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SPATIAL DISPERSION OF POPULATION IN THE BRAZIL

dispersão espacial da população no Brasil

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Resumo

As evidências históricas não deixam dúvidas sobre a relevância dos deslocamentos espaciais da população na ocupação do território nacional. Em vários momentos no tempo essa força de trabalho móvel serviu como fonte catalisadora de profundas transformações econômicas e sociais nas regiões de origem e destino e não apenas como mão de obra disponível para as atividades econômicas. Esse trabalho tem como objetivo a avaliação da magnitude e diferenças no processo de dispersão espacial da população nas Regiões de Influência das Áreas de Concentração definidas pelo IBGE, tendo como base na distribuição dos estoques de população e dos fluxos migratórios identificados no Censo Demográfico de 1991, 2000 e 2010. Os resultados demonstram que não há uma tendência generalizada de ampliação da dispersão espacial da população. Embora os núcleos regionais que compõem as denominadas ACPs tenham experimentado, em sua maioria, queda no ritmo de crescimento demográfico e perdas relativas no processo de redistribuição espacial da população, ainda exercem alto nível de atração na população em cada região.

Palavras-chave: Dispersão Espacial; População; Migração; Áreas de Concentração (apcs).

Abstract

The historical evidence leaves no doubt about the relevance of the spatial displacement of the population in the occupation of the national territory. At various points in time this mobile workforce served as the catalyst of profound economic and social changes in their regions of origin and destination and not only as labor available for economic activities. This study aims to evaluate the magnitude and differences in the process of spatial dispersion of the population in the Regions of Influence of the Areas of Concentration defined by the IBGE, based on the distribution of population stocks and migration flows identified in the 1991, 2000 and 2010 Censuses. The results show that there is not a general trend of increasing spatial dispersion of the population. Although on the whole the regional centers that make up the so-called APCs have experienced a fall in the rate of population growth and relative losses in the process of spatial redistribution of the population, they still exert a high level of attraction over the population in each region.

Key Words: Spatial Dispersion of Populations; Migration; Areas of Population Concentration (apcs).

Resumen

Las evidencias históricas no dejan dudas sobre la relevancia de los desplazamientos espaciales de la población en la ocupación del territorio nacional. En varios momentos del tiempo esa fuerza de trabajo móvil sirvió como fuente catalizadora de profundas transformaciones económicas y sociales en las regiones de origen y destino y no solamente como mano de obra disponible para las actividades económicas. Este trabajo tiene como objetivo la evaluación de la magnitud y diferencias en el proceso de dispersión espacial de la población en las Regiones Influencia de las Áreas de Concentración definidas por el IBGE, tomando como base la distribución de los estoques de población y de los flujos migratorios identificados en el Censo Demográfico de 1991, 2000, 2010. Los resultados demuestran que no hay una tendencia generalizada de ampliación de la dispersión espacial de la población. Aunque los núcleos regionales que componen las denominadas ACPs hayan experimentado, en su mayoría, reducción en el ritmo de crecimiento demográfico y pérdidas relativas en el proceso de redistribución espacial de la población, aún ejercen alto nivel de atracción en la población en cada región.

Palabras claves: Dispersión espacial; Población; Migración; Zonas de concentración.

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INTRODUCTION

One of the issues of interest to regional studies refers to the supposed process of spatial deconcentration of the population and economic activities. Despite the recurring controversy on the subject, which resulted in the proposal of terms such as "reverse polarization ", "concentrated de-concentration", and "polygonal development", there is at least a consensus regarding the empirical evidence of a reduction in the momentum of population growth in large Brazilian metropolitan centers, especially in the final decades of the last century. Although the processes of urbanization and metropolization in Brazil are relatively recent, the data available from the past demographic Censuses seem to confirm a trend, although not widespread, in the growth of emigration from the main metropolises in the country, even if these centers have maintained their regional demographic expression and have continued to attract significant numbers of migrants. In addition to the contributions of the regional economy and demographics, already traditional in research in the area, this debate requires new evidence about the effects of the alleged spatial redistribution of the population. However, in the field of Geography there are few studies on internal migration in Brazil, especially those that use census data to estimate the spatial movements of the population. The regional analysis of migration flows makes it possible to recognize under-explored dimensions in studies of the de-concentration or spatial dispersion process of the population.

