Social Networks xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Social Networks

journal homepage: www.elsevier.com/locate/socnet

The network of global migration 1990–2013
Using ERGMs to test theories of migration between countries

Michael Windzio

University of Bremen, SOCIUM – Research Center on Inequality and Social Policy, Bremen, P.O. Box 330440, D-28334, Germany

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Global migration
Gravity models
Global inequality
Cultural homophily
ERGMs

ABSTRACT

For the period 1990–2013, 202 countries are analysed as nodes linked by in- or out-migration of substantial shares of the sending country's population. The resulting network shows regional, but also "cultural" clustering. Variants of ERGMs are used to determine *geographic*, *demographic*, *economic*, *religious*, *linguistic* as well as *historical* factors of migration between countries. Results are in line with gravity models, theories of global inequality, hegemonic languages and religious homophily, even though not all effects are fully consistent across all models. Moreover, former colonies show higher out-degree and there are strong network-structural effects indicating a hierarchy in attractiveness between countries for unobserved reasons.

1. Introduction

Global migration has an impact on receiving as well as on sending countries and attracts high attention both in scientific research and public debates. It is thus important to get better informed insight into causes of migration between countries. Out- or inflow of migrants create a network between countries and bind them "socially" together. But what are the basic determinants of migration between countries? Why do people migrate from one country to another? Why do they choose specific destinations? The present paper focuses on *geographic*, *demographic*, *economic, religious*, *linguistic* and *historical* factors of migration between countries. It is a new approach in migration research to take a global perspective, to statistically control various factors against each other in a comprehensive model, and also to control for statistical non-independence of dyads in networks. Are global migration flows directed from poor to richer countries or from the Global South to the North? Are there effects of spatial distance, area size or demographic trends on migration, as expected according to demographic and geographic theories? Do we find effects of language and religion as well as historical path dependencies due to colonization? And, more importantly, does the social network paradigm lead to new insight into statistical non-independence and embeddedness of two country-dyads into a wider "social" environment?

Global migration results from a multi-factorial constellation of determinants statistical models should account for. Social network analysis provides methods to control for the embeddedness of dyads into the surrounding *network structure*. If Spain attracts immigrants from Morocco, and sends at the same time migrants to Germany, migrants might be also pulled from Morocco to Germany, indicating an underlying hierarchy of attractiveness and pull-factors.

Using data from the UN Migration Wallpaper on 202 countries for the years 1990, 2000, 2010 and 2013, this paper investigates global migration patterns from a social network perspective by using methods of temporal and cross-sectional exponential random graph modelling (ERGM). The focus is on *factors* triggering global migration, so each country will be equally treated as a vertex in the network, regardless of its population size. According to the measurement of migration suggested in this paper models are neither dominated by large countries nor by extraordinarily high migration flows between particular country-dyads. If a country-dyad is in the highest quartile of the migration measure's distribution, a migration flow from ego to alter will be regarded as being relevant, and will thus constitute a tie in a binary network. In addition, the analysis will be also extended to valued networks of different *intensities* of a migration flow.

1.1. Theories of migration

Over the history of migration research different theories have been developed to explain migration flows between spatial units. *Spatial distance* and *population size* are crucial factors in the early theories. Together, these two components make up the *gravity model*: the higher the mass of two objects and the smaller the distance between them, the stronger are the forces pulling them together. In this case, these forces trigger migration flows between them (Boyle et al., 1998). Spatial proximity might facilitate also

http://dx.doi.org/10.1016/j.socnet.2017.08.006
0378-8733/

back-and-forth migration, as highlighted in theories of *immigrant transnationalism* (Jaworsky and Levitt, 2007), since travel time, monetary costs and cultural differences increase with increasing spatial distance.

A migration flow from the *South* to the *North* is often assumed (Collier 2013; Castles et al., 2014), but it is an open question whether a general effect of *South* or *North* location exists net of economic differences. According to the *neoclassical theory*, migration results from disequilibrium in the global distribution of income and wealth (Massey 1998; Castles et al., 2014). Rational individuals try to maximise their benefit and decide to migrate to richer countries. As a result, the supply of labour in the richer regions increases and wages decrease, which would, in the long run, lead to a convergence of regions in wealth and income. Even though this mechanism rarely exists in a pure form, basically due to border control and immigration policies, it motivates the hypothesis of a global migration flow from poor to rich countries. But opportunities for out-migration can be restricted as well, as it was the case in the socialist countries in Central-Eastern Europe. Today, global mass communication brings information about wealthy lifestyles into each lodge and yurt; the extreme inequalities between countries are now globally visible. Given that, non-forced migration is often also driven by relative deprivation rather than by objective needs (Czaika and de Haas, 2013), so that comparatively well-off persons in the Global South invest in illegal migration e.g. to the US or Europe.

Another branch in migration theory focuses on the *evolution of migration systems* (Castles et al., 2014). In history, waves of immigration such as from Europe to the US in the 19th century created diaspora-groups which boosted a further inflow via chain-migration. The *classic immigration countries* attract more immigrants from a wide range of sending countries simply due to the fact that, on average, the size of diaspora groups is already large. More importantly, the experience with immigration and the absorption of "strangers" evolved over decades, even centuries. It is ". . . part of the myth of nation-building" (Castles et al., 2014: 20), which is why countries such as New Zealand, Canada and the US are regarded as being tolerant and open and are still attractive to immigrants.

