

Accounting for immigration policies in the analysis of migration networks

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1 Introduction

International migrations have always been in the spotlight due to their impact on societies, population structure and global geopolitics. In the last decades, globalization and developments in transportation and technology, as well as armed conflicts and natural disasters, have affected long-range mobility, leading to the wide spreading of temporary and permanent settlements (Nijkamp et al., 2011; Tranos et al., 2015). International migrations have hence become a major component of population change, with some countries being net receivers and others net senders (UNDESA, 2019). A large body of literature on international migration has attempted to determine what are the factors influencing the intensity and the direction of migration flows.

Over the last decades, an increasing number of studies have looked at international migrations as a social network in which countries are the vertices and the ties are the migration flows from one country to another. The network approach offers an appealing and convenient representation of the migration data and allows to account for tie dependence, i.e. the fact that flows from one country to another might depend on the flows between other pairs of countries.

Many of those studies applied network tools to describe the structure of the network by identifying the most central countries and cohesive groups. Only a few studies investigated the macro factors that might have generated and fostered the migration links between countries (e.g. Nogle, 1994; Tranos et al., 2015; Windzio, 2018). Drawing on applications of the gravity model and its variants, and economic and sociological approaches, the network structure has been explained by considering geographical proximity, population size, cultural traits (e.g. language, religion and historical relations) and push and pull economic factors. Although, theories of international migrations suggest that countries' immigration policies and migratory chains play a fundamental role in selecting and canalizing migration flows (Arango, 2004; Castles et al., 2013), none of these previous studies considered those factors as explanatory variables.

Here, we apply statistical network models to study the effects of macro factors on determining international migration flows from developing countries to the 16 Western European countries that are part of the Organisation for Economic Cooperation and Development (OECD). Besides the traditional pull and push economic factors, gravity related variables and cultural traits, we investigate the role of immigration policies and of the local immigrants community in explaining the network structure. We also contribute to the existing literature by analysing the networks of migration flows by reason of migration. After describing the migration-by-reason networks, we test whether the determinants of migrations play a different role according to the motive of migration.

2 Theoretical framework

Many theories have been proposed to explain migration flows between pairs of countries. Economic theories have a long-standing history in migration research and identify a large variety of economic factors as the driving force of migration. According to the *neoclassical theory* income and wealth define human flows between two countries, basing the decision on individuals' salaries and career

ambitions (Massey et al., 1993; Arango, 2004). The *dual labour market theory* defines the labour market structure as the main determinant of migration flows, underlining the role of the destination country’s labour market as a pull factor (Piore, 1979). In addition to the labour market, the *new economics of migration theory* considers also the financial and insurance aspects, including a broader economic and welfare structure that could represent an advantage for the whole family, as pull factors (Smith and King, 2012).

Besides the economic theories, destination countries’ immigration policies have been taken into account. Theories related to *migration policies* stress that immigration laws are responsible for the selection and canalization of migration flows (Arango, 2004; Castles et al., 2013). In the European context, the literature traditionally highlights four main macro models of national immigration and integration policy. The *exclusionist model* represents the closest position: Migration is preferred if temporary and functional to the local labour market, and family reunification and immigrant naturalisation are not encouraged (Koopmans and Statham, 2000; Castles et al., 2013). For the *assimilationist model* the migrant’s adaptation to the culture and values of the host country is crucial. In this case, integration is defined as adherence to the mainstream society (Koopmans and Statham, 2000). The *multiculturalism model* aims at preserving and enhancing ethnic minorities’ identity, culture, language and religion. Policies hence tend to promote ethnic particularism rather than assimilating them into the mainstream society (Castles, 1995). The *Mediterranean model* suggests that, compared to other European countries, Mediterranean countries have a more recent immigration history that started in the 80s. The lack of selective immigration policies in the first decades of the phenomenon lead to the use of ex-post instruments to provide a legal status to immigrants, such as regularizations. Furthermore, in the local labour market a relevant underground economy has attracted undocumented immigrants and a strong labour segmentation has penalized migrants (King et al., 2000).

Other theories suggest that migration flows between countries are fostered by *cultural similarities* with respect to common *religion and language* (Windzio, 2018). This is often the case of migrations between and from ex-colonies to the colonizing countries that have a long-history of trade and integrated market and may share languages and cultural traditions.

