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Regional Differences in the Effect of Immigration on Poverty rates in Spain

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***Abstract*—**This paper explores the extent of the gap in poverty rates between immigrant and native households in Spanish regions and assess to what extent regional differences in individual and contextual characteristics can explain the divergences in such a gap. By using multilevel techniques and European Union Survey on Income and Living Conditions, we estimate immigrant households experiments an increase of 76 per cent in the odds of being poor compared with a native one when we control by individual variables. In relation to regional differences in the risk of poverty, regional-level variables have higher effect in the reduction of these differences than individual variables.

***Keywords*—**Immigration, Multilevel Analysis, Poverty, Spanish Regions

I. Introduction

IN recent decades, the social interest on the phenomenon of immigration in the Southern Europe countries has significantly increased, especially as migrant inflows from developing countries have enlarged. Some countries, as Spain, have experienced large-scale immigration in the 1990s and 2000s for the first time in modern history both from Europe and from other continents, with considerable immigration flows from low- and middle-income countries, such as Romania, Morocco and Latin America (Ecuador, Colombia, Bolivia...). This increment in immigration in Spain has been accompanied by a growing concern among the national public opinion about the social and economic implications of this impressive raise of immigration flows [13].

In the framework of the connection between immigration and poverty, the purpose of this paper is to examine the extent of the gap in poverty rates between immigrant and native households in Spanish regions. Likewise, we aim to investigate whether the regional differences concerning the effect of immigration on the poverty rate can be explained by differences between the regions in the composition of their populations (micro-level or individual perspective) or by global characteristics of the regions (macro-level or contextual perspective). To that end, we use the European Union Survey on Income and Living Conditions (EU-SILC from now on) for the year 2008.

In the existing literature, two distinct approaches have been considered to explain poverty: micro and macro-level approaches. The former approach effectively scrutinizes the precise mechanisms of individual poverty, but omits the information for the country or region characteristics; although, as pointed out by [9], such macro-level differences manifest at the individual level.

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Alternatively, macro-level studies may suffer from a black-box problem of causal inference because micro-level mechanisms are unobserved [22]. Moreover, macro-level studies can only control for individual characteristics such as family structure at the aggregate level (e.g. the rate of single motherhood). Given these considerations, we understand a clear need for research that combines micro and macro-level. In this sense, we aim to explicitly add the macro-level dimension to the predominantly individually oriented study field of poverty. Our analysis method took advantage of multilevel techniques especially suited for the analysis of such mixed-level data.

The paper is structured as follows: next section revises some significant papers on the study of the gap in poverty rates between immigrant and native households. Section 3 reviews important hypothesis from the individual and contextual perspectives on poverty. Section 4 describes the data used and the variables introduced in the study. The method of analysis is explained in section 5. Section 6 presents and discusses the results of our analysis. The final section concludes.

II. Background

The relationship between immigration and poverty constitute a subject of increasing interest in high-income OECD countries, because of the importance of both phenomena and the close linkages between them. Although this topic has received considerable attention from a number of researchers especially in the US, Canada and Nordic countries, so far very few relevant studies exist on immigrant poverty in host countries in Southern Europe, despite the importance of immigration in these countries.

The existing literature mainly comprises cross-section analysis of the low income shares by countries of origin or ethnic origin relative to the native population in the destination country. In general, the studies highlight big differences regarding the poverty risk. For the United States, for instance, [7] finds, for 1980 data, higher poverty rates among immigrants, with a range between 6 and 37 per cent in the poverty rates for 42 groups of immigrants by national origin. Likewise, [14] show that, although over the 1994-2000 period poverty rates fell much more quickly for immigrants than for natives, in 2000 the poverty rates of immigrants in New York and California were 19.1 and 20.3 per cent (22.2 and 26.8 for recent immigrants), against poverty rates of U.S. natives around 11.4 and 9.1, respectively. Reference [40] focuses on the analysis of the socio-demographic profile characterizing the immigration from Eastern Europe in the U.S., examining its income levels and the poverty status (at the individual and family levels). He observes a wide diversity in terms of income and poverty levels among people coming from different Eastern European countries, though in general the poverty rates of the immigrants coming from these countries are similar to those of people coming from Mexico, and significantly higher than the poverty rate of native population.

In this context, [39] states that, although a growth in the proportion foreign born is expected to increase the national poverty rate, it is important to take into account that immigration alters the relative supplies of workers with different skill levels, which may influence the wages and employment of both migrants and natives. They assess the impact of immigration on native poverty rates analyzing sensitivity of native employment and earnings to labour supply shifts, and conclude, with results by race/ethnicity, that immigration in the US between 1970 and 2005 had negligible effects on poverty overall.

Other researches for Canada, such as [27], also indicate that immigrants are consistently overrepresented among the poor. Their poverty rates are particularly high in larger cities, which have larger concentrations of immigrants, and among immigrants, the poverty rates are higher for visible minorities, who are mostly recent immigrants. The authors develop a series of logistic regression models by using 1991 data and three sets of potential contributors –human capital, assimilation and structural factors–, and find that the first two are more relevant to explain poverty status. They also reveal that the human capital factors were less decisive for immigrants than for natives in terms of changes in poverty. As well, with Canadian data for the period 1980-2000, [34] observe a strong increase in low-income rates among more recent cohorts of immigrants, and perceive that less than half of the increase in low-income rates among post-1980 immigrants can be explained by changes in composition of a number of relevant background factors[i]. On the other hand, [18] uses two specifications of logistic regressions and examines how the profile of low-income recent immigrants differs in many aspects from that of other low-income natives. All characteristics being equal, recent immigrants are at greater risk of poverty than earlier immigrants and native-born Canadians. However, having paid employment, accumulating a reasonable number of hours of work and being part of a family with more than one potential breadwinner are characteristics that help recent immigrants avoid poverty, as they do for the rest of the population. Nonetheless, recent immigrants do not benefit as much from personal characteristics favourable to labour market participation such as having a higher level of education, having more labour market experience, and not having work-limiting disabilities.

