From circulatory to neutral migration places: New patterns of population mobility in Brazil from 1995 to 2010[a].

Everton E. C. Lima[b]
Fernando G. Braga[c]

Introduction

The recent pattern of internal migration in Brazil has emerged as a challenge for either theoretical or empirical analysts. From the 1980s, we saw a decrease in the intensity of the internal population movements associated with the rural exodus and the occupation of the Brazilian agricultural frontiers. This new context has led experts to study more about the emergence of new migration patterns, with innovative features in terms of both direction and intensity of the flows (Pacheco & Patarra, 1997). Therefore, it is extremely important to endeavor a more accurate description of population mobility in Brazil, which may result in the identification of other categories that meet the recent complexity created by these new patterns of mobility. The main characteristics of these new features are: 1) The reduction in distance of the migration flows; 2) Diversification of migratory routes; 3) Reduction of the rural exodus; 4) Increasing the predominance of urban-urban flows; 5) Increasing flows from urban to rural areas; 6) Growing process of population spreading; 7) Increased migration return; and 8) Growth of short-term migration (Matos, 1995, 2002; Brito, 2006).

These new processes have reduced the potential explanation of old concepts that usually describes internal migration. In addition to that, the concepts of attractive and repulsive areas of migration seem not to accurately describe the current complex dynamics of population mobility.

In this context, we propose a method for classifying the municipalities in Brazil according to their characteristics of migration, as shown in the data now available from the 2010 National Brazilian Census. We apply a multivariate factor analysis for data reduction and, afterwards, a cluster analysis was carried out on a set of selected variables that describe how the municipalities in the country are articulated with the Brazilian migration network.

Thus, this work has as main objective classify the Brazilian municipalities according to the observable patterns of internal migration. Such methodological effort is justified in the face of the spatial changes undergone by many municipalities due to the internal migration. Many events such as the decentralization of production, diversification of markets, the urbanization of rural areas, the emergence of metropolises and the expansion of the agricultural frontier that create new possibilities for the reallocation of labor markets across the country. This set of factors indirect suggests that new pattern of population mobility might rise across the country. Formed by the overlapping of past and present conditions, we believe in the existence of a new set of population movements, which insert new meanings to territorial integration.

Data and Methods

The proposal presented here for classification of municipalities regarding migratory trend relies on two basic assumptions. First, that municipalities are considered the best approximation of the concept of "place", that is the spatial area that encloses the living spaces, in which individuals develop activities that constitute the practice of citizenship, and the municipalities also carry the positive and negative effects of migration. The places thus constitute the vertices of network flows. Second, the migratory flows synthesize significant part of

established connections between places, since the decision of where to migrate is based on preexisting economic, cultural and emotional ties in the place of origin. In this sense, the recognition of new patterns of migration from the perspective of places can reveal broader aspects of internal migration.

Thus, the 5,565 Brazilian municipalities are the basic unit of analysis for this study. However, given that we are analyzing the entire country, we consider the Metropolitan Regions (MRs) as a unique entity or locality, since migrants that are living in any county of the MR will probably participate in labor market activities and will consume in the Metropolitan Region where his residence municipality belongs. This reduce the number of observations to 5114 places.

In order to understand the migration process, we selected a set of characteristics of the localities that synthesizes the most important aspects of the migration network from these locations. These characteristics are: 1) the net migration; 2) Percentage of immigrants; 3) Percentage of emigrants; 4) Total population of the locality; 5) The effectiveness index migratory, estimated as the ratio of the net migration by the total of migrants and 6) The average degree of centrality, estimated as the average of the number of municipalities for which the location has sent and/or received migrants from 2005 to 2010. This last variable is a *proxy* for circulatory movements among places.

As employed methods, first, a Principal Component Analysis was applied in order to reduce the original set of six variables into a new set of uncorrelated components. In the next step, these components were used in a classificatory cluster analysis with the purpose of establishing a migration typology for the locations studied. The results of both analysis are described in table 1 and 2.

Table 1 shows that the three components combined explain something about 84% of the variability of the original set of covariates. This means that more than 4/5 of the initial data can be compressed in three independent orthogonal components.