Studies on the spatial mobility of the population underwent a significant change in their theoretical approach after the analysis of the reality of late industrializing countries (PACHECO and PATARRA, 1997). The dynamics of capital accumulation, the historical heritage and social structures are now considered key to the mobility of the population and the workforce for the industry in expansion or in response to the situation of stagnation with the growing concentration of the dynamic poles. Singer (1973), for example, considers migration to be a direct reflection of the structure of the development of the capitalist system, whose main driver is the intensification of regional inequalities. Despite their merits, considering the context in which they were proposed, Structuralist formulations do not respond fully to the most dynamic issues of the population, including those specific to migration and other spatial displacements, such as commuting or seasonal mobility, not only linked to the needs of the today's capitalist system. If the way spatial elements are arranged can be seen as a historical result of the activities of political, economic and social actors, the flows of information, capital and people allow and feed the dynamism of forms and functions that make up and characterize each region. Santos (1997), for example, considers the need for fluidity as one of the most important features of the present world, which is especially relevant to regional studies. Migratory movements are phenomena that manifest themselves and materialize in time and space and should not be considered only as a result of a given social reality and / or economic condition, but also as a cause of other flows such as investment, technology, professional experience , etc., which have their regional manifestations (LOBO and MATOS, 2011).

Therefore understanding migration dynamics on a regional scale involves the investigation of relations that are established between the various forms of human settlement, favoring combinations and differentiations which manifest themselves in space. It is precisely the approach on a regional scale which gives this research its distinctiveness. The objective proposed in this study is to evaluate the current stage of the spatial dispersion of the population, in particular in the spatial area established by the Regions of Influence (RIs) of the Areas of Population Concentration (APCs), as defined by the IBGE (REGIC 2007). Once the dimensions and flows of the stock had been broken down into the resident population and inter-municipal migration, the microdata extracted from the 1991, 2000 and 2010 Demographic Censuses was used in the study. Although it may be subject to criticism and controversy, the regional profile established also allows the analysis of the migration flows circumscribed in a network analysis, assessing the losses and gains of each spatial unit at various hierarchical and aggregation levels.

THE CONCENTRATION AND SPATIAL DISPERSION OF THE POPULATION: THEORETICAL AND CONCEPTUAL ASPECTS

Richardson (1980) published a reference work on the process of reversing the polarization of economic activities and the population. In this work, the author established as a premise the idea that the continued growth of the concentration of economic activities does not lead to a perpetual increase in efficiency because the marginal benefits derived from the urban scale and concentration tend to decrease from the time at which the urban center reaches a certain population size. In the same work the author states that the rollback process is characterized by the change in the trend of spatial polarization in the national economy, from which there would be a spatial dispersion out of the central region. Still according to Richardson (1980), a sequence of events characterizes the reversal of the polarization: at first, a well-defined process of economic concentration is established, creating a center and a periphery, when there are structural changes in the central area. As the adjacent cores begin to show faster growth than the center, the process of reversing the polarization begins, schematizing a wider dispersion. The dispersion also reaches secondary centers when the central area begins to lose population. The faster expansion of employment opportunities outside the major metropolitan area promotes a redistribution of the population in the whole urban system, reflecting the growing comparative advantages of the secondary cities (average). This framework is the reflection of the conversion of flows of capital and work out of the central core (metropolis) to secondary (average) cities, promoting the increase of economic and demographic growth rates.

There have been several attempts to empirically evaluate evidence on the process of economic and demographic de-concentration / dispersion. Champion (1984), for example, specifically emphasized demographics, using the official annual population estimates to examine changes in the scale of the rural-urban shift in the distribution of the UK population since the 1960s. The results showed that the level of de-concentration of the population at the regional level reached its peak in the early 1970s and since then the rate of population loss observed in London and several other major cities has declined sharply. The results indicate that the differentials of the growth rate of the population between metropolitan and non-metropolitan Britain narrowed between 1970 and 1980 but the negative relationship between the urban situation and population change remained. Unlike the experience of the USA and other European countries, in the mid-1980s Britain experienced a resurgence of non-metropolitan growth, which had a widespread impact across the country (Champion, 1994). Lipshitz (1996) examined the population and migration in Israel in the period from 1948 to 1992 and noted that the most common feature was a slowing or even a reversal in the trend of concentration, which had been occurring widely in the previous decade, although the results were not generalized to all regions of the country. One conclusion of the study was that most people moving from central regions chose the metropolitan peripheries as their destination.

