Investigaciones Regionales - Journal of Regional Research
ISSN: 1695-7253
ISSN: 2340-2717
investig.regionales@aecr.org
Asociación Española de Ciencia Regional
España

Serrano-Domingo, Guadalupe; Cabrer-Borrás, Bernardí; Requena-Silvente, Francisco
Networks and the location of foreign migrants: evidence for Southern Europe
Investigaciones Regionales - Journal of Regional Research, no. 47, 2020, pp. 97-112
Asociación Española de Ciencia Regional
España

DOI: https://doi.org/10.38191/iirr-jorr.20.012

Available in: https://www.redalyc.org/articulo.oa?id=28965214006

How to cite
Complete issue
More information about this article
Journal's webpage in redalyc.org

Scientific Information System Redalyc
Network of Scientific Journals from Latin America and the Caribbean, Spain and Portugal
Project academic non-profit, developed under the open access initiative

Journal of Regional Research
Investigaciones Regionales

ISSN: 1695-7253 e-ISSN: 2340-2717
investig.regionales@aecr.org
AECR - Asociación Española de Ciencia Regional
www.aecr.org
España – Spain

Networks and the location of foreign migrants: evidence for Southern Europe

Guadalupe Serrano-Domingo, Bernardí Cabrer-Borrás, Francisco Requena-Silvente
Networks and the location of foreign migrants: evidence for Southern Europe
Investigaciones Regionales - Journal of Regional Research, 47, 2020/2
Asociación Española de Ciencia Regional, España

Available on the website: https://investigacionesregionales.org/numeros-y-articulos/consulta-de-articulos

Additional information:

To cite this article: Serrano-Domingo, G., Cabrer-Borrás, B., & Requena-Silvente, F. (2020). Networks and the location of foreign migrants: evidence for Southern Europe. *Investigaciones Regionales - Journal of Regional Research*, *2020/2*(47), 97-112. https://doi.org/10.38191/iirr-jorr.20.012

Investigaciones Regionales – Journal of Regional Research (2020/2) 47: 97-112
https://doi.org/10.38191/iirr-jorr.20.012

Articles

Networks and the location of foreign migrants: evidence for Southern Europe

Guadalupe Serrano-Domingo, Bernardí Cabrer-Borrás**, Francisco Requena-Silvente****

Received: 16 May 2019
Accepted: 12 April 2020

Abstract:

This paper investigates the effect of co-national immigrant´s communities (social networks) and historical international trade relationships (business networks) on the decision of migrants to locate in a particular province within Italy, Portugal and Spain. We study whether spatial dependence also determines the immigration decision by testing for migration spillover effects across provinces in the destination country and by accounting for the effects of social and business networks in contiguous provinces. We find that social networks enhance immigration of co-nationals, a positive effect that is moderated if neighbor provinces have large co-nationals´ communities. For the case of business networks, neighbor provinces having commercial linkages with the immigrants' origin country compete as alternative destinations. Thus, the impact of immigration spreads over alternative destinations in the host country, so the coordination of local and national migration policies is required to be fully effective.

Keywords: International migration; networks; spatial interdependence; spatial gravity model.
JEL Classification: C21; F22; J61.

Efecto redes y la localización de los migrantes extranjeros: Evidencia para el sur de Europa

Resumen:

Este trabajo investiga el impacto de las comunidades de inmigrantes (redes sociales) y de las relaciones comerciales históricas (redes de negocios) sobre la decisión de localización de los inmigrantes en una determinada provincia de Italia, Portugal o España. Se analiza la dependencia espacial que puede afectar a esta decisión contrastando, primero, si existen efectos spillover de la inmigración en el resto de provincias y, a continuación, si hay un efecto asociado a la presencia de estas redes en las provincias vecinas. Los resultados muestran que las redes sociales actúan como factor de atracción, pero su efecto positivo se atenúa cuando hay provincias adyacentes con comunidades de inmigrantes del mismo país grandes. En el caso de las redes de negocios, las provincias contiguas con lazos comerciales históricos con el país de origen del inmigrante compiten como destinos alternativos. Así, el impacto de la inmigración se desborda al resto de provincias en el país de destino, y requerirá de la coordinación de las políticas de migración locales y nacionales para que sean efectivas.

* Department of Economic Analysis, Universitat de València. Spain. guadalupe.serrano@uv.es
** Department of Economic Analysis, Universitat de València. Spain. cabrer@uv.es
*** Department of Applied Economics II, Universitat de València. Spain. francisco.requena@uv.es
Corresponding author: Department of Economic Analysis, Faculty of Economics, Universitat de València, Avda dels Tarongers, s/n, Campus dels Tarongers, E-46022, Valencia, Spain. Tel. 963828247 fax. 963828249. guadalupe.serrano@uv.es

Palabras clave: Migración internacional; efectos red; interdependencia espacial; modelo de gravedad espacial.
Clasificación JEL: C21; F22; J61.

1. Introduction

Over the last two decades, the intensity of migration flows has risen worldwide. This phenomenon has resulted in a renewed interest in understanding the factors affecting the location of migrants in the host country. If migrants of the same nationality are not randomly located in the host country, it is important to examine whether there is spatial interdependence among alternative destinations and, if so, how it affects a migrant´s settlement within a country.

The existence of past connections between different territories of the host country and the country of origin provides migrants with easy access to information about alternative destinations and facilitates their settlement in the chosen destination (Borjas, 1999). Such connections may include the presence of communities of previous immigrants from the same country of origin living in the destination economy and providing social networks (Artal-Tur et al., 2012; Beine et al., 2015; Neubecker et al., 2017), as well as past bilateral trade relationships providing business networks (Aguiar et al., 2007).

So far, the literature on migration location has paid little attention to the spatial dependence structure between territories. Bertoli and Fernandez-Huertas (2013) use a random utility model (RUM) of migrants´ location to introduce the concept of "multilateral resistance terms to migration" (MRT) as a measure of the (lack) of attractiveness of migrating to alternative destinations. Controlling for MRT alleviates the possible problem of omitted variable bias but consistency of the estimates is based on the cross-sectional independence among destinations in the random term. The question remains as to whether the inclusion of MRT –generally a set of origin and destination fixed effects– are sufficient to ensure cross-section independence among destinations. In addition, spatial interdependence has received little attention. An exception is the paper by Nowotny and Pennerstorfer (2019), who estimate a random probability model for a sample of EU regions over the period 1997-2008 and provide evidence of spatial spillovers from the effect of migrant networks on migrants´ choice of target regions. However, they do not use spatial econometric techniques, which have been designed specifically for that purpose.

