



ALAP 2020

IX Congreso de la Asociación
Latinoamericana de Población



9 a 11 diciembre

EL ROL DE LOS ESTUDIOS DE POBLACIÓN TRAS LA PANDEMIA DE COVID-19 Y
EL DESAFÍO DE LA IGUALDAD EN AMÉRICA LATINA Y EL CARIBE

Andrea Lisette Aparicio-Castro

Department of Social Statistics, School of Social Sciences, University of Manchester, UK
andrea.apariciocastro@manchester.ac.uk

Arkadiusz Wiśniowski

Department of Social Statistics, School of Social Sciences, University of Manchester, UK
a.wisniowski@manchester.ac.uk

Francisco Rowe

Geographic Data Science Lab, University of Liverpool, UK
F.Rowe-Gonzalez@liverpool.ac.uk

Mark Brown

Department of Social Statistics, School of Social Sciences, University of Manchester, UK
mark.brown@manchester.ac.uk

Translating from five-year to one-year migrant data

The five-year/one-year problem

Censuses are a common data source when analysing migration flows due to their relative completeness and comparability (Juran, 2018; Bryant, 2018, p.1986; Bilsborrow, 1977, pp.52-75). As opposed to other data sources (e.g. administrative data), which can capture migrations, census data provide information about migrants and five-year information. For simplicity, many studies that have used census data have assumed that the number of migration flows over five years is equal to five times the number of migrants in one year (e.g. see Azose & Raftery, 2019, supplementary material p. 7). This is an unrealistic assumption. Notwithstanding that the number of migrations and migrants are very similar when they refer to short intervals (e.g. one year), the number of migrants tend to be fewer than the number of migrations when the time interval is wider (e.g. five years) (Rees *et. al.*, 2017, p. 4).

There have been studies that have proposed methods to link five- and one-year migration data in order to enable their comparability (Dyrting, 2018; Rogers *et.al*, 2010; Rogerson, 1990; Kitsul & Philipov, 1981; Rees, 1977). These methods are based on dissimilarities between five- and one-year migration data. Returners and onward migrants are believed to cause the difference between five- and one-year migration flows (Dyrting 2018, p.12; Rogerson 1990). Yet Rees (1977) has shown that

non-surviving migrants produce these differences. Rogers *et.al.* (2010, p. 22) and Kitsul & Philipov (1981) demonstrate that these discrepancies are due to spatial pattern differences.

The previous studies have proposed methods to link five- and one-year flows, which require information on the relationship between five- and one-year data. This relationship cannot be established for all censuses, because not all of them collect information on the place of residence five years and one year prior to the census date. Thus, this paper proposes an alternative and novel method to translate from five- to one-year migration data using South American censuses collected during the 2010s.

Data

This study uses micro census data on migration flows extracted from South American censuses taken in the 2010s¹. Origins correspond to Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, the USA, Canada, Spain and the rest of the world group by continents (i.e. America, Africa, Asia, Europe, and Oceania). Destinations are census places (i.e. Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela). Each origin-destination possibility represents a corridor. Data on migration flows were obtained from the question on the country of residence five years prior to the census date (i.e. the question that identifies who is a recent migrant). For the translation method, data resulted from the questions on birthplace and year of arrival to the destination country.

Method to translate from five- to one-year period data

The method of this study follows an analogous idea of Rogers, Raymer & Newbold (2003) to translate from five- to one-year period. Rogers, Raymer & Newbold (2003) use inflation factors to convert one-year values in five-year estimates. These inflation factors correspond to five-/one-year ratios.

Instead of inflation factors, the current paper uses deflation factors to get one-year migration flows from five-year information. Using the available information in censuses, the deflation factors are built based on one-/five-year migrant stocks ratios. The denominator of the ratios corresponds to the total number of foreign-born migrants who arrive at census place in the same interval to which the question of residence five years prior to each census refer. The numerator of these ratios is the number of foreign-born migrants whose year of arrival are either the census year, one, two, three or four years prior to the census. After building the deflation factors, we multiply them by the number of recent migrants.