Another theory that is worth mentioning is the *theory of networks*, called into question after the start of a migration flow (Arango, 2004; Castles et al., 2013). It is based on the idea that a consistent, cohesive and well-rooted community in the destination country is attractive for new flows since the social network, expressed by the migration chain, constitutes a social capital in migration. The link between migrants and non-migrants is testified by the level of remittances between two countries expressing emotional, cultural and commercial ties (De Haas, 2007).

All these theories, but those on immigration policies, have been recently used to explain the structure of migration networks. Nogle (1994) suggested the use of formal network analysis to the study of within-Europe migration flows. The aim was to understand the European migration network and untangle the role of language, distance and imports in links formation. More recent literature has focused on larger groups of countries. Starting from migrants stocks, the structure of the global migration network has been studied, providing its evolution and connectivity patterns, as well as highlighting underlying mechanisms of links formation. Danchev and Porter (2018) found that world migration exhibits a heterogeneous connectivity pattern creating unequal migration opportunities across the world. Davis et al. (2013) showed that the global human migration network has become more and more interconnected and that specific groups of countries tend to interact to form migration communities based largely on historical, cultural and economic factors. Windzio (2018) accounted also for the role of network-structural effects and provided evidence for hierarchy in attractiveness between countries and the existence of homophily with respect to cultural traits.

3 Data

We consider immigration flows in year 2017 from 144 developing country classified as high migratory pressure (shortly HMP countries) to the 16 Western European countries that are part of the Organisation for Economic Cooperation and Development (OECD). The HMP countries include all Eastern European, Latin American African and Asian countries with the exclusion of some rich

countries (e.g. Japan and South Korea). Eurostat data show that in 2016 the percentage of foreign born population living in the 16 selected European countries ranges from about 6% in Finland up to over 45% in Luxembourg, while all other countries exhibit shares around 15%. With regard to immigrants' nationality, the balance between Europeans and extra-Europeans is similar across countries, with the exception of Luxembourg and Switzerland where the former constitute a much larger community.

Information on the immigration policies were obtained by the migrant integration policy index (MIPEX) database (<http://www.mipex.eu/>) providing indicators measuring the political and integration dimensions of all EU Member States. Among the 167 indicators, we considered those related to labour market mobility, family reunion, permanent residence, racial and religious discrimination, and access to the education and health systems.

Based on the literature cited in Section 2, we included in our data set variables related to geographical, economic and cultural factors. We use the distance among centroids of the countries as a proxy for the proximity between countries. In a similar way, we consider similarity in religion and language (defined by the Jaccard index) and the presence of a colonial relation among pairs of countries as a measure of cultural similarity. As economic factors, we consider indicators of European labour markets and GDP per capita. We also consider foreign community characteristics in the country of destination, including sex ratio of foreigners in the destination country, to account for the stability and settlement of the foreign communities in Europe.

Data were extracted from primary and secondary sources. Data on migration stocks, migration flows and total population were obtained by the databases provided by OECD, UNHCR, UN and Eurostat. Geographical and cultural data comes from CEPII and UN database. The World Bank database provides the estimates of bilateral remittances between countries. For human development indexes we use UNDP database.

4 Methods

We analyse the two-mode network of migration flows from 144 HMP countries to the 16 selected Western European countries. The ties between two countries is defined as the immigration rate from one country to another.

Firstly, we use standard network indices (e.g. density and degrees of the nodes) to describe the overall structure of the network (see Wasserman et al. (1994) for more details). Secondly, we use multiple regression quadratic assignment procedures (Dekker et al., 2007), shortly MR-QAP, to test whether the presence of a migration tie and its intensity depend on political factors while controlling for geographical, economic and cultural factors.

Formally, let X be the adjacency matrix whose cell X_{ij} takes value $w_{ij} \in \mathbb{R}^+$ equal to the immigration rate from country i to country j . Let Z_1, \dots, Z_K be the explanatory variables which have been described in Section 3. MR-QAP procedures are permutation tests used to make inference in standard regression models when the assumption of independent observations is untenable. In our study, we consider the multiple regression model having the form

$$X_{ij} = \theta_0 + \theta_1 Z_1 + \dots + \theta_K Z_K + \varepsilon_{ij} \quad ,$$

where the dependent variable are the tie random variables X_{ij} . Those variables are assumed to be dependent since countries send and receive multiple ties. To account for tie dependence when making inference on the parameters, the significance of the parameters is assessed using MR-QAP. We use the semi-double partialing procedure based on the permutations of the model residuals (Dekker et al., 2007) to compute the reference distribution and the empirical p-values.