In Europe, we find significant contributions in the literature regarding some countries, mostly Nordic countries. Reference [19]-[20], for example, examine assimilation effects on poverty among immigrants in Norway and verify that the number of years since migration does indeed have a significantly negative effect on the probability of being poor, but the extent of the effect varies substantially across the different ethnic groups. They point out that this negative relationship between years since migration and the probability of being poor surely lie with the labour market participation of immigrants. In fact, a certain degree of assimilation of immigrant wages relative to the native population has been repeatedly proven (see, among others, [15], [6] for US; [26], [29], [2] for Norway).

For Sweden, [23]-[24] shows that there are differences between immigrants and natives in disposable income and in the probability of having a low disposable income, and they remain when factors such as age, gender, education and civil status are controlled. Likewise, the differences in disposable income are smaller than the differences in income from work, although the tax and transfer system not completely counterbalance. A notable finding of the latter study is also that in times of recession, the earnings gap between immigrants from European countries and natives remains stable, while the earnings gap between non-European immigrants and natives at the bottom of the earnings distribution increases substantially.

For Denmark, [33] analyses the annual incidence of poverty 1984–2007 separately for natives and for immigrants from Western and non-Western countries, as well as entry and exit rates relative to poverty and persistence of poverty for these three population groups. Among other findings, he observe a stable and low poverty level for natives in contrast to a strong increase for non-Western immigrants from about 30 per cent to about 50 per cent, until the poverty share stabilizes around this higher level from the mid-1990s. The profile is the outcome of a complex interaction between changes in arrival patterns, countries of origin, and waves of refugees entering from the mid-1980s to the mid-1990s.

As these Nordic countries share to a large extent the same institutional structure regarding the welfare state and the labour market, some authors have carried out comparative studies on immigrant poverty in these countries. An example are [4]-[5], who examine determinants of relative poverty among immigrants and natives in Denmark and Sweden during the 1980s and 1990s. They find that immigrants have higher poverty rates than natives in both countries, especially in Denmark, as well as big differences in the impact on poverty risk by national origin and duration of residence. They also detect significantly higher poverty rates for people aged below 30, for those with low educational qualifications, for women, for persons living in families with many children, and for single adults living with one or more children. Regarding the different poverty profiles between immigrants in Sweden and Denmark, they conclude that it seems to reflect two main important factors: compositional differences concerning the stock and flows of immigrants to Sweden and Denmark, and differences in the structure and trend of income transfers to families with children.

Other comparative studies, such as [21], deal with immigrant child poverty indeed. The mentioned work researches immigrant and native child poverty in Denmark, Norway and Sweden from 1993 to 2001, and confirms a strong overrepresentation of immigrant children from low and middle income countries. Besides showing that child poverty rates are generally high shortly after arrival to the new country, their multivariate analysis suggests that parents years since immigration and education considerably affect persistent child poverty[ii]. On the other hand, although there are broad

similarities in immigrant child poverty in the three countries, some notable differences across countries do exist. In particular, Denmark stands out as the country where immigrant child poverty is largely stable at the highest level for the three countries, and has the highest persistence.

Although this research field has little tradition in Southern European countries, there exist in the literature some noteworthy specific studies. A significant example is [30], a pioneering work in Spain in this subject, which explores the relationship between immigration and poverty in Spain for the years 2004-2008. They observe that both moderate and severe poverty are more acute for immigrants than for natives, and social transfers do not substantially amend this situation of the former group. In addition, they show that the different poverty risk faced by natives and immigrant is irrespective of basic household and demographic characteristics, and stress the very recent nature of Spanish immigration flows.

III. Hypotheses

In this section we present the usual hypotheses that explain the determinants of poverty, considering jointly both micro and macro hypotheses. From the micro perspective the corresponding hypotheses are the following.

- *Immigration Hypothesis*. The previous literature review shows that there are differences between immigrants and natives in disposable income and in the probability of having a low disposable income. Regardless of the country, most of the studies find that immigrants are at greater risk of poverty than natives.

- *Gender Hypothesis*. The conventional view considers that women are more often poor than men. However, some papers highlight that women are over-represented amongst the poor in some countries, but under-represented in others [43], [36]-[38]. We also consider that gender affects to immigrants in a different way than to natives.

- *Human Capital Hypothesis.* Since the possession of human capital leads to better jobs and more financial security, we can derive that people with lower education level have higher poverty risk. In this line, [41] finds that higher levels of education correspond to lower levels of poverty, defined in different dimensions. We, then, expect that better educated people show smaller poverty rates. We expect that the effect of level of education over the poverty risk of the immigrants is weaker than for the natives.

- *Age Hypothesis.* This hypothesis relies on the demographic composition of the population. Poverty rates are larger among older than among middle age individuals because the older ones do not accumulate more human capital, do not participate in the profits of emancipation. On the other hand, poverty rates are higher among younger than among middle age ones, because they are incorporating to the labor market. Therefore, regional level differences in age can partly explain cross-regional immigrant differences in poverty. We are also interested in knowing to what extent natives and immigrants are affected in the same way by age.

- *Employment Status Hypothesis*. This hypothesis refers to the role of the labor market in preventing and resolving situations of poverty. Employment status is presumed to play a significant role in explaining poverty. Unemployed and inactive people or those working few hours face a high likelihood of poverty [17]. Following previous literature, we expect the employment status to affect natives and immigrant with different intensity.