In Brazil, some attempts to apply these models have been presented. However, Brazilian structural and sectorial characteristics make it additionally difficult to interpret the phenomenon correctly. Townroe and Keen (1984) presented some concrete evidence of a reversal of polarization in the state of São Paulo between 1970 and 1980. In addition to the decline in population of the core population, the authors identified clear signs of spatial de-concentration of the population. However, the proposals regarding the possible reversal of the process of polarization in Brazil was heavily criticized, both for the consistency of the empirical evidence presented and the type of variables and methodology used. Azzoni (1986) highlighted that the size of the city should be considered as an indicator of agglomeration economies as it is crucial to consider the central region capable of generating an attraction field of new investments. For Azzoni (1986) regional attraction transcends the environment of cities, while the locational costs are essentially urban. Therefore, it would be foolhardy to believe in the occurrence of a process of polarization reversal in Brazil because, on the contrary, the evidence suggests that far from being a sign of polarization reversal, the phenomenon

observed in São Paulo would be closer to a spread of industry within the most industrialized area of the country, in a process of "concentrated de-concentration" (AZZONI, 1986). Diniz (1993) provided elements of a new form of interpretation. After the indisputable economic and demographic concentration verified until the late 1960s, the process of reversal of polarization began (DINIZ, 1993). For Diniz (1993), the "spread" of Brazilian industry did not only occur within the limited radius of 150 km of the metropolitan area of São Paulo. After the undeniable economic and demographic concentration verified until the end of the 1960s, initially there was the process of reversal of this polarization. However, the de-concentration process was not widespread; instead it took place in well-equipped, rich selective spaces in the externalities of the country, mainly reflecting the spread inland in certain states. In a second phase, there was the relative re-concentration in the polygon defined by the region formed by Belo Horizonte-Uberlândia-Londrina / Maringá-Porto Alegre-Florianópolis-São José dos Campos-Belo Horizonte.

In addition to considering Azzoni's analogy unwarranted, Negri (1996), believed the polygon established by Diniz (1993) was inappropriate, as although the central region benefited from the decentralization of the previous 20 years, when its share in the domestic industry increased from 33.1% to 49.2%, this represented no inconsistencies against the growth outside the polygon. In a way Matos' (1995) observations corroborate the analysis carried out by Azzoni, as the true scope of the alleged phenomenon of decentralization is unknown or if the existing explanations cover all cases, even though major changes in the spatial distribution of the population are underway. It is important to recognize, therefore, that much of the expansion of the country's urbanization in recent decades stems from the multiplier effects of the spread of urban and industrial concentration in the Southeast. This process stimulated the increased density of the urban network and the links of complementarity between the various centralities. Lobo and Matos (2011), on analyzing spatial dispersion in Brazil in the 1980s to 2000, did not confirm the completeness of the reversal of polarization in Richardson's terms or the supposed economic and demographic de-concentration highlighted by Redwood III, among others, but they provide signs of the spatial dispersion of the population, already prominent in certain cases, such as the Region of Influence of São Paulo. In this region, the volume of targeted migratory flows to the main attraction centers suggests that this is a form of "polynuclear dispersion" (LOBO, 2009).

In fact, the interpretation of reality by theoretical models outlined for the advanced developed countries collides with the particularity and complexity that mark the formation of territory and the organization of national space. The Brazilian urbanization process began to take shape in the 1940s, when a still fragile industrialization led to a spatial reorganization of the population in the country. A new pattern of urbanization, essentially concentrating, was being drawn. It is in the Southeast that the big urban centers concentrating this huge mass of urbanites forming in the country were located. This occurred over the heads of government efforts aimed at the opening of the agricultural frontiers since the 1930s (MARTINE, 1987; PATARRA, 1984 TASCHNER and BÓGUS, 1986). In contrast, the rural population has declined since the 1950s. In the 1970s the urban population accounted for about 56% of the total Brazilian population. In the same period, this proportion reached 72.7% in the case of the Southeast. The increase in rural-urban migration flows promoted the intensification of the process of growth of the urban population, heavily concentrated in major Brazilian cities, forming large and complex urban agglomerations, via the process of metropolization and conurbation.