Table 1: Total variance explained, after applied a Principal Component Analysis to the original set of variables that describes migratory characteristics of Brazilian municipalities in 2005-2010.

Number of Components	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.0	32.8	32.8	2.0	32.7	32.7
2	1.8	29.6	62.4	1.8	29.7	62.4
3	1.3	21.5	83.9	1.3	21.6	83.9
4	0.8	13.6	97.6			
5	0.1	1.5	99.1			
6	0.1	0.9	100.0			

Source: Census Brazil, 2010.

Analyzing the correlation matrix[d], we identify that the first Principal Component indicates municipalities characterized by circulatory migration. The second Component indicates other construct dimension, which we call places ruled by pull factors. The third and last Principal Component describes places with tendencies to push population of its area. These components are then afterwards employed in a cluster analysis.

The results and description of each cluster are presented by table 2. The color tones distinguish the mean values of each component across the clusters. In

---

[d] Due to extended abstract page limitations, the correlation matrix is not shown.

each the column, the darker shades reflect higher mean values of the component in each specific cluster. In the lines, we have the specification of each cluster, which is obtained by simultaneous comparison of the three mean values of each components.

Table 2: Clusters of type of Migration places. Brazil, 2005-2010.

Cluster	Circulatory Migration Component		Attractive Migration Component		Repulsive Migration Component		N	Name of cluster
	Mean	Sig.	Mean	Sig.	Mean	Sig.	N	Name of cluster
1	-0.01	ns	0.07		1.57		733	Places ruled by push factors
2	-0.09		-0.83		0.40		1175	Places with low migration flow and with tendencies to push population
3	-0.13		-0.51		-0.71		1488	Neutral migration places
4	0.03		0.69		-0.60		1352	Places with low migration flow and with tendencies to pull population
5	8.17		1.15	ns	-0.76		26	Circulatory migration places
6	0.14		2.15		0.76		340	Places ruled by pull factors
Combined	0.00		0.00		0.00		5114	

Source: Census Brazil, 2010.
ns: non-significant mean ajusted by a Bonferroni test.
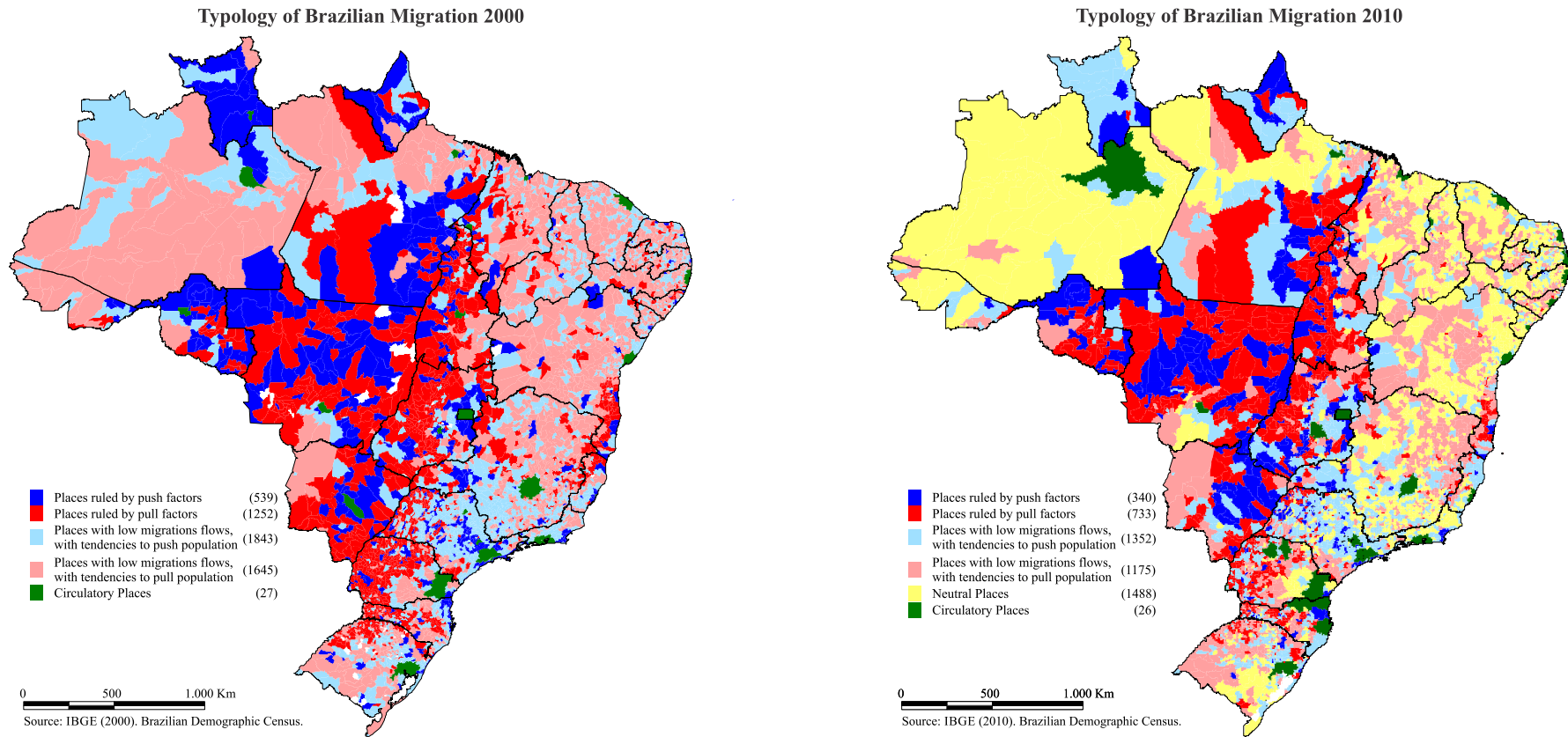
Results and Discussion