The main objective of this paper is to investigate whether spatial interdependence plays a role in the impact of social and business networks on bilateral migration flows. Past co-national location choices to locate to a particular province may positively affect the choice made by current co-national immigrants. In addition, proximity to co-national networks in other provinces may also facilitate migration inflows to this province. However, these positive effects could decrease rapidly or even become negative as neighboring provinces become substitute destinations that compete, attracting migrants from the same origin. The sign of the effect is an empirical question and spatial interaction among destination alternatives becomes key in reaching a better understanding of the location choices made by immigrants within a country (Chun, 2008; Le Sage and Pace, 2009; Chun et al. 2012).

Our empirical analysis uses a gravity model in which both multilateral resistance terms to migration and spatial autocorrelation are considered, constituting a contribution to the network-migration literature. We use country-of-origin- migration data to 103 Italian provinces, 50 Spanish provinces and 18 Portuguese provinces over the period 2003-2010. The three countries shifted from being sources of migration flows to becoming receiving countries from the mid 1990's until 2010, the year that seems to be a turning point in the migration tendencies of the decade (Moreno and López (2006) for Spain; Morettini et al. (2012) for Italy and Mourao (2016) for Portugal). The use of small sub-national geographic units is an advantage for better identification of local networks of immigrants by nationality as well as spatial interdependence among territories.

Using spatial econometric techniques, we provide evidence of spatial dependence in migrants' destination choices within a country. Once spatial dependence is identified, it is clear that local networks have a positive impact on bilateral migration. However, the magnitude of the impact varies depending on the role adopted by other provinces of the same country. In Spain and Italy, compatriots living in communities in adjacent provinces or adjacent provinces with strong commercial linkages with the country of origin of the immigrants affect the immigration flows due to competition, reducing it in one of the provinces through competition. So, the positive impact of social networks on immigration flows is smaller in provinces with large compatriot communities in their neighborhood. In addition, business networks effect becomes negative for those provinces having weaker commercial linkages with the country of origin of their immigrants compared to their adjacent provinces.

The rest of this paper is structured as follows. Section 2 introduces the econometric framework and the estimation issues. Section 3 describes the data and provides empirical evidence on the phenomenon under analysis. It explains the empirical specification of the model used to analyze the impact of social and business networks on immigration location and presents the main estimations and results. Finally, Section 4 sets out the conclusions.

2. Econometric model and estimation issues

Our empirical models are based on a Poisson specification of a gravity model for bilateral migration flows from country c to province i ($m_{c,i}$), as a function of country of origin (X_c) and province of destination characteristics (X_i) - the so called push and pull factors in the migration literature - distance factors approximating the migration costs, $X_{c,i}$ and an error term $v_{c,i}$ (Anderson, 2011; Mayda, 2010).

$$m_{c,i}= \exp[X_c'\beta + X_i'\phi - X_{c,i}'\gamma]\, v_{c,i} \tag{1}$$

In specification (1), the omission of the multilateral nature of one location's attractiveness and the omission of cross-sectional relationships among alternative destinations may cause biased estimators. According to Feenstra (2002, 2015), the common way to deal with this omitted variable bias is the use of origin and destination fixed effects to capture all the origin-specific and destination-specific determinants of migration. As a result, only dyadic determinants of migration flows, $X_{c,i}$, would enter explicitly in the econometric model, while monodic determinants would be wiped out:

$$m_{c,i}= \exp[\alpha_c+\alpha_i+X_{c,i}'\gamma]\, v_{c,i} \tag{2}$$

The estimation of a non-linear model such as (1) implies some issues. Santos Silva and Tenreyro (2006) demonstrate that using the PPML (Pseudo-Poisson maximum likelihood) estimator provides consistent estimates of the nonlinear model in (1) in the presence of heteroscedasticity and performs well even when the data fail to satisfy the equi-dispersion property that characterizes the Poisson distribution. Additionally, Schmidheiny and Brülhart (2011) and Bertoli and Fernandez-Huertas (2015) also established the consistency of the PPML estimation of this model with general RUM models of location decisions made by migrants, based on the cross-sectional independence in the random term. Nevertheless, this assumption becomes highly unrealistic in a location decision among interrelated destinations.

Interdependence among locations can affect the migration decision since changes in the characteristics of one destination affect the probability of migrating to the alternative destinations and thus would make the model incompatible with the theoretical RUM for migration decisions. These spatial patterns may arise from utility-maximizing location choices made by migrants when migrants not only choose focusing on one specific destination but also on its neighboring destinations (spatial spillovers). This would violate the i.i.d. assumption about the error term. Because of this, spatial interdependence should be considered carefully, mainly when spatial interdependence may not be sufficiently controlled for by including origin and destination fixed effects.

To address this issue, Peeters and Chasco (2013) propose including *origin-destination fixed effects*, $\gamma_{c,i}$, to accommodate the correlations that exist among unobservable localized factors across destinations. In a similar way, Bertoli and Fernandez-Huertas (2013, 2015) include a richer structure of fixed effects (origin dummies interacted with destination nests dummies) assuming a nest-specific cross-sectional correlation among destinations regarded as close substitutes by potential migrants from the same country of origin. Nevertheless, they do not consider any assumption about the spatial patterns for cross-sectional dependence.

Contrary to these attempts, our strategy is to allow for spatial interdependence affecting international migration inflows into a province by considering spatial autocorrelation in the model. So, bilateral interdependence can create a diffusion process over space that increases (decreases) the attractiveness of nearby provinces (if they are perceived as complementary/substitute destinations) or because unobserved factors have a spatial nature that needs to be accounted for in the model (Anselin, 1988; Le Sage and Pace, 2009). This will require the inclusion of spatial autocorrelation in the model, either as an autoregressive spatial factor or a "spatial lag" of the endogenous variable –SAR (Spatial Autoregressive term)– and/or a spatial lag of the random term – SE (Spatial Error term):

$$m_{c,i}= \exp[\alpha_c+\alpha_i+X_{c,i}'\beta + \rho W_{.i}m_{c,i}]\, v_{c,i} \tag{3}$$

where W is the spatial weighting matrix and $v_{c,i}$ is approximated as: $v_{c,i}= \exp[\rho W_{.i}\, v_{c,i}]\varepsilon_{c,i,}$ and $\varepsilon_{c,i}$ ~$N(0, \sigma^2 I)$. We first evaluate for cross-section spatial interdependence using the Lagrange Multiplier tests (see Anselin and Florax, 1995). Additionally, we use Holmberg's K test to test for spatial autocorrelation since it is robust against structured heteroskedasticity problems and alternative underlying distribution (Holmberg et al., 2015).

3. Empirical analysis

Our study focuses on the determinants of migration flows from countries to provinces of Italy, Portugal and Spain over the period 2003-2010.[1] We approximate such immigration flows as the difference in immigrant stocks at provincial level in the three host countries over the 2003 to 2010 period.[2] Table 1 shows the huge immigration flows in the three countries in the decade following the year 2000, taking into account the starting migration population. Foreign population doubled in Portugal, tripled in Italy and quadrupled in Spain during the 2003 to 2010 period. In this last year, the share of foreign population reached 4.3% in Portugal, 7.0% in Italy and 12.2% in Spain. In addition, over this decade the location of immigrants in the provinces of Spain, Italy and Portugal was clearly not random.