- *Household Structure Hypothesis*. Reference [42] highlight the fact that single women more often take care of children than men, either the group of women were never married or cohabited, or the group of divorced women. Children rearing is costly in time, then women with children are more likely not to work or to work part-time, and even in the case of working full time, the choice of jobs is restricted to those not being time demanding. Consequently, we would expect, first, that those households with dependent children exhibit more probability to be poor. Secondly, that those individuals who have never been married or cohabited exhibit more probability to be poor as those divorced or separated could receive some income through payment alimentation, or widow payments. We would like to know if the natives and immigrants are affected in the same way by the household structure. Cross-national differences in poverty may be partly explained by dissimilarities in the institutional framework and in socio-economic structural factors among regions. In this respect, we present some hypotheses from a macro-perspective analysis.

- *Welfare State Hypothesis*. This hypothesis is based on the idea of welfare state generosity, in particular, the higher the social security benefits, the more likely people will cross the poverty line. Welfare states reduce the cost of unfortunate life events and risks, and distribute economic resources more favorable to the poor. This idea is defended in [42, [9], [11].

- *Immigration Population Hypothesis*. As we widely argue in the previous section, immigrants are overrepresented among the poor, and their poverty rates are generally higher than natives in larger cities. We expect that those living in regions with higher immigration level show higher poverty rates.

- *Labor Market Hypothesis*. Unemployment constitutes a serious problem for the unemployed individuals themselves and for the overall economy. It is obvious that people who are unemployed are losing the opportunity to earn income, gain work experience and training, and even receive future potential social benefits. That is, unemployment involves a decline in living standards. Therefore, we expect that individuals living in regions with higher unemployment rate experience higher risk of poverty.

- *Scholarships and Grants Hypothesis*. This hypothesis is based on the idea that the higher the expense on scholarships and grants in one region, the more opportunities the individuals have to study and therefore they are more likely to escape from poverty[iii].

IV. Data And Measurement Issues

To reach our goals, we use the EU-SILC data set that is an

international database that consists of country specific comparable data. Specifically, to perform our analysis we work with data for Spain for 2008. The analysis is carried out over 13,004 households in Spain from 17 different regions. We have clustered some Spanish regions in a group (Cantabria, Castilla y León, Castilla-La Mancha, Extremadura, and País Vasco), as well as considering Ceuta and Melilla together, because of data on immigration on these regions are not individually representative. Table 1 includes the number of households analyzed by region and the proportion of immigrants in the dataset.

TABLE I
NUMBERS OF HOUSEHOLDS

	Observations	Immigrants
Galicia	927	3.6%
Asturias	622	5.6%
Navarra	449	6.2%
La Rioja	396	13.8%
Aragón	568	7.0%
Madrid	985	15.8%
Cataluña	1426	9.4%
C. Valenciana	1031	9.3%
Illes Balears	464	12.3%
Andalucía	1565	4.5%
Murcia	528	11.5%
Canarias	633	8.3%
Ceuta y Melilla	251	15.0%
Rest	3159	3.3%

TABLE II
POVERTY RATES

	TOTAL		INMIGRANT		NATIVE	
Regions	Poor	Stand. Err.	Poor	Stand. Err.	Poor	Stand. Err.
Galicia	0.21	0.0134	0.25	0.0789	0.21	0.0136
Asturias	0.12	0.0132	0.24	0.0810	0.12	0.0133
Navarra	0.07	0.0117	0.20	0.0746	0.06	0.0112
La Rioja	0.19	0.0199	0.47	0.0744	0.15	0.0192
Aragón	0.13	0.0141	0.24	0.0772	0.12	0.0142
Madrid	0.15	0.0112	0.35	0.0456	0.11	0.0105
Cataluña	0.13	0.0088	0.21	0.0375	0.12	0.0089
C. Valenciana	0.20	0.0125	0.44	0.0532	0.18	0.0125
Illes Balears	0.14	0.0160	0.20	0.0514	0.13	0.0168
Andalucía	0.29	0.0115	0.30	0.0558	0.29	0.0118
Murcia	0.25	0.0188	0.41	0.0724	0.23	0.0192
Canarias	0.25	0.0172	0.30	0.0633	0.24	0.0179
Ceuta y Melilla	0.33	0.0297	0.53	0.0809	0.29	0.0313
Rest	0.21	0.0072	0.29	0.0450	0.21	0.0073
Spain	0.20	0.0035	0.31	0.0158	0.19	0.0035

Immigrants account for 7.9 per cent of the total population being Madrid the region with the highest proportion of immigrants (about 16 per cent) and Galicia the region with the smallest.

A. Definition of poverty

Among the different options to define poverty proposed in the literature, we have chosen an objective, relative definition. Individuals are counted as poor if their household disposable equivalent income[iv] (y_i^e) falls below 60 per cent of the contemporary median equivalent income of the country where the individual lives. We define q_j as the individual equivalent coefficients determined by member j's age and role in the household. We use the modified-OECD equivalence scale[v]. We also define y_i^j as each individual member's total annual monetary income. Given that definitions, the total household equivalent income is defined by the following expression:

$$y_i^e = \frac{\sum_{j=1}^{k_i} y_i^j}{\sum_{j=1}^{k_i} q_j}$$

where $\sum_{j=1}^{k_i} q_j$ is the number of equivalent members for each household i with k_i members, and $\sum_{j=1}^{k_i} y_i^j$ is the total household income. One thing that must be mentioned is that income data correspond to the year previous to the survey, while information on the demographic composition of households is referred to the time of the interview (see [16] for some considerations to this respect).