5 Preliminary results and future work

Figure 1 provides a representation of the two-mode network of migration flows from 144 HMP countries to the 16 selected Western European countries. Circle orange vertices represent the HMP countries, while squared green vertices Western European countries. There is a link between two countries if there is a flow from one country to another. The colour of the links is proportional

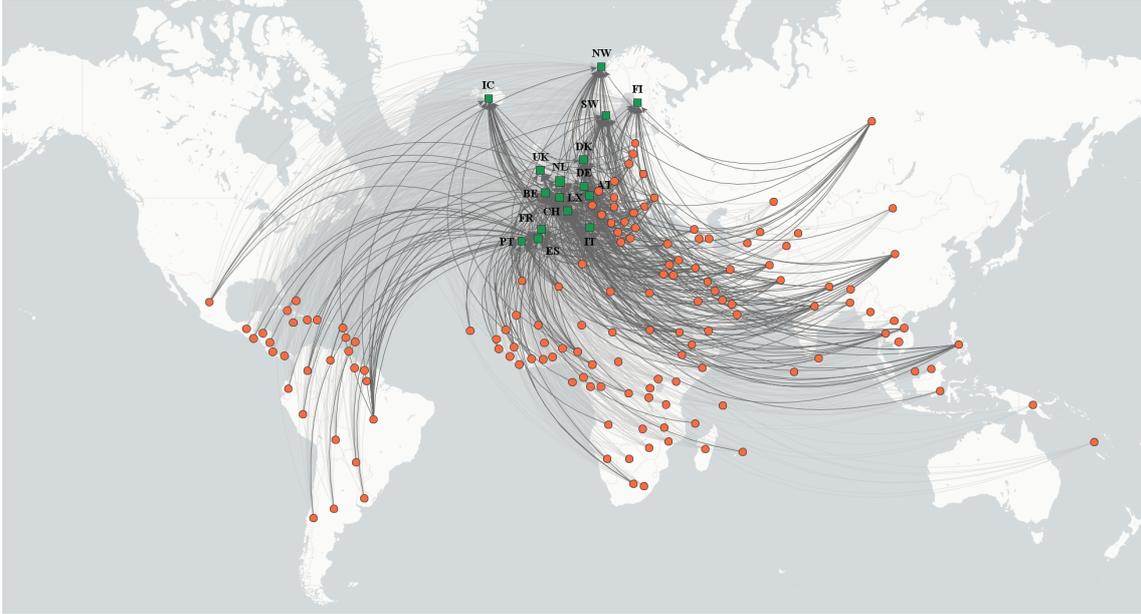


Figure 1: Network of immigration flows in 2017. Circle orange vertices represent the HMP countries, while squared green vertices Western European countries. There is a link between two countries if there is a flow from one country to another. The colour of the links are proportional to the immigration rate recorded in 2017 and provided by the OECD. The darker the tie, the higher the immigration rate.

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Network descriptives indicate that the degree distribution of the European countries (i.e. the number of countries of origin) is heavily distributed (range: 11-126, mean:113, s.d.: 34.4). Belgium, Switzerland and Germany are the countries with a higher number of non-zero immigration rates from HPM countries (126, 124, and 112 in the order), while United Kingdom and Portugal are destinations for only a few HPM country (11 and 20, respectively). The degree distribution of the HMP countries (i.e. the number of countries of origins) is more homogeneous (range: 1-16, mean: 11.4, s.d.: 4.2). A similar distributional result is observed when accounting for the immigration rates. However, the analysis shows that Germany, Luxembourg and Austria are the countries with higher inflows, while the Eastern European countries (e.g. Poland and Romania) are those characterised by higher outflows to the Eastern European countries.

The correlation between the flows and the MIPEX indicators suggests that there might be an association between the several dimensions of the immigration policies and the immigration rates. We are going to investigate this relation further by applying the MR-QAP to test whether the presence of a migration tie and its intensity depend on political factors while controlling for geographical, economic and cultural ones.

We will repeat this analysis on the migration-by reason networks, a subset of the global migration network illustrated in Figure 1 obtained by distinguishing the flows by the reason of migration. The results deriving from the MR-QAP will be used to assess whether the determinants of migrations play a different role according to the motive of migration.

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