceteris paribus*, immigrants are significantly more penalized than natives regarding loan-to-values and the term of the mortgage. Another interesting result is that when the income-immigrant interaction term is included, the sign of the estimated coefficient associated to income reverses to negative and becomes statistically significant at the 10% level for natives. In contrast, the income-immigrant interaction variable stays positive but becomes statistically significant at the 1% level. This result indicates that wealthier natives are charged with lower ADIR, while natives receive the opposite treatment. One should expect a negative effect for both groups. All the evidence provided in Model 2 suggests that natives and immigrants receive disparate treatment from lenders.

[Table 6, around here]

## 5.2. Oaxaca decompositions

So far, the disparate mortgage pricing treatment that natives and immigrants receive from lenders observed in the previous subsection might indicate the potential existence of discrimination. To test this hypothesis, we carry out a Oaxaca-Blinder decomposition of the gap in the ADIR between natives and immigrants (equation 2). In order to disentangle the existence of racial patterns in this potential discriminatory treatment, we also carry out separate estimations of the decomposition across the different groups of immigrants: Latin Americans, Africans and Eastern Europeans.

The results of the decomposition analysis, which are reported in Table 7, are quite revealing. Discrimination, reported by the coefficient labelled as “unexplained”, is significant for immigrants as a whole, as well as for each of the immigrant groups. Our estimates indicate that only one-third of the gap in the ADIR between immigrants and natives can be explained by market forces. The remaining two-thirds of the gap can be attributed to discrimination. This proportion holds constant for Latin American borrowers. For African and Eastern European borrowers, the level of discrimination is even more significant because up to three-quarters of the gap in the ADIR with respect to natives can be attributed to discriminatory treatment. The difference between discrimination coefficients in favour of Latin Americans and against Africans and Eastern Europeans could be explained by the better language skills of the Latin Americans, which would provide them with better bargaining skills.

[Table 7, around here]

To conclude our analysis, we carry out some simulations of the effects of interest rates on expected mortgage repayments (Table 8). In simulation 1 we use estimated models in the Oaxaca-Blinder decomposition to simulate how the mortgage repayments of the average Spanish born borrower would increase if she were treated as an immigrant. Any increase in the mortgage reported in simulation 1 is the result of discriminatory treatment by lenders against immigrants. In contrast, in simulation 2 we estimate the changes in mortgage repayments if the average immigrant borrower were to receive the same treatment as the average native. Changes reported in simulation 2 come from differences between immigrants and natives regarding individual and loan characteristics. The difference between the amounts obtained in simulations 1 and 2 can be called the “price of discrimination”. We base the simulations on an average mortgage of 200,000€ over a period of 35 years and a benchmark interest rate of 3.2%.

In simulation 1, we find that the average Spanish borrower would pay 10,210€ more if her mortgage was priced using the same criteria that are used for Latin Americans. These amounts are 7,657€ and 9,494€ if lenders use the same criteria as are used for African and Eastern European borrowers. For simulation 2, we find that in the absence of discrimination, mortgage repayments would be reduced by 3033€, 2628€ and 2274€ for Latin American, African and Eastern European borrowers, respectively. Finally, if we subtract the estimated amounts in simulation 2 from the estimated amounts in simulation 1, we find that the estimated price of discrimination is 7176€, 5029€ and 7220€ for Latin Americans, Africans and Eastern Europeans, respectively.

## **6. Conclusions**

In this paper we test for the first time out of the U.S. whether immigrants are discriminated against the mortgage market. More specifically, we use data from Spain to test whether identical borrowers who differ only in their native or foreign-born status are charged with different average interest rates on their mortgages. We contribute to the existing literature in that this is the first analysis of this kind that has been done outside the US. Our estimates indicate that only one-third of the gap in the ADIR between immigrants and natives can be explained by market forces. The remaining two-thirds of the gap can be attributed to discrimination. We estimate that immigrants may repay up to 7,200€ more than natives (excluding commissions) due to discriminatory treatment by lenders. This is undoubtedly a very high price of discrimination. Our results are in line with studies that find evidence of discrimination once relevant variables have been controlled for (Boehm and Schlottmann (2007), Courchane and Nickerson (1997), Black et al (2003), and Boehm and Schlottmann (2007)).