B. Definition of immigrant

According to [30], we have two alternatives, in defining the immigrants, country of origin or citizenship. The existence of markedly different naturalization rules depending on the country of origin is a strong argument in favor of the former criterion, as suggested by [10]-[11], [1]. Secondly, following another common procedure in the literature [8], [11], [25], the migrant status of the household head[vi] is allowed to be determined by the national or immigrant condition of the household. Finally, other key methodological issue refers to which foreigners should be considered immigrants. The EU SILC only allows distinguishing between people born in Spain, some country of the EU-25, the rest of Europe and the rest of the world. We have considered as immigrants all those households headed by a person born outside Spain[vii].

In Table II we present the poverty rates. We find that, on average, 18.7 per cent of individuals living in native households (natives from now on) are poor, against 31.1 per cent of individuals living in immigrant households (immigrants from now on). By region, we find that poverty rate is larger for immigrants in all regions, and the immigration differences[viii] in poverty ranges from 1.4 percentage points in Andalusia to 31.8 in La Rioja. Finally, notice that there are eight regions with differences in poverty rates among immigrants and natives greater than 10 percentage points. In Spain immigrants are 7.9 per cent of the population, but they are 12.5 per cent of the poor population. Therefore, the share of immigrants below the poverty line is much higher than the share of natives that are poor, and this is the case for all the regions. This fact deserves a close analysis.

C. Definition of explanatory variables

The key variable in this analysis is *Immigrant* coded 1 if the head of the household was born in a country different from Spain. As previously commented immigrant households account for 7.9 per cent of the total population of Spain in 2008. To test the group of hypothesis that correspond to factors from the individual perspective (micro-level analysis) we choose the following variables. *Woman*, coded 1 if a woman is the head of the household and 0 otherwise. The proportion of women household heads in the survey is 34.5 per cent while the proportion of women household heads among immigrant is slightly higher (36.9 per cent) that among natives (34.3 per cent). Descriptive results for the variables introduced in the analysis are shown in Table 4. For the *Human Capital Hypothesis*, we consider the variable *Tertiary*, coded 1 if the first stage of tertiary education (not leading directly to an advanced research qualification) or second stage of tertiary education (leading to an advanced research qualification) has been attained by the head of the household and 0 otherwise. Recall that in EU-SILC, the educational attainment of a person is the highest level of an educational program the person has successfully completed and the study field of this program. The educational classification to be used is the International Standard Classification of Education (ISCED 1997) coded according to the seven ISCED-97 categories. In 2008, 27 per cent of households in Spain had a household head with tertiary education, almost the same proportion among immigrants and natives.

TABLE III
PROPORTION OF IN MIGRANTS AMONG THE POOR

	Immigrant	Stand. Err.
Galicia	4.30	0.01
Asturias	10.90	0.03
Navarra	19.42	0.06
La Rioja	33.21	0.05
Aragón	13.07	0.03
Madrid	37.56	0.04
Cataluña	15.34	0.02
C. Valenciana	20.06	0.03
Illes Balears	17.55	0.04
Andalucía	4.76	0.01
Murcia	18.70	0.03
Canarias	9.90	0.02
Ceuta y Melilla	24.37	0.05
Rest	4.59	0.01
Spain	12.46	0.01

To include the idea behind the *Age Hypothesis*, we include two variables related to age: *Young*, if the head of the household is below 20 years of age and *Old*, if above 65 years of age. Therefore the age reference group is composed by individuals between 20 and 65 years of age. We observe that the proportion of young head of household is smaller among native households than in the case of immigrant households and the opposite occurs for old head of household.

To capture the effects behind the *Employment Status Hypothesis*, we define the variable *Unemployed*, based on the self-declared main activity status, in principle, determined on the basis of the most time spent. Variable *Unemployed* is coded 1 for those unemployed and 0 otherwise. The target variable captures the person's own perception of their main activity at present. In 2008, 13.1 per cent of all immigrant households were unemployed, compared with 5.8 per cent of the native households.

The *Household Structure Hypothesis* is modeled through the variable *Children*, that represents the number of household members aged 13 or less. Having children is more common among immigrants. In 2008, the mean number of dependent children for native household was 0.51 against 0.93 for immigrant household. We also include information about marital status, that is, the variable *Marital_Status* is coded 1 if the household head was never married, and 0 otherwise. The proportion of immigrants never married (21 per cent) is higher than the proportion of natives never married (12 per cent).

Similarly, to include the regional characteristics, as described before through the structural context hypothesis, as explanatory factors of the differences in poverty by region among natives and immigrants, we consider the following variables.

TABLE IV
MAIN CHARACTERISTICS IF THE IMMIGRANT AND NATIVE HOUSEHOLDS IN SPAIN

	TOTAL		INMIGRANT		NATIVE	
Variable	Mean	Std.	Mean	Std.	Mean	Std.
woman	0.35	0.475	0.37	0.483	0.34	0.475
tertiary	0.27	0.444	0.27	0.444	0.27	0.444
young	0.05	0.220	0.13	0.333	0.04	0.206
old	0.18	0.385	0.04	0.196	0.19	0.395
unemployed	0.06	0.244	0.13	0.338	0.06	0.234
children	0.54	0.809	0.93	0.990	0.51	0.783
marital_status	0.13	0.331	0.21	0.407	0.12	0.323

To cover the *Welfare State Hypothesis*, we use information on expenditure on social protection in the regions analyzed, provided by the statistical office of Spain (INE). The variable *Socialbenefit*, by region, measures the ratio of the total population that receives social benefits. Navarra and Murcia show the smallest ratios (less than 50 per cent) while in Galicia and Asturias the proportion of households that receives social benefits is greater than 60 per cent.

The *Immigration Population Hypothesis* is modeled through the variable *Immigresid*, which measures the number of immigrant households as percentage of the total number of households. The smallest rates correspond to Asturias, Galicia and Andalusia while the highest belongs to Madrid.