Migration flows between countries can also result from *homophily* in the dominant *religion* and *language*. Homophily is a central concept in social network theory, usually applied in studies on network ties between persons (Kadushin, 2012). Taking the expected costs of acculturation into account (Esser, 2010), immigrants might decide to move to countries where languages, but also basic behavioural standards, are assumed to be similar to those in the country of origin. Religious ideas are related to fundamental attitudes, values, norms and conduct of life (Windzio and Wingens, 2014). Conversion, relaxing a religious commitment or even to apostatise is unthinkable in some religious groups. If two countries have the same dominant religion, conflicts e.g. due to children's affinity to assimilate towards secular norms or to convert are unlikely. Hence, if two countries are part of the same religion, the decision to migrate might be less costly. Religious doctrines can be even directly related to migration, such as variants of the *hijra* concept in Islam (Masud, 1990). *Hijra* means "to migrate" or "to depart" and refers to the migration of the early Islamic community from Mecca to Medina in order to escape from a "territory of disbelieve". Over the centuries Islamic scholars elaborated different interpretations of *hijra*, e.g. as being obligatory when the religious life of the community is repressed by non-Muslim forces, but also to propagate Islam in other countries (Masud, 1990: 43). The latter interpretation would imply that countries with a dominantly Muslim population send migrants non-Muslim countries.

Cultural characteristics such as religion and language sometimes gain *hegemonic* dominance. Hegemony implies that power is concentrated on one or a limited number of actors (Vögtle and Windzio, 2016). In history, some countries became expansive by imperialistic politics, and thereby also their *languages*, as important vehicles for the diffusion of power, became hegemonic, e.g. Latin in ancient Europe or Arabic in Asia and Northern Africa during the Umayyad Caliphate since 661. The origin of English's and Spanish's hegemony is their colonial history. Still today, powerful nation-states such as the US influence the world-culture through all kinds of cultural media, so that English becomes a lingua franca. Potential migrants have a basic knowledge of these languages, so the costs of migration decrease, which is also the case when languages are similar between country of origin and destination, that is, if languages belong to the same branch in the classification of languages.

One of the driving forces of migration is *population density* (Durkheim, 1965: chp. 2, I), the number of persons divided by the country's area size. Densely populated countries show intensified competition for housing space, but also on labour markets. In the 1950s, the Turkish government was highly interested in sending migrants to European countries, e.g. the Netherlands and Germany, because of Turkey's increasing population (Boyle et al., 1998: 59p).

If a country B attracts migrants from a county C, and B sends migrants to another country A, also C and A might be linked by migration if migrants from C expect opportunities in the even more attractive alternative A. If such a hierarchy in attractiveness exists between countries, it should be captured by effects of triadic closure in subnetworks, which usually occur in friendship networks (Windzio, 2015). Analysing such kind of statistical non-independency is unique to the social network approach. Effects of e.g. triadic closure can provide insight into hierarchies of attractiveness resulting from unobserved factors. These hierarchies are not only due to differences in economic performance and welfare, but possibly also due to the countries' "social models" (Collier, 2013), namely the institutions and regulations guiding actors' expectations and behaviour. Social models correspond with safety, order and economic performance (North, 1990). However, these dimensions of place utility (Wolpert, 1965) are difficult to measure in a global data set and the research design should attempt at controlling them as unobserved factors (see below).

1.2. Existing research based on different designs

Migration research should ideally be based on data on migration decisions at the level of individual actors or households. Excellent studies have been conducted e.g. on Mexican-US migration (Massey and Espinosa, 1997), and on migration from Poland to Germany (Massey et al., 2008). However, in fact they are *case studies* of country-dyads, and often focus on moving back and forth in a transnational social space between two or more countries (Jaworsky and Levitt, 2007), or on one sending and one receiving country (e.g. Mexico and the U.S. or Poland and Germany) (Massey et al., 2008). An individual-level global migration survey is hardly conceivable. Studies based on aggregate data, in contrast, do not allow conclusions about migration decisions at the micro level, but can reveal in which world regions migration flows are most intensive. This intensity strongly depends on population size, so absolute numbers of migrants should be used as a dependent variable for descriptive purposes (Abel and Sander, 2014). If the focus is on the *factors causing* migration, however, or on links between two countries by high diaspora populations, relative frequencies should be used. Based on global data on the foreign-born population in the receiving countries, causes of migration can be analysed on a global scale. Data on global migration is provided by the UN population division and the World Bank. For instance, the UN (2014: 6) ranks country-dyads according to the population born in a sending country living in a receiving country. Czaika and de Haas (2013) draw on

Please cite this article in press as: Windzio, M., The network of global migration 1990–2013. Using ERGMs to test theories of migration between countries. Soc. Netw. (2017), http://dx.doi.org/10.1016/j.socnet.2017.08.006