Figure 1 shows a map of the provinces (NUTS III) of Spain, Italy and Portugal, the shaded areas being those provinces where there is a high concentration of immigrants from the most representative nationalities among foreign residents in the country: Eastern Europe, North Africa and South America. For instance, in Portugal, Brazilian immigrants are mostly located in Lisbon and Setubal; in Spain, immigrants from Romania are mostly located in provinces near Madrid, such as Toledo, Guadalajara and Ciudad Real; in Italy, immigrants from Ecuador are mainly located in Genoa and its neighborhood. Thus, immigrants come from different countries and yet they are not evenly distributed across provinces in the national territory in Spain, Italy and Portugal. They tend to concentrate in groups of neighboring provinces. This concentration of immigrants could be due to spatial autocorrelation in the factors affecting

[1] Sample size varies by host country: 112 countries and 103 provinces for Italy; 111 countries and 18 provinces for Portugal; 93 countries of origin and 50 destination provinces for Spain. See Table A1 in the Appendix for a detailed list of countries included in the analysis.

[2] For Spain, it is possible to get annual bilateral migration flows for provinces in Spain using the *Registro de Variaciones Residenciales*, but not for Italy and Portugal. The estimation of migration flows using migration stocks is a standard practice in the empirical literature (Beine et al, 2011; Bertoli and Fernandez-Huertas, 2015; Abel and Cohen, 2019).

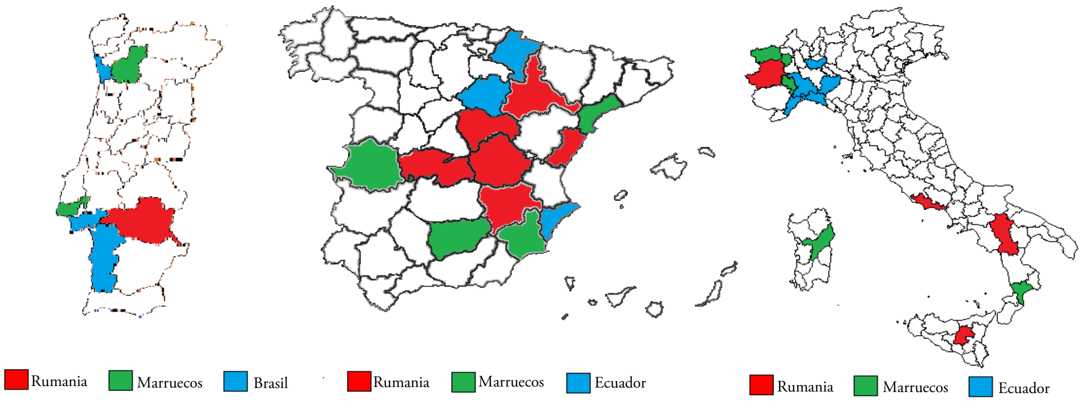
these variables and/or potential interaction of socio-economic characteristics of regions since they belong to the same area.

TABLE 1.
Foreign residents in Portugal, Spain and Italy

	Portugal	Italy	Spain
Migration inflows (2003-2010)	245,953	2,900,170	4,377,073
Migration stock 2002	208,198	1,334,889	1,370,657
Share total population 2002 (%)	2.0	2.6	3.3
Change in share 2003-2010 (%)	195%	269%	370%

Source: Compiled by the authors with data from ISTAT-Italy, Statistics National Institute of Spain, Statistics National Institute of Portugal and SESTAT-Portugal.

FIGURE 1.
Spatial distribution of immigrants by destination province in Portugal, Spain and Italy, 2010. Most representative nationalities from the East of Europa, North of Africa and South America



Note: The province is shaded with color when the Balassa index for immigrants from one country in the province equals the maximum value among the 10 most representative nationalities and is higher than 2. The Balassa index is computed as the ratio of the share of immigrants from one country in the province over the total share of immigrants in the province.

BASIC EMPIRICAL SPECIFICATION

We first estimate a gravity-type model for bilateral immigration flows from country *c* to province *i* over the period 2003-2010, $m_{ci,\,2010-2003} = IM_{ci,2010} - IM_{ci,2003}$:

$$m_{ci,\,2010-2003} = \exp[c + \beta_1 \ln(POP_{i,\,2002}) + \beta_2 \ln(POP_{c,\,2002}) + \beta_3 \ln(PCGDP_{i,\,2002}) + \beta_4 \ln(PCGDP_{c,\,2002}) + \beta_5 \ln(distance_c) + \beta_6\, border_c + \beta_7\, eufta_c + \beta_8\, lang\_f_c + \beta_9\, edu\_f_c + \beta_{10}\, dem\_f_c + \beta_{11} \ln(IM_{ci,2002}) + \beta_{12} \ln(T_{ci,1995-2000})]\, v_{ci,2010-2003} \quad (4)$$

Population and current GDP in dollars per capita in 2002 in the provinces of destination and countries of origin act as push and pull factors. As a deterrent to migration, migration costs are commonly proxied by the distance from the country of origin. Besides geographical distance between origin and destination countries, we include other proxies for bilateral distance: border, a dummy variable that equals 1 if the origin and destination economies share a land border, 0 if otherwise, and euefta, a dummy variable that equals 1 if both economies share a trade agreement, 0 if otherwise. We also consider bilateral cultural and political distances between economies, as in Dow and Karunaratna (2006), based on language and education differences, lang_f and edu_f respectively, and on a proxy for the political system in the country of origin based on a political freedom index, dem_f.[3]

We aim to analyze the relevance of social and business network effects on bilateral migration flows. Social networks emanating from the communities of co-patriates already established in the possible destination attract new immigrants since they reduce the cost of migration. They also facilitate the adaptation of new immigrants by providing them with information about the risks associated with immigration and about job opportunities, helping them to find a friendly social environment and to aid their integration (Balan, 1992; Wilpert, 1992; Waldorf, 1996). We approximate this social network by the stock of migrants from the same country of origin, c, living in the province *i* at the beginning of the decade, referring to the first year we have information available, $IM_{ci,\,2002}$, in order to reduce the possible endogeneity problem of this regressor.

We also analyze whether the presence or strengthening of the historical commercial relationships between the country of origin and the destination province enhances migration flows. To date, this effect on migration in empirical literature has not been conclusive (Aguiar et al., 2007). Several studies point out that the settlement of immigrant population is associated with an increase in trade between the host and origin economies. This is attributed to migrants' superior knowledge of products, legal requirements and market opportunities in both home and host economies, and/or the possibility of establishing trust relationships reinforcing trade contracts (Gould, 1994; Dunlevy et al., 1999; Head and Ries, 1998; Girma and Yu, 2002). However, a negative migration-trade relationship would be expected, as trade indirectly transfers labor embedded in the traded good, just as migration does directly, resulting in the increase in one of these flows and implying a decrease in the other. We measure the intensity of historical trade relationships between country of origin c and destination province i by the openness rate computed as the sum of exports and imports between the province and each foreign country divided by the country's GDP over the period 1995-2002 ($T_{ci,\,1995-2000}$). We use decade-lagged values of trade intensity rates to alleviate potential endogeneity problems.