Variable *Countryunemp*, which measures the percentage of the population looking for job, captures the *Labour Market Hypothesis*. Navarra is the region with the smallest proportion of population in long term unemployment, while Ceuta and Melilla have the highest proportion, followed by Andalusia.

To test the *Scholarships and Grants Hypothesis*, we include the variable *Grant*, obtained from records of Ministry of

Education, and being the expenditure of the Ministry of Education in each region in terms of scholarships and grants as a proportion of the GDP of the region. *Grant* varies between 0.07 per cent (Aragon) and 0.52 per cent (Andalusia).

Finally, we are interested in contrasting if immigrants are affected by these micro and macro-magnitudes in the same way as natives, and therefore we include interaction terms.

V. The Model

As presented in previous sections, our dependent variables will reflect the risk of being poor among Spanish regions. Thus, we will consider binary dependent variables reflecting whether or not poor. The logistic regression model is typically utilized to estimate that type of variables.

However, as pointed out by [9], due to the clustering of individuals within regions and the inclusion of regional-level variables, the standard logistic regression model violates the assumption of the independence of errors[ix]. A natural way to analyze such a hierarchical data structure is to use contextual regression models. Contextual regression models integrate variables at several levels of a hierarchy in one analysis. Reference [28] notice three different approaches in contextual regression modeling: traditional non-hierarchical extensions (e.g. separate regressions by region), classical contextual models (e.g. analysis of covariance) and modern multilevel models (random components). Clearly, in separate regressions no regional-level explanatory variables can be included in the analysis. A major drawback of analysis of covariance is that the effects of regional-level explanatory variables are confounded with the effects of region dummies. In a multilevel model, these effects can be separated out by specifying region membership as an unobserved random effect.

Reference [11] point that, traditionally, in non-hierarchical models the nested nature of the data has been ignored completely. In classical contextual models and in modern multilevel models, individual and regional-level variables can be introduced simultaneously. These methods adequately can split the variation into a between-individual level and a within-region level, but each in their own way. Classical contextual models let the intercept and/or the coefficients vary in a fixed way, while modern multilevel models allow the intercept and/or the coefficients to vary randomly. We prefer to model the nesting of individuals, *i*, within region, *c*, using random effects. We make random effects to take the form of both, random intercepts and random coefficients, and the grouping structure of the data consist of multiple levels of nested groups (individuals nested into regions). The random effects are summarized according to their estimated variances and covariances. Finally, it is worth mentioning that the random effects model is a 'unit specific' rather than 'population averaged' approach[x].

We would like to point out that this methodological approach is the proper one to answer the type of proposed goals. The alternative approaches yield also correct standard errors, but treat clustering as a nuisance. Since for us, regional differences are of substantive interest, we need a model in which we can explore information behind clustering.

We denote by y_{ic} the response for individual *i* in region *c*, and x_{ic} is an explanatory variable. A random intercept and random slope model can be written as follows:

$$y_{ic} = \beta_0 + \beta_1 x_{ic} + \xi_{0c} + \xi_{1c} x_{ic} + \varepsilon_{ic} \quad (1)$$

where ξ_{0c} designate the random intercept and ξ_{1c} designate the random slope. The random effects, ξ_{0c} and ξ_{1c}, and the individual level residuals, ε_{ic}, are assumed to be independent and to follow normal distributions with zero mean. The random effects variances are extra parameters to be estimated. If they are significantly different from zero, then we can say that regional differences are present in terms of poverty and in terms of the effect of immigration on poverty.

Formally, model (1) for the logit transformed hazard rate for individual *i* belonging to region *c* becomes accordingly:

$$\log(P_{poor,ic}/(1 - P_{poor,ic})) = \beta_0 + \beta_1 x_{ic} + \xi_{0c} + \xi_{1c} x_{ic} \quad (2)$$

where $P_{poor,ic} = \Pr(y_{ic}=1)$, y_{ic} being 1 if the individual *i* in region *c* is poor.

In order to test our hypothesis we propose four models.

We use four different versions of (2). Model A, a random random intercept and slope model with only one explanatory variable *Immigrant*, given by:

$$Log\,(P_{poor,ic}/(1-P_{poor,ic})) = \beta_0 + \beta_1 \times Immigrant_{ic} + \xi_{0c} + \xi_{1c} \times Immigrant_{ic} \quad (A)$$

which allows us to investigate if there are indeed differences between regions with respect to the effect of immigration on the risk of poverty. In this way we will test if the level of the response varies over the clusters or regions and if the effect of *Immigrant* varies over regions.

In order to analyze whether the differences in poverty among region can be explained by compositional differences (individual perspective) of their population we propose Model B, which incorporates individual-level explanatory variables (Z_{ic}).

$$Log\,(P_{poor,ic}/(1-P_{poor,ic})) = \beta_0 + \beta_1 \times Immigrant_{ic} + \beta_2 \times Z_{ic} + \xi_{0c} + \xi_{1c} \times Immigrant_{ic} \quad (B)$$

We also propose Model C, which incorporates to Model A the regional-level explanatory variables (W_{ic}.)

$$Log\,(P_{poor,ic}/(1-P_{poor,ic})) = \beta_0 + \beta_1 \times Immigrant_{ic} + \beta_3 \times W_{ic} + \xi_{0c} + \xi_{1c} \times Immigrant_{ic} \quad (C)$$

If the regional-level intercept variance (ξ_0) is not statistically significantly different from zero, then it is said that the regional -level variables capture the regional variation and there is not significant regional heterogeneity left. In the same line, if the slope variance (ξ_1) is not statistically significantly different from zero, then it is said that the regional-level variables capture the regional variation in the immigration gap.

