

# Analysis of Possible Transit Country in Global Migration

Xiaomeng Li<sup>1</sup>, Siyu Huang<sup>1</sup>, and Qinghua Chen<sup>1,2</sup>

<sup>1</sup>School of Systems Science, Beijing Normal University, Beijing 100875, China [lixiaomeng@bnu.edu.cn](mailto:lixiaomeng@bnu.edu.cn)

<sup>2</sup>Department of Physics, Boston University, Boston, MA, USA

‘Transit migration’, which is a specific type of migration that involves crossing one or several countries or regions, is an increasingly popular topic that has attracted the concern of organizations and scholars for the last three decades. Since statistical data that could describe or measure the phenomena are rarely available, empirical and quantitative analysis is hard to carry out effectively or globally [1]. This paper proposes a quantitative method to analyze the irregular migration relationships of countries. It takes an effective approach to characterize a systematic view of transit migration and represents possible transit countries with comparisons of direct and transit migration costs.

Suppose that there are  $N$  entities. In country  $i$ , the potential migrants have the opportunity to migrate to any other countries/regions, with  $j$  as the candidate destination, then, the migration cost matrix  $[Cost_{ij}]$  is obtained with the LC model [2].

For special country  $k$ , the migration costs when moving from country  $i$  to country  $j$  could be saved by migrating through country  $k$ , as  $Cost_{ij} > Cost_{ik} + Cost_{kj}$ . In that situation, country  $i$  and  $j$  experience a bad relationship where even migrants in country  $i$  find that transit by country  $k$  is easier than to migrate to country  $j$  directly. Therefore, those who want to migrate to their dream countries but face a high migration cost may find another possible path to achieve their goals.

Figure 1 helps to visualize irregular migration relationships and possible transit countries in all continents of the world. For transit migrants, countries in North America and West and North Europe, such as Canada, United States, Germany, United Kingdom, France, Italy, Australia and Turkey, were the most popular springboards because many migrants could reduce migration costs by traveling through those countries. Most potential transit countries in Figure 1 have been recognized by previous scholars [3, 4].

In addition, we discovered that Cambodia, the United States and Seychelles are transit countries that were seldom noticed before. Actually, the transfer behavior in the global migration network is rare, with a proportion less than 0.5%. These results provide an objective view to transit migrants and countries that is free of prejudice and political attitudes.

## References (optional)

- [1] Duvell, F.Y. (2012). Transit migration: A blurred and politicised concept. *Population Space and Place*, 18(4), 415-427.
- [2] Li, X., Xu, H., Chen, J., Chen, Q., Zhang, J. & Di, Z. (2016). Characterizing the international migration barriers with a probabilistic multilateral migration model. *Scientific Reports*, 6, 32522.
- [3] Duygu, A., Ykseker, D. (2012). Rethinking transit migration in turkey: reality and representation in the creation of a migratory phenomenon. *Population Space and Place*, 18(4), 441-456.
- [4] Artuc, E., Ozden, C. (2018). Transit migration: All roads lead to america. *Economic Journal*, 128(1), F306-F334.

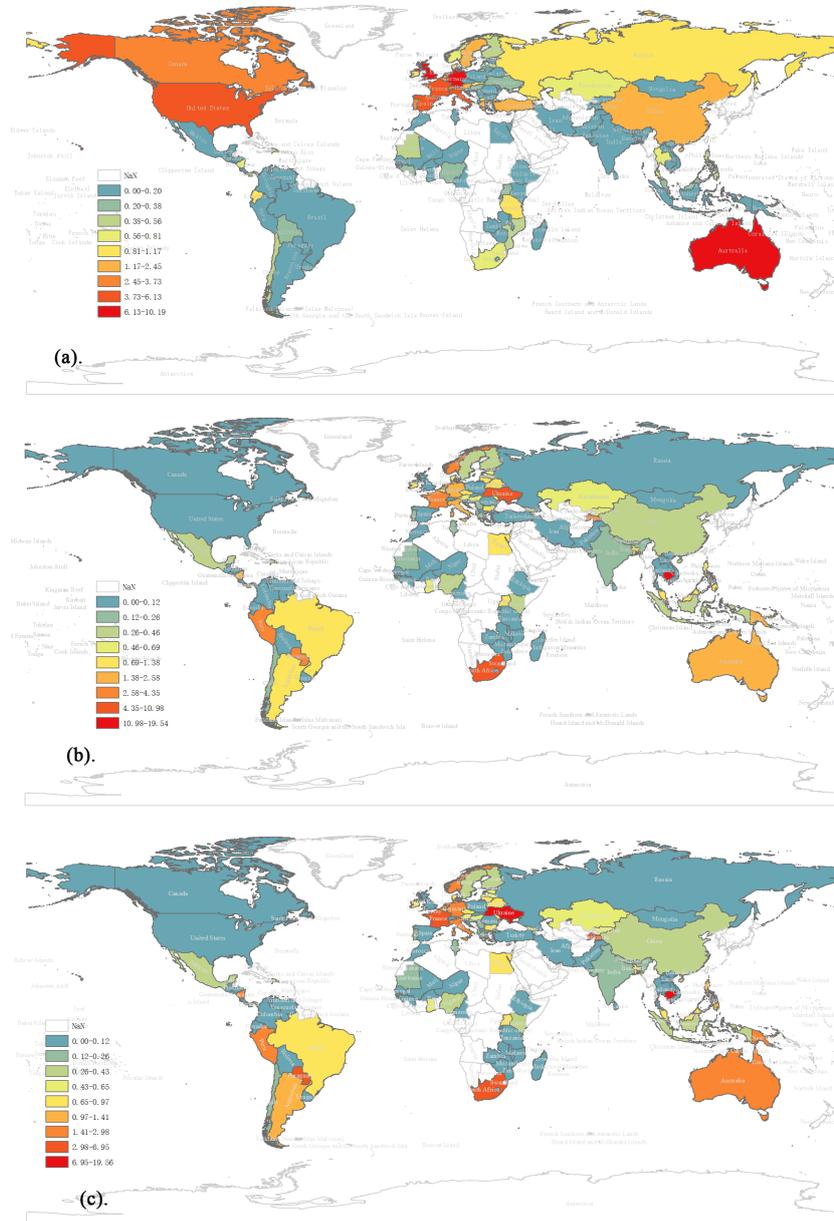


Figure 1: The frequency of possible transit countries during (a)1990-1999, (b)2000-2009, and (c)2010-2013. The color for each country demonstrates its frequency for being a possible transit country. If a country has a higher frequency, their color in the map will be close to red, and if a country has a lower frequency, their color will be close to blue. The yellow ones are ranked in the middle. The countries without available data are blank.