The analysis of the structure and spatial distribution of populations is not new. For example, at the end of the nineteenth and early twentieth centuries Ravenstein (1980) indicated that there were significant relationships between the economic activities and spatial displacements of the population, especially with regard to distance, movements in stages, the configuration of currents and crosscurrents, the predominance of female migration and also the fact that migrations tended to generate successive movements from areas near an industrial or commercial center. Big cities "provide facilities so extraordinary to the division and combination of labor, to the exercise of all

the arts and the practice of all professions that each year a greater number of people may dwell in them" (RAVENSTEIN 1980: .26). For this same author, there are other aspects that should be considered, given their inducing effect in migration, such as educational facilities, the health of the climate or the cost of living. In reviewing Ravestein's theses, Lee (1980) introduces some additional information about the internal movements in the societies of late capitalism. In his analysis, Lee (1980) states that the decision to migrate is linked to a rational (though not exclusive) decision involving the positive and negative factors in the areas of origin and destination. It is natural, in the perspective offered by this author, that different people are affected differently by a number of obstacles or incentives to the possibility of migration.

Although the individual perspective is not literally excluded, Singer (1973) considers migration a direct reflection of the structure and the mechanisms of the development of the capitalist system, whose main driver is the intensification of regional inequalities. For this author,

> Of course, any manufacturing process involves a large transfer of activities (and therefore people) from the countryside to the cities. However, along capitalist lines such a transfer tends to favor only a few regions in each country, emptying the others. Such regional imbalances are well known and are compounded in that locational decisions are taken solely using the perspective of private enterprise as a criterion (SINGER, 1973, p.222).

Singer's contribution (1973), especially as it relates to reflections on migration, is to identify how the factors of attraction reflect the need for manpower as a reflex of the growth of industrial production and the expansion of the urban services sector. The push factors, in turn, can be divided into factors of change stemming from capitalism's penetration in the countryside and the adoption of a labor saving system, and stagnation factors linked to demographic pressure on the Earth. The regions of change lose population, but productivity increases, which, at least in principle, allows an improvement in local living conditions. However, the areas of stagnation present a deteriorating quality of life, sometimes acting as "nurseries of labor" for the landlords and the big agricultural companies (SINGER, 1973). In the same Structuralist approach, there are still some authors who consider migration as a flow deeply linked to the creation, expansion and articulation of labor markets. If development is uneven within capitalism, the population is distributed following the same logic of the intensification of economic spaces, forming large labor pools. Aside from the merits of such formulations the Structuralist approach cannot cover the whole multiplicity of the most dynamic and specific causes of migration, such as comparative advantages and external capabilities that have transformed the destination areas. For Matos (1995) little effort has been made to analyze the migration of urban origin and often there has not even been any mention of return migration. In addition, there is no substantive investment in understanding the positive effects that migration can stimulate in dynamizing destination regions, both with regard to the supply of skilled labor and certain possibilities of new investments and technical exchanges, for example. The analysis of migration gives visibility to broader social processes, not limited to being a simple indicator of the concentration or dispersion of economic activities. It also allows the identification of a rural and urban development profile, the institutional and social forms of dissemination of information and innovations, the late or advanced insertion into the demographic transition and the degree of regional inequality when discussing the end of the concentrating pattern of activities. For Matos (2003) visibility should be given to recent changes in the Brazilian migratory pattern, which has been characterized by the second-class position of flows from the countryside to the cities and the increasing complexity of the urban network, obvious signs of an increase in some positive externalities on the outskirts and new migratory flows that are already heading to the medium-sized cities.

Considering that the organization of the spatial elements should be regarded as the historical result of the activities of political, social and economic actors, the flows of information, capital and people, for example that enable and feed the dynamism of the forms and functions that com-

pose and characterize the space. According to Santos (1997), fluidity is one of the most important features of today's world that is simultaneously the cause, condition and result of its own need. Internal migrations are, in essence, manifestations of these flows that materialize in space. These are contingents of people moving in space, a non-exclusive reflection of a social reality and / or momentary economic condition, but also the causes and consequences of other flows. These involve investments, technologies and professional experience, which can translate into significant positive increments in the areas of origin. Evaluating this fluidity at the regional level is a challenge proposed in this study.