TABLE VI
LOGISTIC ESTIMATION RESULTS FOR PROBABILITY OF BEING POOR (RANDOM INTERCEPT)

Poor	Model A	Model B	Model C	Model D
Immigrant	1.902***	1.762**	0.151	0.032
	[0.155]	[0.458]	[0.377]	[0.087]
Woman		1.290***		1.291***
		[0.064]		[0.064]
Tertiary		0.379***		0.379***
		[0.041]		[0.041]
Young		0.854		0.849
		[0.123]		[0.123]
Old		1.961***		1.977***
		[0.319]		[0.323]
Unemployed		2.017***		1.983***
		[0.276]		[0.271]
Children		1.544***		1.537***
		[0.072]		[0.071]
Marital_stat		0.849		0.850
		[0.096]		[0.096]
Inm_woman		0.926		0.935
		[0.162]		[0.164]
Inm_tertiary		1.811***		1.799***
		[0.395]		[0.393]
Inm_young		1.207		1.210
		[0.348]		[0.351]
Inm_old		0.869		0.882
		[0.283]		[0.288]
Inm_unempl		0.813		0.801
		[0.222]		[0.219]
Inm_childre		1.265**		1.265**
		[0.117]		[0.117]
Inm_marital		0.571**		0.570**
		[0.129]		[0.129]
Socialbenefi			1.035	1.046
			[0.029]	[0.030]
Inmigresid			1.015	1.026
			[0.033]	[0.035]
Countryune			1.047**	1.041**
			[0.019]	[0.020]
Grant			0.999	1.000
			[0.003]	[0.003]
Inm_socialb			1.046	1.068
			[0.040]	[0.043]
Inm_inmigre			1.088*	1.101**
			[0.049]	[0.052]
Inm_country			0.950**	0.952*
			[0.023]	[0.024]
Inm_grant			0.994	0.997
			[0.004]	[0.004]
Constant	0.323***	0.321***	0.026**	0.012**
	[0.035]	[0.052]	[0.047]	[0.024]
Var sigma 0	0.136	0.122	0.033	0.034
	[0.057]	[0.0514]	[0.018]	[0.019]
Vpc	3.989	3.571	0.992	1.037
Observation	12095	12095	12095	12095
Number of	14	14	14	14
Log	-6120	-5732	-6105	-5721

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

TABLE V
LOGISTIC ESTIMATION RESULTS FOR PROBABILITY OF BEING POOR (RANDOM SLOPE AND INTERCEPT)

Poor	Model A	Model B	Model C	Model D
Var sigma 1	0.067	0.040	0.002	0.000
	[0.061]	[0.051]	[0.006]	[0.003]
Var sigma 0	0.081	0.082	0.262	0.032
	[0.041]	[0,042]	[0.018]	[0.022]
Cov	-0.055	-0.042	-0.007	-0003
	[0.035]	[0.032]	[0.010]	[0.015]
p-value LR test of nested model(no random slope)	0.0503	0.2778	1	1

To test whether context effects have an effect on the differences among regions with respect to poverty gap after controlling for salient individual predictors of poverty, we propose Model D, which incorporates both, individual and the regional level variables:

$$Log\,(P_{poor,ic}/(1-P_{poor,ic})) = \beta_0 + \beta_1 \times Immigrant_{ic} + \beta_2 \times Z_{ic} + \beta_3 \times W_{ic} + \xi_{0c} + + \xi_{1c} \times Immigrant_{ic} \quad (D)$$

VI. THE EMPIRICAL RESULTS

We first test for the convenience of a random slope model. Table 5 shows the estimation results for the intercept and slope variance $\sigma^2_{\xi_0}$ and $\sigma^2_{\xi_1}$, respectively, and for the covariance between the slope and the intercept, $\sigma_{\xi_0\xi_1}$, for the four models.

We first test whether there exist regional differences with respect to the immigrant effect. We test the relevance of including the random slope in the model, it is, we compare the fit of each model (A, B, C and D) for the risk of being poor with random slope, with the fit of a version of each model without random slope. We carry out a likelihood ratio test to assess the null hypothesis of no regional variation in the effect of immigration on poverty. Table 5 also shows the p-value of the likelihood ratio test. We find that in A model there exist evidence of the differential regional effect for immigrants[xi]. In contrast, there is no evidence of differential regional effects for immigrants in models B, C and D. Hence the proper model is one with fixed immigrant effects. Consequently we can conclude that initially the immigrant effect is not the same for each region, but once we control for individual and regional variables apart from the fact of being immigrant, these differences across regions vanish. As we cannot reject the null hypothesis of no random slope, we therefore revert to a model with a fixed coefficient for immigrant. Table 6 shows the estimates for the β_i coefficients and the intercept variance $\sigma^2_{\xi_0}$ in the four models.

We first focus on A model results of Table 6. It shows that for the 'average' individual we predict an increase of 90 per cent in the odds of being poor for the immigrants if we do not control for any other variable.

Concerning the general hypothesis that individual characteristics influence regional differences regarding the risk of being poor, we describe our results. As long as we control for other individual variables apart from the variable *Immigrant*, the 'average' immigrant experiment an increase of 76 per cent in the odds of being poor. Therefore we still have evidence of the *Immigration Hypothesis*. Related to the *Gender Hypothesis* we find that in general women have higher chances to be poor (29 per cent more) than men. With respect to the Human Capital Hypothesis, in general, individuals with a higher than secondary education are around 60 per cent less likely to be poor than those with a lower level of education. Nevertheless, this is not the case for the immigrant. The fact of being born outside Spain reduces the benefits of having a higher level of education. Reference [27] find a similar result for Canada and conclude that the human capital factors were less decisive for immigrants than for natives in terms of changes in poverty. Also [18] assure that immigrants in Canada do not benefit as much from personal characteristics favourable to labour market participation such as having a higher level of education. And this happens to be the case in Spain. In general, elderly are twice as likely as the middle-aged heads to become poor as an evidence of the *Age Hypothesis*. However, we do not find evidence that support the *Age Hypothesis* in relation to younger, and the effect of age over immigrant does not significantly differ from the effect over the Spanish people. Unemployed individuals are also twice as likely to be poor as those with a job (evidence in favour of *Employment Status Hypothesis*) with no specific effect on the immigrants.