Table 2 presents the results of the PPML estimation of the standard gravity equation (4) for migration flows for each host country separately in columns (i), (iii) and (v). Our variables of interest are those measuring past trade relationships (business networks) and the existence of migrant networks between the country of origin of the migrants and their province of destination. The larger the social network of foreign population from the country of origin settled in the province, the larger the migration flow from this country to the province. Past trade links also attract new migrants in Spain but not in Italy and Portugal where a significant negative effect is obtained.

The rest of country-of-origin characteristics exhibit the expected impact in most cases. The larger the economic activity in the country of origin, the lower the migration flows from that country. On the contrary, a higher economic activity in the destination province will attract migration, although this effect is only significant in the case of Portuguese provinces.

Next, we analyze the role played by geographic, cultural and political factors. The geographic factors show interesting results. Increasing the distance between the home and host economies significantly reduces the number of immigrants in Italy and Portugal. However, a common land border does not appear to affect immigration in Spain, see column (i) in Table 2, but shows negative significant effects on immigration flows in Italy and Portugal.

Sharing commercial agreements enhances immigration flows in Spanish and Italian provinces and reduces immigration rates in Portuguese provinces (in this last case the impact is not statistically

[3] See Table A2 in the Appendix for basic descriptive statistics and data sources of all the variables used in the regressions.

TABLE 2.
Determinants of bilateral migration flows. PPML estimates

Variables	SPAIN		ITALY		PORTUGAL	
	Basic (i)	MRT (ii)	Basic (iii)	MRT (iv)	Basic (v)	MRT (vi)
$\ln(POP_i^{02})$	0.174***		-0.087**		0.698***	
	[0.053]		[0.037]		[0.197]	
$\ln(POP_C^{02})$	0.164***		0.084***		0.545***	
	[0.039]		[0.032]		[0.138]	
$\ln(PCGDP_i^{02})$	-0.107		-0.091		1.445***	
	[0.207]		[0.129]		[0.455]	
$\ln(PCGDP_C^{02})$	-0.691***		-0.985***		-2.345***	
	[0.070]		[0.042]		[0.214]	
$\ln(distance_C)$	-0.293***		-0.600***		-2.301***	
	[0.112]		[0.073]		[0.315]	
$Border_C$	-0.14		-0.761***		-6.745***	
	[0.158]		[0.093]		[0.981]	
$Eufta_C$	2.540***		0.402***		0.14	
	[0.197]		[0.111]		[0.477]	
$Lang\_f_C$	-0.248***		-0.785***		-1.098***	
	[0.062]		[0.103]		[0.139]	
Edu_f_C	0.192*		-0.555***		-2.731***	
	[0.111]		[0.064]		[0.359]	
Dem_f_C	0.318**		-0.520***		-1.179**	
	[0.140]		[0.085]		[0.485]	
$\ln(T_{ci}^{95-00})$	0.018	0.026	0.009	-0.061***	-0.196***	-0.029
	[0.023]	[0.020]	[0.021]	[0.016]	[0.045]	[0.037]
$\ln(IM_{ci}^{02})$	0.690***	0.689***	0.891***	0.798***	0.446***	0.256***
	[0.035]	[0.024]	[0.017]	[0.017]	[0.117]	[0.075]
Moran´s I test	5.00		9.81		2.94	
p_value	(0.00)		(0.00)		(0.01)	
Country dummies		*yes*		*yes*		*yes*
Province dummies		*yes*		*yes*		*yes*
LM_lag test		2.26		47.66		246.23
LM_err test		62.92		11367.45		187.08
Num Province	50	50	103	103	18	18
Num Country	93	93	112	112	110	110
Observations	4650	4650	11536	11536	1980	1980
R-squared	0.72	0.94	0.87	0.97	0.79	0.95
AIC		759751		565882		60204

Notes: All regressions include a constant (not reported). Critical value of LM tests is $\chi^2(1) = 3.84$.

significant). On the other hand, as the distance between home and host countries increases, in terms of language, education and political freedom, this is seen to produce different results in the three countries. The expected negative impact of the language is obtained for all three countries. Distance in education and political freedom among origin and destination countries negatively affects immigration in Italian and Portuguese provinces yet shows an unexpected positive impact in Spanish provinces.

As we mentioned earlier, failure to control for the attractiveness of alternative destinations in the migrant's location choice leads to biased and non-consistent estimates. Thus, our next step is to include origin and destination fixed-effect to control for multilateral resistance terms to migration. By doing so, all the monodic variables in our model are dropped from the analysis. The estimation results for this multilateral resistance terms (MRT) model for immigration flows are shown in Table 2, columns (ii), (iv) and (vi). The goodness-of-fit increases in all the cases, suggesting that origin and destination fixed effects are controlling for more unobserved factors than those that were previously included in (4) as monodic regressors, mitigating the omitted variables problem. The sign and significance of coefficient estimates for social networks are robust to the new specification, while the magnitudes of coefficient estimates substantially change, pointing to the non–consistency of the previous results. Additionally, business network effects on immigration change from significant to non-significant in Spain and Portugal and become significant, and negative, for Italy.

Spatial dependence of immigration at the provincial level

In this sub-section, we explain how we test whether spatial dependence matters, that is, whether immigration in nearby provinces reinforces or weakens a province's attractiveness as a migrant´s choice of destination. In line with Neumayer and Plümper (2010), spatial dependence exists whenever the expected utility of one unit of analysis is affected by the decisions or behaviour made by other units of analysis. When this analysis comes to a dyadic variable such as immigration, where it is possible to distinguish the source, the country of origin c, the target of interaction, and the destination province i, we can assume that contagion (the reinforcing effect) does not come from the aggregate policy choices of other sources or other targets but only from the choices of other sources or targets in relation to the specific dyad under consideration. Specifically, our previous description of social networks as a factor affecting immigration from country c to the target province i fits with the Neumayer and Plümper's "specific target contagion" in which other regional targets j affect i's interaction with c only if province j has received migrants from the very same source country c, being w_{ij} the ij component of the (NxN) weighting matrix, W_N, used to model the connectivity between provinces that form the spatial dependence. Thus, we assume that the location decision by immigrants is affected by interdependence between provinces but is independent across immigrant nationality, leading to a weighting matrix for N provinces in the country and c international trade partners of $W = W_N \otimes Ic$ (block-diagonal matrix).