Results and discussion of translating from five to one-year data.

Figure 1 illustrates the deflation factors created for South American censuses taken in the 2010s. While the grey lines represent deflation factors per corridor, the black dashed line corresponds to the mean of the deflation factors.

¹ This decade was selected since it is expected that the most recent censuses provide better information than censuses taken in previous decades.

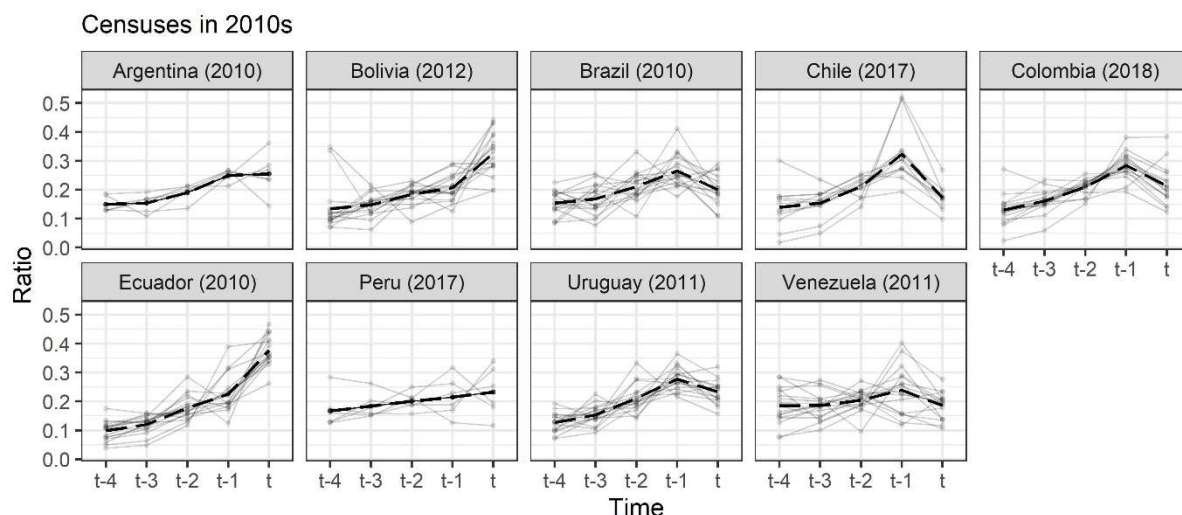


Figure 1. Deflation factors (one-/five-year ratios based on migrant stocks) obtained from censuses taken in the 2010s. The census year t is in parenthesis after each census country. Grey lines represent deflation factors per origin-destination possibility. Black dashed line corresponds to the mean of the deflation factors.

After multiplying the deflation factors by the number of recent migrants, we obtain annual migration flows. To assess how well our translation method is, we compare the translated flows with the observed ratios extracted from censuses, which provide one- and five-year information (i.e. the 2010 Brazilian, 2011 Uruguayan and 2018 Colombian censuses). The numerator of the observed ratios is the number of migrants whose residence one year prior to the census is different from the census place. The denominator of the observed ratios is the total number of recent migrants.

Figure 2, 3 and 4 show the comparison between the logarithm of one-year observed (solid line) and one-year translated flows (dashed line) obtained from the 2010 Brazilian, 2011 Uruguayan and 2018 Colombian censuses, respectively. Overall, the translated flows trend is similar to the observed information, although their magnitude varies. While the translated flows fluctuate between 0.04 and 0.58, the observed ratios oscillate between 0.05 and 1.17.

In particular, there are some translated flows, which reflect a different pattern. As an example, Figure 2 shows that the number of observed migrants from Oceania to Brazil between 2006 and 2007 has a downward tendency, as opposed to the upward trend that is reflected by the translated flows. The fact that the deflation factors are based on foreign-born information may explain these discrepancies. Despite the differences between the observed and translated one-year values, the proposed method relaxes an unrealistic assumption that five-year migration data is five times larger than annual data.