The results showed that there are great differences among municipalities and in their participation in the migration network. There are many municipalities with weak ties with the migration network and a few areas with strong ties, where the populations are very mobile. We have called these municipalities "circulatory locations." This pattern is also observed by Lima and Braga (2013) between the period of 1995 and 2000. However, the period of 2005 to 2010 reveals the emergence of other kind of migration places. These places seem to do not attract neither push population to its areas. We call these municipalities: areas with a neutral pattern of migration.

The figure 1 shows the spatial distribution of the two typologies of migration places for the periods from 1995–2000 (see Lima and Braga, 2013) and from 2005–2010. Many places were categorized as areas with low migration flows from 1995–2000 and became neutral areas of migration during the second period of analysis. We suspect that the reason behind the emergence of neutral regions of migration is the increase of social benefit distribution in these municipalities. Thus, social benefit programs – like the Brazilian Bolsa Família – are keeping the poor population in their place of origin. At the same time, the lack of better socioeconomic conditions in those areas might inhibit immigration as well[e].

This classification indicates the existence of new categories of territories that go beyond the classical definitions of attractive and repulsive regions and, thus, new kinds of population movements are emerging in the contemporaneous Brazilian society.

[e] We tested the association between Bolsa Família beneficiaries and the six migration places using a contingency table. Our analysis shows that more than 70% of the places characterized as neutral places of migration, many people receive this social benefit. This association is also statistical significant according to Chi-Square test.

Figure 1: Typology of migration patterns. Brazil, from 1995 to 2000 and from 2005 to 2010.

Typology of Brazilian Migration 2000

Typology of Brazilian Migration 2010

	Places ruled by push factors	(539)
	Places ruled by pull factors	(1252)
	Places with low migrations flows, with tendencies to push population	(1843)
	Places with low migrations flows, with tendencies to pull population	(1645)
	Circulatory Places	(27)

0   500   1.000 Km

Source: IBGE (2000). Brazilian Demographic Census.

	Places ruled by push factors	(340)
	Places ruled by pull factors	(733)
	Places with low migrations flows, with tendencies to push population	(1352)
	Places with low migrations flows, with tendencies to pull population	(1175)
	Neutral Places	(1488)
	Circulatory Places	(26)

0   500   1.000 Km

Source: IBGE (2010). Brazilian Demographic Census.

Source: Censuses 2000 and 2010. The typology for year 2000 extracted from Lima and Braga (2013).

4