Geographical contiguity or bilateral distance (in km) matrices have been widely used in spatial econometrics as, for instance, in Jayet et al. (2010, 2016). However, from a wider perspective, the distance separating two provinces could be more than merely geographical. For example, Schumpeter defines the innovative contiguity between productive sectors, observing that the intensity in their commercial relationships is higher than the average. In line with this idea, the proximity between provinces can be defined depending on the intensity of their commercial relationships: the higher the volume of trade between them, the greater the closeness of both destination provinces. Information about a province is made more available to help the immigrant choose between two trading provinces, depending on the advantages or disadvantages (the complementarity or substitutability) of a suitable destination.[4]

---

[4] We also checked spatial autocorrelation in immigration flows among provinces with a contiguity matrix and an inverse distance weighting matrix. In all the cases the results point to the existence of spatial autocorrelation across provinces in the three countries considered (results available under request).

Unfortunately, bilateral regional trade flow matrices within countries do not exist. Thus, to homogenize the interregional weighting matrix measurement for the three countries under analysis, we estimate bilateral trade flows between provinces i and j based on a standard gravity equation (Frankel and Romer, 1999). We compute inter-province trade flow as "a gravity-type relationship":

$$w_{ij} = [(GDP_i^{\alpha} GDP_j^{\beta}) / DIST_{ij}^{\gamma} (1- \phi D)] \tag{5}$$

where α=1, β=1 and γ=1 according to those values widely accepted in empirical literature. Finally, to also consider contiguity as an additional factor for interdependence between provinces, we include a "border premium" when considering distance, DIST, between i and j in (5). When both i and j regions(provinces) share a common border, D=1, we reduce by 10% the inverse effect of the distance on the trade flow among those provinces, ϕ =0.1, in comparison to two provinces that do not share a common border, D=0. We use the row-standardised version of the asymmetric matrix of weights, W_N, to test the null hypothesis of the absence of autocorrelation in immigration flows to provinces in Spain, Italy and Portugal.

We use Moran´s I statistic in the basic gravity model and the Lagrange multiplier tests to evaluate the presence of spatial autocorrelation (both as a spatial lag or a spatial error term) in the MRT model for migration flows.[5] The bottom of Table 2 shows that both LM-lag and LM-err provide evidence against the absence of spatial autocorrelation, with the former being smaller than the latter in the case of Italy and Spain, and the opposite in the case of Portugal. Accordingly, we proceed by estimating a spatial model including a spatial error and testing if a spatial autoregressive scheme is also required in order to control for substantive spatial autocorrelation in models for Spain and Italy. For the case of Portugal, we first include the spatial autoregressive scheme and test if a spatial error term is required.

Table 3 shows the PPML estimation results for the MRT model. For Spain and Italy, columns (i) and (iii) show the model's estimation including a spatially autocorrelated error term (SEM). The model for Portugal in column (v) includes substantive spatial autocorrelation term (SAR). Columns (ii), (iv) and (vi) show estimates including both SAR and SEM schemes. Evidence provided by the K test points to the absence of spatial autocorrelation in the spatial specifications, while the one with the lowest Akaike's AIC criteria is the one including both SAR and SEM terms for the three countries.

Table 3 columns (ii), (iv) and (vi) are our preferred specifications for migration flows into Spanish, Italian and Portuguese provinces, respectively. The coefficient estimates for the previous immigrants from the same country of origin are positive and significantly different from 0. Thus our results provide evidence supporting the immigration-enhancing effect of ethnic networks in the destination province.

The inclusion of spatial effects in the model mainly affects the impact of business networks. Information networks established through historical trade relationships will significantly attract immigrants from trade partners to Spanish provinces by reducing the cost of migration, in comparison with the non-significant estimates in the MRT model. On the contrary, the inclusion of spatial autocorrelation in the model for Italy implies the direct effect of this variable is not significant. As in column (vi) of Table 2, we find no evidence of business networks affecting migrant flows. Thus, only for Spanish provinces do we find historical trade relationships acting as an attracting factor for immigrants from trade partner countries.

Additionally, spatial interdependence among provinces enhances immigration flows in the province of reference, both in Spain and Italy. The positive and significant estimate for the SAR term implies that the concentration of migrants in trade-related provinces from the same country of origin also positively affects the decision of a new migrant to choose a particular location. It points to the existence of immigration cost-reducing spillovers across regions emanating from immigration flows from the same

[5] To test cross-sectional independence in the random term in this non-linear model, H_0: ρ=0, we approximate the spatial error term as: $\exp[\rho W_{.i}\, r_{c,i}]$, using the zero-mean residuals: $r_{ci} = m_{ci} - \hat{\mu}_{ci}(\overline{m}_{ci}/\overline{\hat{\mu}}_{ci})$, where $\hat{\mu}_{ci}$ is the expected count according to the model and m_{ci} is the actual endogenous variable.

country of origin to commercially related provinces within the country, suggesting a certain complementarity of co-national immigration across provinces. On the contrary, in Portugal the SAR coefficient, though statistically significant, is very close to zero, suggesting that immigration spillovers in Portugal play no role in explaining bilateral migration flows.

Table 3.
Spatial effects on bilateral migration flows. PPML estimates

Variables	SPAIN		ITALY		PORTUGAL	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$\ln(T_{Ci}^{95-00})$	0.028	0.034*	-0.020	-0.005	-0.037	-0.035
	[0.020]	[0.020]	[0.014]	[0.014]	[0.032]	[0.033]
$\ln(IM_{ci}^{02})$	0.687***	0.654***	0.811***	0.749***	0.250***	0.250***
	[0.023]	[0.024]	[0.015]	[0.016]	[0.071]	[0.071]
$W\ln(m_{ci,t})$		0.433***		0.663***	-0.002**	-0.003**
		[0.107]		[0.067]	[0.001]	[0.001]
ρ	1.17-e04**	5.90-e05	0.001***	3.64e-4***		0.0000
	[4.98e-05]	[4.87e-05]	[4.02e-05]	[4.40e-05]		[1.16e-05]
Country dummies	yes	yes	yes	yes	yes	yes
Province dummies	yes	yes	yes	yes	yes	yes
K test	-0.28	-0.22	0.30	0.22	0.28	0.24
p_value	(0.38)	(0.39)	(0.38)	(0.39)	(0.38)	(0.39)
Num Provinces	50	50	103	103	18	18
Num Countries	93	93	112	112	110	110
Observations	4650	4650	11536	11536	1980	1980
AIC	748221	730813	468178	439723	58036	57889

Notes: All regressions include a constant (not reported). $\ln(T_{ci}^{95\text{-}00})$ measures the business network effect and $\ln(IM_{ci,2002})$ measures the migrants network effect. Substantive spatial autocorrelation term (SAR): $W_i \cdot IM_{Ci,t}$. Spatially autocorrelated error term (SEM): $v_{ci,t}$ where $v_{ci,t} = \exp[\rho W_{.i}\, v_{ci,t}]\varepsilon_{ci,t}$ and $\varepsilon_{ci} \sim N(0, \sigma^2 I)$.