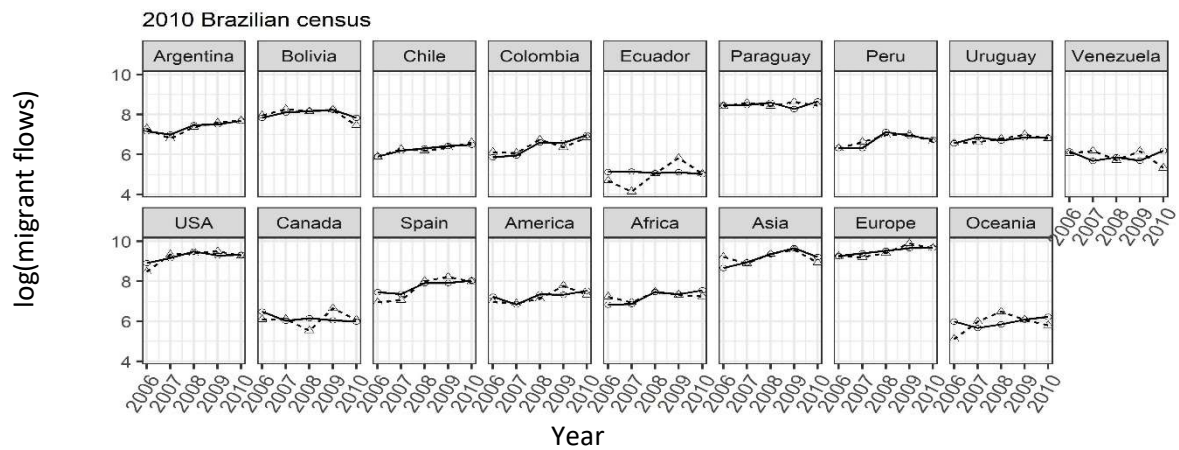


Figure 2. Comparison between the logarithm of one-year observed (solid line) and one-year translated flows (dashed line) obtained from 2010 Brazilian census.

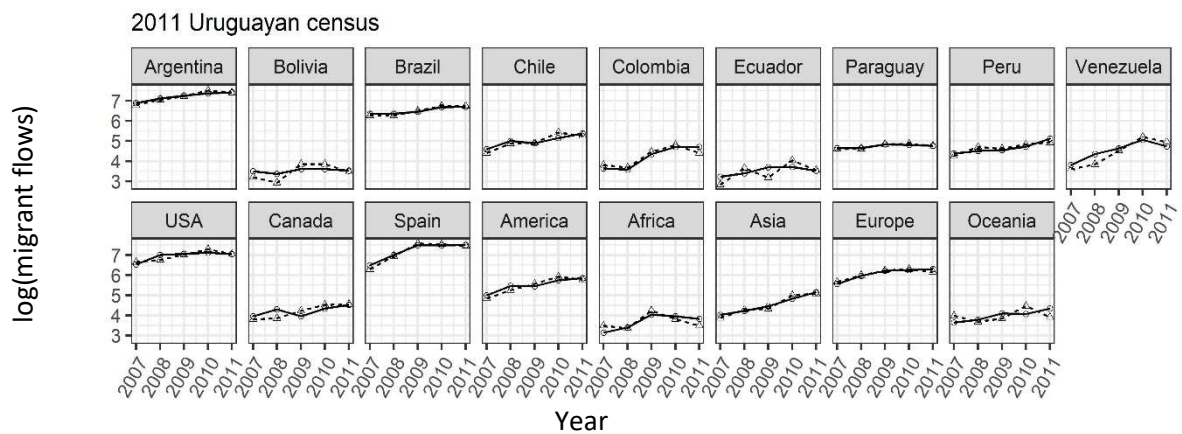


Figure 3. Comparison between the logarithm of one-year observed (solid line) and one-year translated flows (dashed line) obtained from 2011 Uruguayan census.