We recognize that an empirical model on mortgage pricing which controlled for the probability of acceptance would provide a more suitable framework because it would prevent potential selection bias. However, we have been unable to create such a model because our data is based on loans that have already been granted, and data that allows for selectivity correction is not generally available. On the whole, the relevant variables that determine the probability of rejection are the same as those that determine the price of a mortgage; therefore, controlling for these variables in the price equation dispels the potential selection bias. Consequently, we believe that if there is any selection bias, it is fairly modest.

One may also fear the devastating effect of omitted variable bias. However, we have controlled for a large set of relevant variables regarding supply and demand factors; therefore, we think that this is unlikely to be a problem in our estimates.

The policy implications of our results are clear. Once evidence of discrimination in lending markets appears, Spanish legislators must consider passing more specific laws to protect minorities from unfair practices in lending markets, as has been the case in the US. However, we also recognize that more empirical evidence is needed before such policies can be implemented.

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**Table 1: Variable definitions**

<b>Variable</b>	<b>Description</b>
Annual differential interest rate	Differential applied over the benchmark interest rate (euribor <sup>11</sup> ).
Opening commission	Commission (%) levied on the borrower by the bank for setting up the mortgage
Partial cancellation commission	Penalty paid in the event of early repayment of part of the loan
Total cancellation commission	Penalty paid in the event of early repayment of the whole loan
Loan-to-value	Loan amount against the value of the dwelling
Age	Age (in years) of the principal holder of the mortgage.
Income	Net monthly household income
Mortgage	Loan amount
Holders	Number of individuals holding the mortgage
<u>Type of job</u>	Dummies for the borrower's type of job Administrative officer, Manager, White collar, Blue collar, other
<u>Education</u>	Dummies for the borrower's level of education Primary or lower, Secondary, University
<u>Type of contract</u>	Type of contract of the borrower
Indefinite	Dummy variable: 1=Indefinite contract; 0=Other.
Fixed discontinuous	Dummy variable: 1=Fixed discontinuous contract; 0=Other.
Without contract	Dummy variable: 1=without contract; 0=Other.
Temporary	Dummy variable: 1=temporary contract; 0=Other.
Work and service	Dummy variable: 1=work and service contract; 0=Other.
<u>Marital status</u>	Marital status of the borrower
Married	Dummy variable: 1=married; 0=Other.
Living with a partner	Dummy variable: 1=living with a partner; 0=Other.
Separated	Dummy variable: 1=separated; 0=Other.
Single	Dummy variable: 1=single; 0=Other.
Widower	Dummy variable: 1=widowed; 0=Other.
Term	Loan duration in years
<u>Nationality</u>	Nationality of the borrower
Spanish	Dummy variable: 1=Spanish; 0=Other.
Latin American	Dummy variable: 1=Latin American; 0=Other.
African	Dummy variable: 1=African; 0=Other.
Asian & Oceanian	Dummy variable: 1=Asian or Oceanian; 0=Other.
Rich countries	Dummy variable: 1=From rich countries; 0=Other.
East European	Dummy variable: 1=East European; 0=Other.

<sup>11</sup> Euribor is the reference index for 99% of Spanish mortgages.