Furthermore, households with children are more likely to be poor than those without children; in particular, with each additional child the odds of being poor increase by 54 per cent, even more in the case of immigrant households. These results partially support the *Household Structure Hypothesis*. In contrast, those native household heads that have never been married compared to those who were married once show no differences in the risk of being poor. But the marital status is important for immigrants, for whom being married is a factor that reduces the chances of being poor.

To sum up, we find evidence in favour of the four specific hypotheses: Human Capital Hypothesis, Age Hypothesis, Employment Status Hypothesis and Household Structure Hypothesis, and we can assert that having children and not being married have a more intense effect on immigrant than on natives, while a higher level of education is less decisive for immigrants than for natives. As [30], we find that immigrants face a higher poverty risk than natives and the gap in poverty rates among Spanish and immigrant households is not explained by a different household composition or differences in the main socioeconomic characteristics. In other words, basic social and demographic characteristics of households do not contribute to explain the gap in poverty rates that exists between local and immigrant households. The possible explanation of this pattern might lie on the difficulties faced by immigrants to benefit from the macro characteristics of the region, in terms of access to social benefits and labour market assimilation.

We find that the addition of individual variables of the random intercept reduces the between regions variance (from 0.132 to 0.122). This reduction suggests that the distribution of individuals by the characteristics analysed differs from region to region. However, to interpret the results the relevant concept is the change in the variance of the random intercept with respect to total variance (individual and regional variance). We use the Variance Participation Coefficient (VPC). This ratio, allows us to capture the contribution of the explanatory variables to differences in poverty among regions. In this sense, individual variables decrease the participation of between-region variance in the risk of being poor by 7.8 per cent (compare VPC for Model B and for null Model in Table 5b). Thus, all these findings lead us to conclude that population composition affects regional differences regarding the risk of being poor.

Concerning our third general hypothesis that regional characteristics influences regional differences regarding the risk of being poor we describe our results. In terms of the *Welfare State Hypothesis* we find that the odds of being poor are not affected by the fact of living in a region with a higher proportion of households receiving social benefits. This is a surprising result insofar as it reflects that certain dimensions of the welfare state may not reduce poverty. Concerning the *Immigration Population Hypothesis*, we find that living in regions where the proportion of immigrants is high does not affect the chances of being poor for natives, but it does affect to immigrants, increasing their odds of being poor.

Regarding the *Labour Market Hypothesis*, we find that living in a region with high rates of unemployment has a negative effect on the probability of poverty (around 4 per cent). This could be interpreted in the sense that once you live in a region with high rates of unemployment, your chances of being poor are higher than if you live in a region with a smaller rate. Nevertheless, this effect is curiously less intense for the immigrants than for the natives, as the immigrant population does not seem to be affected as much by certain characteristics of the labour market. Finally, we find no evidence that support the *Scholarships and Grants Hypothesis.*

Regarding the immigration gap, we have to highlight that when introducing regional specific variables the immigration gap vanishes as the variable *Immigration* is not statistically significant[xii].

As before, to finally answer the third goal, we need some extra analysis. First, we test the relevance of including the context variables and the cross-level interactions. We study the change in between-region variance in the model for the risk of being poor when we introduce regional-level variables and the cross-level interactions compared to the case without regional-level variables (Model C vs. null Model). We conclude that regional effects significantly decrease the participation of between-region variance regarding the risk of being poor by 74 per cent.

Finally, we include both types of variables, individual- and regional-specific, in the model. The estimated coefficients in B and C are close to those of D, indicating robustness of the estimation procedure. We conclude that, once we control by individual and context variables the immigration gap is the

same for all the Spanish regions but it is not statistically significant. Second, both variables, individual- and regional-specific, reduce regional differences in terms of poverty. Regional-level variables reduce the proportion of total variance due to between-region differences regarding the risk of being poor much more than individual level variables. Third, even after introducing individual and/or regional level explicative variables, there is still a significant part of the unexplained variance due to the regional differences. This unexplained variance is indeed, picked up by the random intercept.

VII. Conclusions

This paper analyses the relationship between immigration and poverty in the Spanish regions. Usually, social scientists have tended to emphasize individual characteristics to explain poverty. In recent years, there has been a call to contextualize inequality within institutions and social relations. This study answers that call by examining how the population composition of regions and contextual effects shape the odds that households will be poor, and especially if these two level variables (micro and macroeconomics variables) explain the differences in the poverty gap among regions due to immigration. Our study aims to advance research on the contextual dimension in the predominantly individually-oriented study field of poverty. To facilitate an integrated approach that encompasses individual and contextual dimensions, we used multilevel techniques that are especially suited for the analysis of such mixed-level data. We provided, as far as we know, the only multilevel analyses of poverty across Spanish regions.

From our analyses, we can conclude that, first, the immigration gap varies across regions, but once we control by any of both, compositional and/or contextual effects, the immigration effect is the same for all regions. Therefore, region's populations may differ in terms of the individual characteristics that increase the likelihood of immigrant becoming poor or, alternatively, the structural and institutional context may directly influence the poverty risks of immigrant and natives in different ways.