Robustness analysis: the neighbors' definition

According to our results, the inclusion of origin and destination dummies is not enough to control for the influence of alternative destinations in the destination choice of immigrants. Immigration in provinces nearby affects immigration in the province of reference. We measure interprovincial linkages within the country using the magnitude of the bilateral gravity-type flows. We find immigration spillover positively affecting immigration from a country of origin to a destination province, since the arrival of immigrants from one nationality to a province with trade partners will increase immigration from the same country of origin to the province of reference. The next question that arises is whether such spatial autocorrelation might affect the way both business and ethnic networks affect immigration flows. In this case, the immigration-cost reducing effect of networks might affect the attractiveness of alternative destinations; on the one hand, in a positive way if there is a complementarity between networks in such alternative destinations and, on the other hand, in a negative way if networks decrease the attractiveness of one province compared to another. We consider contiguous provinces as those that can be complementary attractors of immigrants from a country of origin or rivals, in terms of attracting them. So, we define a contiguity matrix, C, for provinces in each country, taking the value 1 when the two provinces considered share a border and, if otherwise, 0. The inclusion of interacted trade and ethnic networks with this contiguity matrix allows us to determine the relevance of a differential effect on the impact of networks on migration due to spatial relationships.

Table 4 shows the results. The preferred estimations are based on both the significance of the SEM and SAR terms and the AIC criteria: only SAR for Spain; both SEM and SAR for Italy and only SAR for Portugal. We want to examine if there is a differential effect in the impact of business and social networks on migration inflows due to adjacency among destination provinces.[6] In the case of Spain and Italy, contiguity between provinces compensates part of the positive effects of social and business networks on immigration in the province, since neighboring regions are perceived as substitute locations competing for attracting immigrants from trade-partner countries and/or from countries of origin of immigrant communities settled in the province. For Portugal, we found that only contiguous provinces significantly enhance the province's attractiveness as a destination for immigrants coming from a trade partner country, but we found no enhancing effect coming from adjacency on the positive impact of social networks on migration inflows into the province.

TABLE 4.
Contiguity and spatial effects on bilateral migration flows. PPML estimates

	SPAIN (i)	ITALY (ii)	PORTUGAL (iii)
$\ln(T_{Ci}^{95-00})$	0.044**	0.011	-0.038
	[0.021]	[0.014]	[0.032]
$C^*\ln(T_{Ci}^{95-00})$	-0.089**	-0.075***	0.003***
	[0.042]	[0.022]	[0.001]
$\ln(IM_{ci}^{02})$	0.679***	0.752***	0.250***
	[0.027]	[0.016]	[0.069]
$C^*\ln(IM_{ci}^{02})$	-0.126***		0.0004
	[0.049]		[0.003]
$W\ln(m_{ci,t})$	0.651***	0.663***	0.0017
	[0.130]	[0.065]	[0.0013]
ρ		0.0004***	
		[4.32e-05]	
Num Provinces	50	103	18
Num Countries	93	112	110
Observations	4650	11536	1980
AIC	716229	437203	56896

Notes: All regressions include a constant (not reported).

[6] For Italy we include only a differential effect of the impact on business networks due to border effects because over parametrization and multicollinearity problems between the social networks in contiguous provinces and the SAR term lead to misleading results on the estimates of the SAR term, while the conclusions on the rest of variables remain unaltered.

4. Concluding remarks

Migrants are not evenly distributed across space, and regions are not locally bounded, thus spatial dependence (neighborhood effects among provinces within a destination country) is a relevant factor determining the flow of immigrants from the same country of origin who locate in a specific province within the destination country. We analyze this issue using spatial econometric techniques in a random utility model for a migrant´s choice of location. Our assumption is that origin and destination fixed effects, the so-called *multilateral resistance terms to migrate*, are not capturing all the spatial factors that could reduce the migration and settlement costs which make one province more attractive than another. Our PPML estimation results show that spatial autocorrelation problems persist when multilateral resistance terms are included in our model specification. Thus, immigration spillovers affect positively the location choice of migrants. Once spatial interdependence is controlled for, ethnic networks proved to be immigration-enhancing factors for the region in which the communities of compatriot immigrants are located. The effects of historical trade relationships between the country of origin and destination province on migration proved to be non-significant.

The next question that arises is whether such spatial autocorrelation might determine both business and ethnic network effects on immigration. In this case, the immigration-cost reducing effect of networks might affect the attractiveness of alternative destinations in a positive way if there is a complementarity between networks in such alternative destinations, or in a negative way if networks decrease the attractiveness of one province compared to another. In this case, we assume that such alternative destinations are those being close enough to compete for attracting immigrants from one country of origin, that is, the adjacent or contiguous provinces. In the case of Spain and Italy, contiguity between provinces compensates part of the positive effects of social and business networks on immigration in the province, since neighboring regions are perceived as substitute locations. In the case of Portugal, only contiguous provinces significantly enhance the province's attractiveness as a destination for immigrants coming from a trade partner country, yet there is no differential effect concerning the positive impact of social networks on migration inflows in the province.

The positive impact of ethnic networks on bilateral migration can be qualified when the role of adjacent provinces is considered. In Spain and Italy, both compatriots' communities and trade linkages in adjacent provinces act as competitors, while in Portugal trade linkages in adjacent provinces act as enhancers.

Our results show that the three countries under study are quite different even though they are South European host countries with similar immigration growth rates. In the three countries there is strong evidence of uneven distribution of migrants, which are exacerbated due to the presence of social and business networks. Local migration policies aiming for a balance distribution of migrants should take into account spillover effects because they attenuate the concentration of migrants in the territory. Additionally, the existence of interprovincial linkages calls for some degree of coordination among local migration policies.

5. References

Abel, G.J., & Cohen, J.E. (2019). Bilateral international migration flow estimates for 200 countries. *Scientific Data*, *6*(82). https://doi.org/10.1038/s41597-019-0089-3

Aguiar, A., Walmsley, T., & Abrevaya J. (2007). Effects of bilateral trade on migration flows: The case of the United States. Draft paper presented at the *Tenth Annual Conference on Global Economic Analysis*. Purdue University. USA.

Anderson, J. E. (2011). The Gravity Model. *The Annual Review of Economics*. *3*(1), 133-160. https://doi.org/10.1146/annurev-economics-111809-125114

Anselin, L. (1988). *Spatial Econometrics: Methods and models*. Springer.

Anselin, L., & Florax, R. (1995). Local indicators of spatial association-LISA. *Geographical Analysis*, *27*, 93-115.

Artal-Tur, A., Pallardo-López, V., & Requena-Silvente, F. (2012). The trade-enhancing effect of immigration networks: New evidence on the role of geographic proximity. *Economic Letters*, *116*, 554-557. https://doi.org/10.1016/j.econlet.2012.05.046

Balan, J. (1992). The role of migration policies and social networks in the development of a migration system in the southern cone. In M. M. Kritz, L. L. Lim, & H. Zlotnik (Eds.), *International migration systems: A global approach*. Clarendon Press.