**Table 2:** Descriptive statistics

	<b>Spanish</b>		<b>Latin American</b>		<b>African</b>		<b>Easter Europe</b>	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Differential interest rate	0.837	0.348	1.045	0.450	1.019	0.467	1.057	0.399
Opening commission	1.044	0.448	1.083	0.396	1.154	0.386	1.046	0.418
Debt to income	0.561	0.272	0.753	0.282	0.616	0.267	0.662	0.266
Loan to value	81.516	16.173	90.706	11.546	87.592	12.537	89.467	11.656
Age	33.94	10.35	34.68	8.12	33.92	7.27	34.23	7.64
Income	1,447.39	773.98	1,398.36	688.36	1,331.64	588.84	1,454.89	766.62
Mortgage	169,941	146,279	206,865	65,195	159,932	61,271	185,506	67,490
Holders	1.794	0.644	2.144	0.715	1.770	0.722	1.917	0.675
Clerical	0.032	0.175	0.011	0.105	0.004	0.060	0.011	0.104
Manager	0.040	0.197	0.016	0.126	0.009	0.093	0.014	0.118
Qualified	0.455	0.498	0.255	0.436	0.243	0.429	0.329	0.470
Not qualified	0.337	0.473	0.574	0.495	0.551	0.498	0.549	0.498
Other	0.136	0.343	0.143	0.350	0.194	0.395	0.097	0.297
Primary	0.488	0.500	0.793	0.405	0.875	0.331	0.787	0.410
Secondary	0.378	0.485	0.179	0.384	0.108	0.310	0.187	0.390
University	0.134	0.341	0.028	0.164	0.017	0.130	0.026	0.159
Indefinite	0.573	0.495	0.525	0.499	0.377	0.485	0.514	0.500
Fixed discontinuous	0.023	0.150	0.030	0.169	0.037	0.190	0.031	0.174
Temporary	0.317	0.465	0.418	0.493	0.564	0.496	0.418	0.493
Without contract	0.003	0.058	0.002	0.040	0.006	0.076	0.000	0.000
Work and service	0.084	0.277	0.025	0.158	0.015	0.122	0.037	0.188
Married	0.341	0.474	0.417	0.493	0.295	0.456	0.485	0.500
Living with a partner	0.005	0.071	0.006	0.077	0.002	0.046	0.003	0.057
Separated	0.073	0.260	0.017	0.129	0.010	0.100	0.011	0.104
Single	0.568	0.495	0.557	0.497	0.691	0.462	0.498	0.500
Widower	0.013	0.115	0.003	0.057	0.001	0.038	0.003	0.057
Term	33.662	6.440	34.092	5.145	34.609	4.939	33.791	5.239
Simple size	12,641		3,569		1,347		898	

**Table 3:** Test of mean differences in the ADIR according to birthplace

	Mean	Diff.	t-stat
Spanish	0.837		
Latin American	1.045	0.208	22.28
African	1.019	0.182	14.04
East European	1.057	0.220	14.07
Non Spanish born	1.041	0.204	39.76

**Table 4:** Tests of mean differences in the ADIR between immigrants and Spanish born individuals in terms of selected cities.

	<b>N</b>	<b>Spanish</b>	<b>Immigrants</b>	<b>Diff</b>	<b>t-value</b>
Alicante	466	0.905	1.074	0.169	5.55
Barcelona	5,008	0.628	0.796	0.168	5.96
Bilbao	204	0.767	1.001	0.234	4.04
Cordoba	261	0.882	0.993	0.111	1.73
Huelva	2,324	0.974	1.349	0.364	6.02
Madrid	7635	0.860	1.111	0.251	29.63
Malaga	529	0.879	1.086	0.207	5.49
Seville	848	0.796	0.882	0.086	2.42
Valencia	1,176	0.933	1.135	0.202	9.53
Valladolid	298	0.850	1.332	0.482	10.70
Zaragoza	986	0.825	1.049	0.224	8.73

**Table 5:** Tests of mean differences in the ADIR between immigrants and Spanish born individuals in terms of selected banks.

	<b>Spanish born</b>			<b>Immigrants</b>			<i>Diff. t-value</i>	
	<i>N</i>	<i>Mean</i>	<i>s.d.</i>	<i>N</i>	<i>Mean</i>	<i>s.d.</i>		
Bank A	3,102	0.986	0.107	648	1.208	0.288	0.222	19.35
Bank B	367	0.907	0.344	101	0.947	0.377	0.04	0.96
Bank C	3,198	0.548	0.334	1,105	1.125	0.598	0.577	30.47
Bank D	115	0.727	0.238	55	0.914	0.339	0.187	3.68
Bank E	8,097	0.711	0.332	1,113	1.048	0.306	0.337	34.09
Bank F	133	0.869	0.251	228	0.981	0.267	0.112	3.99
Bank G	102	0.57	0.449	1,013	0.654	0.749	0.084	1.67
Bank H	2,742	0.887	0.168	2,377	1.123	0.386	0.236	27.63
Bank I	221	0.853	0.55	114	0.899	0.6	0.046	0.68
Bank J	2576	0.961	0.119	1,165	0.971	0.292	0.01	1.13
Bank K	122	0.99	0.415	231	1.319	0.289	0.329	7.81
Bank L	148	1.073	0.5	145	1.496	0.513	0.423	7.15
Bank M	178	0.877	0.193	30	1.328	0.469	0.451	5.19
Bank N	148	1.016	0.263	118	1.158	0.211	0.142	4.89