Concerning the explanatory power of the individual-level variables, we find that, on the one hand, having a higher education prevents from being poor, but this effect softens by the fact of being immigrant. On the other hand, being immigrant, woman, old-aged and having children increase, in general, the likelihood of being poor, but for immigrant having children and being married have a more intense effect. Regarding the immigration gap, when we control by individual variables we obtain that an immigrant household experiments an increase of 76 per cent in the odds of being poor compared with a native one, and there is not enough evidence that the immigrant effect differ across regions.

Respecting the explanatory power of the contextual-level variables, the evidence supports that the level of unemployment in the region impacts on the risk of being poor having a differential effect for immigrants.

Even more, the proportion of immigrants in the region affects the chances of immigrants being poor but does not affect natives. Regarding the immigration gap, when we also control by context variables and cross-level interactions, the gap vanishes.

Another finding is that regional effects turn out to explain more regional differences in the poverty gap across regions than individual effects. Ultimately, the place of birth clearly matters for immigrant's well-being, and, in turn, poverty outcomes across regions are undoubtedly shaped by social policy design. We have confirmed that the immigration gap is a consequence of the personal characteristics of the population. However, the characteristics of the region in which an individual lives are even more relevant in terms of the deprivation of capabilities and immigrant biases present in both societies and governments.

In the face of persistent immigration poverty gap, social reformers have debated the merits of various policy initiatives. On the basis of what we have reported above, we think that some initiatives are important. The first is to recognize that the best way to reduce poverty is through education and job experience. For immigrant, this requires comprehensive educational and training programs specifically targeted at enhancing immigrant's opportunities for joining the labour market. Therefore, putting an end to immigrant's poverty and providing better economic opportunities for all immigrants will require specific policy actions to ensure that immigrant receive the pay they deserve, enjoy equal working conditions, and have access to higher-paying jobs. Any strategy that relies on paid work as the main route out of poverty must include actions that specifically address immigrant's disadvantaged labour market position and the various obstacles faced by low income immigrants who want to take up paid work.

It is widely accepted that Spain, along with other developed nations, needs immigration, but it needs to do some serious thinking about immigration and move quickly toward sound policies. Given the importance of the macro characteristics of the region when explaining regional poverty differences, and given the reduced access of immigrants to benefit from those macro characteristics, one significant policy requirement for protecting immigrants from poverty could be the improvement of immigrants' access to employment as well as to public services (health, education, and housing) and social protection. Such a policy measure would put a disproportionate strain upon those regions where a large number of immigrants are concentrated, requiring a financial adjustment across regions. Concerns about drains on public finances should not be exaggerated, given the revenues generated by immigrants (through payments of taxes and social security contributions) and the beneficial effects on productivity and economic growth [31]. In any case, if policy makers want to be serious about alleviating poverty, they must also acknowledge the link between immigration and international development. Not forgetting the reality of the native poor, it is essential to take a comprehensive approach which seeks to maximise the benefits of immigration and minimise any disadvantages for the receiving country, countries of origin, and migrants themselves.

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[i] Reference [35] complement these findings with a research on poverty dynamics among successive cohorts of entering immigrants, including changes in the entry and exit probabilities, and the extent of 'chronic' poverty among successive cohorts. Among other results, they estimate that about 65 per cent of entering immigrants enter poverty at some time during the first ten years in Canada, and of these, two thirds do so during the first year.

[ii] Obviously, one factor in explaining the big differences in child poverty between natives and children with background from middle- or low-income countries is the significantly lower employment rates for immigrants and refugees. For surveys of the literature, see for example, [32], [3].

[iii] Although some additional hypotheses could be set up (assimilation, number of years since migration...), the existing limited information at regional level prevents us to test other hypotheses.

[iv] Disposable income does not include in-kind transfers, such as health care, housing, and child care, all of which improve economic welfare.

[v] This scale assigns a value of 1 to the first adult in the household, 0.5 to each remaining adult, and 0.3 to each person younger than 14.

[vi] EU-SILC does not use the term 'head of household'. Instead the household respondent is considered to be the person responsible for the accommodation, that is, the person owning or renting the accommodation. Although aware of terminological issues, we will denote the person responsible for accommodation as the head of household for the sake of simplicity, with no further connotations or implications intended.

[vii] We have repeated the analysis using an alternative definition of immigrant excluding all those born in the EU-25 in order to test the sensitivity of our results. Note that immigrants from Bulgaria and Romania, which are two of the most important foreign population groups in Spain, are still included in this case in the immigrant group. We get that our results are robust.

[viii] We have tested those differences and they are statistically different from zero.

[ix] Ignoring clustering leads to underestimation of standard errors particularly for predictors measured at group level. There are methods to adjust standard errors for design effects. Another approach is to model dependency between observations in the same group using marginal model. Both methods yield correct standard errors but treat clustering as a nuisance rather than a feature of substantive interest in its own right. Therefore, they are useful to control for clustering if you are not interested in exploring clustering.

[x] There are reasonable multilevel modelling alternatives. We could estimate a model with robust-clustered errors. The standard errors would be properly adjusted but we would be unable to asses the degree of between group variation. We could also have estimated a GEE (generalised estimating equation) model but in this type of model no information about higher level variation is provided and it is only useful for making inferences about average population effects. We propose random effects model is defensible with comparable strength to these alternatives as we explicitly specify a hierarchical structure, obtain correct standard errors and an estimate of the between group variance.

[xi] In model A we reject the hypothesis of no regional differences at 10 per cent significance level but not at 5 per cent.

[xii] We have also estimated a version of model C without cross-level interactions that is available from the authors. In this version the immigration gap does not vanish. This result can be due to the fact that immigrants show higher risk of poverty unless the difficulties faced by immigrants to benefit from the macro characteristics of the region are taken into account. Once we control by this fact the gap vanishes.