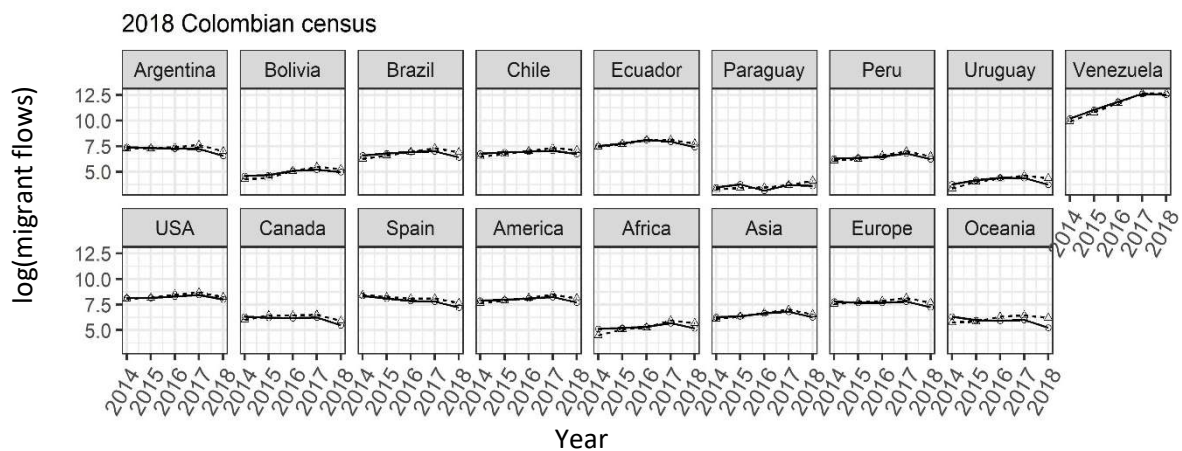


Figure 4. Comparison between the logarithm of one-year observed (solid line) and one-year translated flows (dashed line) obtained from 2018 Colombian census.

Notice that the method proposed in this paper relies on the quality of each census and their response rates, especially, of the questions about birthplace and year of arrival. Additionally, the proposed method follows a deterministic approach. Thus, it is necessary to implement a probabilistic alternative for translating from five- to one-year migration flows. This alternative should include errors related to response rates and the fact that the ratios are based only on foreign-born migrant information rather than the total flows.

References

- Azose, J., & Raftery, A. (2019). Estimation of emigration, return migration, and transit migration between all pairs of countries. *Proceedings of the National Academy of Sciences*, 116(1), 116–122.
- Bilsborrow, R. E., Hugo, G., Oberai, A. S., & others. (1997). *International migration statistics: Guidelines for improving data collection systems*. International Labour Organization.
- Bryant, J., & Zhang, J. L. (2018). *Bayesian demographic estimation and forecasting*. Chapman and Hall/CRC.
- Dyrting, S. (2018). *A Framework for Translating Between One-Year and Five-Year Migration Probabilities*.
- Juran, S., & Snow, R. C. (2018). The potential of population and housing censuses for international migration analysis. *Statistical Journal of the IAOS*, 34(2), 203–213.
- Kitsul, P., & Philipov, D. (1981). The one-year/five-year migration problem. In *Advances in multiregional demography* (pp. 1–33). RR-81-006.
- Rees, P., Bell, M., Kupiszewski, M., Kupiszewska, D., Ueffing, P., Bernard, A., ... & Stillwell, J. (2017). The impact of internal migration on population redistribution: An international comparison. *Population, Space and Place*, 23(6), e2036.
- Rees, P. H. (1977). The measurement of migration, from census data and other sources. *Environment and Planning A*, 9(3), 247–272.
- Rogers, A., Little, J., & Raymer, J. (2010). *The indirect estimation of migration: Methods for dealing with irregular, inadequate, and missing data* (Vol. 26). Springer Science & Business Media.
- Rogers, A., Raymer, J., & Newbold, K. B. (2003). Reconciling and translating migration data collected over time intervals of differing widths. *The Annals of Regional Science*, 37(4), 581–601.
- Rogerson, P. A. (1990). Migration analysis using data with time intervals of differing widths. *Papers of the Regional Science Association*, 68(1), 97–106.