**Table 6:** OLS regressions on the Average Differential Interest Rate (ADIR)

	<b>Model 1</b>		<b>Model 2</b>	
	<i>Coef.</i>	<i>t-val.</i>	<i>Coef.</i>	<i>t-val.</i>
Constant	0.224	0.78	0.361	1.26
Loan to value	0.003	12.50	0.002	6.64
<i>x Immigrant</i>			<i>0.003</i>	<i>6.23</i>
Term	0.002	3.79	0.001	1.32
<i>x Immigrant</i>			<i>0.003</i>	<i>2.54</i>
Age	0.004	2.33	0.002	5.32
Holders	0.043	10.15	0.045	10.57
Mortgage	0.027	3.47	0.059	6.35
<i>x Immigrant</i>			<i>-0.070</i>	<i>-5.59</i>
Income	0.007	1.57	-0.013	-1.96
<i>x Immigrant</i>			<i>0.033</i>	<i>3.99</i>
<u>Type of job</u>				
Manager	-0.022	-0.84	-0.021	-0.82
Qualified	-0.011	-0.53	-0.014	-0.72
Not qualified	-0.026	-1.28	-0.027	-1.35
Other	-0.016	-0.77	-0.024	-1.15
<u>Education</u>				
Secondary	-0.082	-13.02	-0.097	-12.24
<i>x Immigrant</i>			<i>0.048</i>	<i>3.78</i>
University	-0.123	-10.82	-0.136	-10.54
<i>x Immigrant</i>			<i>0.042</i>	<i>1.60</i>
<u>Type of contract</u>				
Fixed discontinuous	0.052	3.15	0.064	2.36
<i>x Immigrant</i>			<i>-0.022</i>	<i>-0.64</i>
Without contract	0.063	10.99	0.075	9.06
<i>x Immigrant</i>			<i>-0.018</i>	<i>-1.61</i>
Temporary	0.113	2.08	0.161	2.09
<i>x Immigrant</i>			<i>-0.099</i>	<i>-0.92</i>
Work and service	0.037	2.67	0.040	2.42
<i>x Immigrant</i>			<i>-0.022</i>	<i>-0.75</i>
<u>Marital status</u>				
Living with a partner	-0.046	-1.16	-0.048	-1.20
Separated	0.056	3.88	0.056	3.88
Single	0.015	2.48	0.017	2.73
Widower	0.056	1.75	0.042	1.33
<u>Birthplace</u>				
<i>Immigrants</i>			<i>-0.061</i>	<i>-0.74</i>
<i>Latin America</i>	<i>0.146</i>	<i>21.00</i>		
<i>Africa</i>	<i>0.136</i>	<i>14.56</i>		
<i>Eastern Europe</i>	<i>0.140</i>	<i>13.00</i>		
N	18710		18710	
R <sup>2</sup>	0.53		0.54	

**Table 7: Oaxaca-Blinder decomposition of ADIR differentials**

	<b>Immigrants</b>		<b>Latin American</b>		<b>African</b>		<b>Eastern European</b>	
	<i>Coef.</i>	<i>t-stat</i>	<i>Coef.</i>	<i>t-stat</i>	<i>Coef.</i>	<i>t-stat</i>	<i>Coef.</i>	<i>t-stat</i>
Gap	0.2170	32.45	0.2213	27.46	0.1946	15.08	0.2336	14.83
Explained	0.0740	10.54	0.0753	9.87	0.0433	4.09	0.0620	5.90
	<i>34.1%</i>		<i>34.1%</i>		<i>22.3%</i>		<i>26.5%</i>	
Unexplained	0.1430	18.06	0.1460	16.05	0.1513	11.34	0.1716	10.68
	<i>65.9%</i>		<i>65.9%</i>		<i>77.7%</i>		<i>73.5%</i>	

**Table 8:** Simulations of the expected increase in life-time mortgage repayments for immigrants due to discrimination

	<b>Latin</b>			
<b>Simulation 1</b>	<b>American</b>	<b>African</b>	<b>East European</b>	<b>Spanish</b>
Estimated ADIR	1.024	0.974	1.010	0.823
Estimated differential ADIR	0.201	0.151	0.187	
Estimated differential amount (€)	10,210.00	7,657.71	9,494.53	

  

	<b>Latin</b>			
<b>Simulation 2</b>	<b>American</b>	<b>African</b>	<b>East European</b>	<b>Spanish</b>
Estimated ADIR	0.883	0.875	0.868	0.823
Estimated differential ADIR	0.060	0.052	0.045	
Estimated differential amount (€)	3,033.72	2,628.53	2,274.17	