Beine, M., Docquier, F., & Özden, Ç. (2011). Diasporas. *Journal of Development Economics*, *95*, 30-41. https://doi.org/10.1016/j.jdeveco.2009.11.004

Beine, M., Docquier, F., & Özden, Ç. (2015). Dissecting network externalities in international migration. *Journal of Demographic Economics*, *81*(4), 379-408. https://doi.org/10.1017/dem.2015.13

Bertoli, S., & Fernandez-Huertas, J. (2013). Multilateral resistance to migration. *Journal of Development Economics*, *102*, 79–100. https://doi.org/10.1016/j.jdeveco.2012.12.001

Bertoli, S., & Fernandez-Huertas, J. (2015). The size of the cliff at the border. *Regional Science and Urban Economics*, *51*, 1–6. https://doi.org/10.1016/j.regsciurbeco.2014.12.002

Borjas, G. (1999). The economic analysis of immigration. In O. C. Ashenfelter & D. Card (Eds.) *Handbook of Labor Economics* (3A, pp. 1697-1760). Elsevier. https://doi.org/10.1016/S1573-4463(99)03009-6

Chun, Y. (2008). Modeling network autocorrelation within migration flows by eigenvector spatial filtering. *Journal of Geographical Systems*, *10*(4), 317-344.

Chun Y., Kim H., & Kim, C. (2012). Modeling interregional commodity flows with incorporating network autocorrelation in spatial interaction models: An application of the US interstate commodity flows. *Computers, Environment and Urban Systems*, *36*(6), 583-591. https://doi.org/10.1016/j.compenvurbsys.2012.04.002

Dow, D., & Karunaratna, A. (2006). Developing a multidimensional instrument to measure psychic distance stimuli. *Journal of International Business Studies*, *37*(5), 575-577.

Dunlevy, J. A., & Hutchinson, W. K. (1999). The impact of immigration on American import trade in the late nineteenth and early twentieth centuries. *The Journal of Economic History*, *59*(4), 1043-1062.

Feenstra, R. C. (2002). Border effects and the gravity equation: Consistent methods for estimation. *Scottish Journal of Political Economy*, *49*(5), 491-506. https://doi.org/10.1111/1467-9485.00244

Feenstra, R. C. (2015). *Advanced international trade: theory and evidence*. Princeton University Press.

Frankel, J., & Romer, D. (1999). Does trade cause growth? *American Economic Review*, *89*, 379-399.

Girma, S., & Yu, Z. (2002). The link between immigration and trade: Evidence from the UK. *Weltwirtschaftiches Archiv*, *138*(1), 115-130.

Gould, D. M. (1994). Immigrant links to the home country: Empirical implications for United States bilateral trade flows. *Review of Economics and Statistics*, *76*(2), 302-16.

Head, K., & Ries, J. (1998). Immigration and trade creation: Econometric evidence from Canada. *The Canadian Journal of Economics*, *31*(1), 47-62.

Holmberg, H., Häggström, E., & Lundevaller, H. (2015). A test for robust detection of residual spatial autocorrelation with application to mortality rates in Sweden. *Spatial Statistics*, *14*(Part C), 365-381. https://doi.org/10.1016/j.spasta.2015.07.001

Jayet, H., Ukrayinchuk N., & De Arcangelis, G. (2010). The location of immigrants in Italy: Disentangling networks and local effects. *Annales d'Economie et de Statistique, 97/98*, 329-350. https://doi.org/10.2307/41219121

Jayet, H., Rayp, G., Ruyssen, I., & Ukrayinchuk, N. (2016). Immigrants' location choice in Belgium. *The Annals of Regional Science*, *57*(1), 63-89. https://doi.org/10.1007/s00168-016-0761-x

Le Sage, J., & Pace, R. (2009). *Introduction to Spatial Econometrics*. CRC Press.

Mayda, A. (2010). International migration: a panel data analysis of the determinants of bilateral flows. *Journal of Population Economics*, 23(4), 1249-1274. https://doi.org/10.1007/s00148-009-0251-x

Moreno, I., & López, G. (2006). Los determinantes de la inmigración internacional en España. *Investigaciones Regionales*, *9*, 25-48.

Morettini, G., Presbitero, A. F., & Tamberi, M. (2012). Determinants of international migrations to Italian provinces. *Economics Bulletin*, *32*(2), 1604-1617.

Mourao, P. R. (2016). Socio-economic determinants for the Portuguese immigration: An empirical discussion. *Socio Indicators Research*, *125*, 955–975. https://doi.org/10.1007/s11205-015-0860-6

Neubecker, N., Smolka, M., & Steinbacher, A. (2017). Networks and selection in international migration to Spain. *Economic Inquiry*, *55*(3), 1265-1286. https://doi.org/10.1111/ecin.12427

Neumayer, E., & Plümper, T. (2010). Making spatial analysis operational: Commands for generating spatial-effect variables in monadic and dyadic data. *The Stata Journal*, *10*(4), 1–21.

Nowotny, K., & Pennerstorfer, D. (2019). Network migration: Do neighbouring regions matter? *Regional Studies*, *53*(1), 107-117. https://doi.org/10.1080/00343404.2017.1380305

Peeters, L., & Chasco, C. (2013). *Multilateral attractiveness, migration networks, and destination choices of international migrants to the Madrid metropolitan* area. Mimeo.

Santos Silva, J. M. C., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, *88*(4), 641-658.

Schmidheiny, K., & Brülhart, M. (2011). On the equivalence of location choice models: Conditional logit, nested logit and Poisson. *Journal of Urban Economics*, *69*(2), 214-222. https://doi.org/10.1016/j.jue.2010.09.004

Waldorf, B. (1996). The internal dynamic of international migration systems. *Environment and Planning A*, *28*, 631-650. https://doi.org/10.1068/a280631

Wilpert, C. (1992). The use of social networks in Turkish migration to Germany. In M. Kritz, L. L. Lim, & H. Zlotnik (Eds.), *International migration systems: A global approach*. Clarendon Press.

Acknowledgements

We gratefully acknowledge financial support from the Spanish Ministry of Economy, Innovation and Universities (RTI2018-100899-B-I00 co-financed with FEDER), and the Generalitat Valenciana (GVPROMETEO 2018/102).

ORCID

Guadalupe Serrano Domingo https://orcid.org/0000-0001-5748-3216

Appendix

Table A1.
Countries of origin of immigrants included in each destination country

Origin countries	Destination countries			Origin countries	Destination countries		
	SPAIN	ITALY	PORTUGAL		SPAIN	ITALY	PORTUGAL
Afghanistan	-------	yes	yes	Libya	-------	yes	yes
Albania	yes	yes	yes	Sri Lanka	-------	yes	yes
United Arab Emirates	-------	yes	yes	Lithuania	yes	yes	yes
Argentina	yes	yes	yes	Latvia	yes	yes	yes
Armenia	yes	yes	yes	Morocco	yes	yes	yes
Australia	yes	yes	yes	Moldova	yes	yes	yes
Austria	yes	yes	yes	Madagascar	-------	yes	yes
Belgium	yes	yes	yes	Mexico	yes	yes	yes
Benin	yes	yes	yes	South Macedonia	yes	yes	yes
Bangladesh	yes	yes	yes	Malta	yes	yes	yes
Bulgaria	yes	yes	yes	Mozambique	-------	yes	yes
Belarus	yes	yes	yes	Mauritania	yes	yes	yes
Bolivia	yes	yes	yes	Malaysia	-------	yes	yes
Brazil	yes	yes	yes	Nigeria	yes	yes	yes
Canada	yes	yes	yes	Nicaragua	yes	yes	yes
Switzerland	yes	yes	yes	Netherlands	yes	yes	yes
Chile	yes	yes	yes	Norway	yes	yes	yes
China	yes	yes	yes	Nepal	yes	yes	yes
Côte d'Ivoire	yes	yes	yes	New Zealand	yes	yes	yes
Colombia	yes	yes	yes	Pakistan	yes	yes	yes
Costa Rica	yes	yes	yes	Panama	yes	yes	yes
Czech Republic	yes	yes	yes	Peru	yes	yes	yes
Germany	yes	yes	yes	Philippines	yes	yes	yes
Denmark	yes	yes	yes	Poland	yes	yes	yes
Algeria	yes	yes	yes	Portugal	yes	yes	-------
Ecuador	yes	yes	yes	Paraguay	yes	yes	yes
Egypt	yes	yes	yes	Romania	yes	yes	yes
Spain	-------	yes	yes	Russian Federation	yes	yes	yes
Estonia	yes	yes	yes	Saudi Arabia	yes	yes	yes
Ethiopia	yes	yes	yes	Sudan	-------	yes	yes
Finland	yes	yes	yes	Senegal	yes	yes	yes
France	yes	yes	yes	Singapore	-------	yes	yes
United Kingdom	yes	yes	yes	Sierra Leone	yes	yes	yes
Georgia	yes	yes	yes	El Salvador	yes	yes	yes
Ghana	yes	yes	yes	Slovakia	yes	yes	yes
Equatorial Guinea	yes	yes	yes	Slovenia	yes	yes	yes
Greece	yes	yes	yes	Sweden	yes	yes	yes
Guatemala	yes	yes	yes	Syria	yes	yes	yes
Honduras	yes	yes	yes	Chad	yes	yes	yes
Croatia	yes	yes	yes	Togo	-------	yes	yes
Hungary	yes	yes	yes	Thailand	yes	yes	yes
Indonesia	yes	yes	yes	Turkmenistan	yes	yes	yes
India	yes	yes	yes	Taiwan	-------	yes	yes
Ireland	yes	yes	yes	Tanzania	-------	yes	yes
Iran	yes	yes	yes	Uganda	-------	yes	yes
Iceland	yes	yes	yes	Ukraine	yes	yes	yes
Israel	yes	yes	yes	Uruguay	yes	yes	yes
Italy	yes	-------	yes	United States	yes	yes	yes
Jamaica	-------	yes	yes	Uzbekistan	-------	yes	yes
Jordan	yes	yes	yes	Venezuela	yes	yes	yes
Japan	yes	yes	yes	Viet Nam	yes	yes	yes
Kazakhstan	yes	yes	yes	Yemen	-------	yes	yes
Kenya	yes	yes	yes	Yugoslavia	yes	yes	yes
Korea, Republic of	yes	yes	yes	South Africa	yes	yes	yes
Lao	-------	yes	-------	Zambia	-------	yes	yes
Lebanon	yes	yes	yes	Zimbabwe	-------	yes	yes

TABLE A2.
Basic descriptive statistics of variables

	Spain				Italy				Portugal			
	Mean	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**
$m_{ci,\, 2010-2003}$	651.70	3817.70	0.00	163380	224.80	1743.80	0.00	122102	120.90	1207	0.00	42632
$\ln(POP_i^{02})$	6.32	0.84	4.51	8.61	12.92	0.70	11.41	15.13	12.84	0.82	11.73	14.58
$\ln(POP_C^{02})$	9.64	1.55	5.66	14.06	9.59	1.46	5.66	14.06	9.61	1.48	5.66	14.06
$\ln(PCGDP_i^{02})$	2.78	0.22	2.42	3.20	-3.87	0.27	-4.42	-3.33	-4.47	0.29	-4.98	-3.90
$\ln(PCGDP_C^{02})$	14.94	1.49	11.63	17.56	14.78	1.55	11.63	17.56	14.79	1.56	11.63	17.56
$\ln(distance_C)$	8.27	0.77	6.52	9.88	8.19	0.93	6.27	9.82	8.44	0.68	6.52	9.88
$Border_C$	0.03	0.18	0.00	1.00	0.04	0.21	0.00	1.00	0.01	0.09	0.00	1.00
$Eufta_C$	0.20	0.40	0.00	1.00	0.17	0.38	0.00	1.00	0.17	0.38	0.00	1.00
$Lang\_f_C$	-0.46	1.54	-3.87	0.53	0.17	0.34	-0.74	0.53	0.13	0.57	-4.35	0.53
Edu_f_C	1.43	0.70	0.10	2.79	1.18	0.75	-0.42	2.53	0.82	0.77	-0.77	2.22
Dem_f_C	0.62	0.63	-0.17	1.97	0.70	0.66	-0.17	1.96	0.77	0.65	-0.07	2.06
$\ln(T_{iC}^{95\text{-}00})$	-4.18	2.54	-11.66	3.07	-3.50	2.34	-11.96	4.28	-6.71	3.16	-13.67	2.20
$\ln(IM_{ci,2002})$	3.03	2.28	0.00	11.58	2.18	2.03	0.00	10.22	1.33	1.79	0.00	9.22
Observations	4650				11536				1980			

Data sources: Country-level POP and GDP has been collected from World Bank Data Indicators; NUTS III POP and GDP in Euros come from Eurostat and were converted to US dollars using nominal exchange rates. Distance, border and Euefta from CEPII gravity database; Lang, Edu and Dem distances from Dow and Karunaratna (2006). Trade intensity ratios and bilateral migration stocks come from National Institute of Statistics of each country (Spain INE, Italy ISTAT, Portugal SESTAT).

© 2020 by the authors. Licensee: Investigaciones Regionales – Journal of Regional Research - The Journal of AECR, Asociación Española de Ciencia Regional, Spain. This article is distributed under the terms and conditions of the Creative Commons Attribution, Non-Commercial (CC BY NC) license (http://creativecommons.org/licenses/by-nc/4.0/).