THE SPATIAL DISTRIBUTION OF THE POPULATION: THE REGIONAL PROFILE AND THE METHODOLOGICAL OPERATIONALIZATION USED

Urban hierarchical levels and the definition of the regions of influence of Brazilian cities come from previous studies conducted by the IBGE, which were based on questionnaires that allowed an investigation of the intensity of consumer flows in search of goods and services in the years 1966, 1978 and 1993. The current proposal for regionalization (REGIC 2007), published in 2008, resumes the original design used in the first works carried out by the IBGE, which resulted in a classic study: Brazil's division into functional urban regions in 1972. The REGIC 2007 favored the concept of territorial management, as defined by Corrêa (1995). For this author, the center of territorial management

> [...] is the city where, on the one hand, the various organs of the state are located and on the other, the headquarters of companies whose decisions directly or indirectly affect a given space that comes under the control of the city through the companies based in it (CORRÊA, 1995, p.83).

In brief, the hierarchy of the classification of the network of cities favored two central levels: Federal Management, measured by the existence of organs of the Executive Branch and the Federal Judiciary and Business Management, which refers to the presence of different equipment and services (trade and services, financial institutions, higher education, health, internet, open television networks and air travel connections). The final set of Regions of Influence in the country involved a total of 711 management centers, classified into six hierarchical levels, according to their position in their respective spheres of federal and business management. Establishing of areas of influence and the articulation of networks of cities occurred according to the intensity of the links, identified based on secondary data and information obtained by a specific questionnaire in the research. The cities were classified into five major levels of hierarchy, namely:

1. METROPOLISES - these are the 12 major urban centers in the country, characterized by their large size and the strong relationships with each other. In addition, they generally possess an extensive area of direct influence. This group was divided into three sub-levels, according to their territorial extension and the intensity of these relationships: 1.a The great national metropolis - São Paulo, the largest city in the whole country, with 19.5 million inhabitants; 1.b - National metropolis - Rio de Janeiro and Brasilia, with a population of 11.8 million and 3.2 million in 2007, respectively; and 1.c - Metropolis - Manaus, Belém, Fortaleza, Recife, Salvador, Belo Horizonte, Curitiba, Goiânia and Porto Alegre, with a population ranging from 1.6 (Manaus) to 5.1 million (Belo Horizonte), are the second level of territorial management.

2. REGIONAL CAPITAL - there are 70 centers on this level, which like the metropolises also relate to the upper strata of the urban network. With a management capacity on the level immediately below that of the metropolises, they have a regional area of influence, being referred to as a destination for a set of activities by a large number of municipalities.

3. SUB-REGIONAL CENTER - there are 169 centers on this level with less complex management activities, dominantly between levels 4 and 5 of the territorial management; they have a smaller area of activity and their relationships with centers external to their network are generally only with the three national metropolises.

4. ZONE CENTER - this level consists of 556 smaller cities and their activity is restricted to their immediate area; they perform basic management functions.

5. LOCAL CENTER - the remaining 4,473 cities whose centrality and performance do not go beyond their municipal limits, serving only their inhabitants; their population is predominantly less than 10,000 inhabitants (median 8,133 inhabitants).

When considering the purposes defined in this work, the spatial area used was the aggregation of the municipalities that make up the Areas of Population Concentration (APCs) from the first hierarchical level defined by the IBGE, which are: Belém, Belo Horizonte, Cuiabá, Curitiba, Fortaleza, Goiania, Manaus, Porto Alegre, Recife, Rio de Janeiro, Salvador and São Paulo. The RIs of Brasilia and Porto Velho were also included, which, although not considered APCs have a well-defined area of polarization, including in the REGIC. The areas delimiting each one of these Regions of Direct Influence are shown in Figure 1. Size-wise, in addition to the RI of São Paulo, with 24.95% of the population, 16.06% of the municipalities and 8.89% of the area of the country, the RIs of Fortaleza and Rio de Janeiro are both notable, with a high proportion of the resident population. The case of Fortaleza is also noteworthy for its high percentage of municipalities and national territorial area, comprising, respectively, 14.43% and 9.30% (Table 1).

Based on this regional area, two dimensions were selected for the analysis of population dispersion: a) the stock (resident population); b) the flow (migration). The first, which converges an established situation of spatial distribution, was obtained from two variables: 1st) the proportion of the population outside the core, given by the sum of the residents in the municipalities of each RI, divided by the population of the municipal seat of each APC; and 2nd) linear distance (Euclidean) of Average Weighted Center (CMP) to the seat of the municipal core of each APC. In this case it is a measure that evaluates the distancing of the gravitational center of the spatial distribution of the population of the core of each APC. The size of the flow is also composed of two variables, which are: 1st) the emigration ratio, given by the division of the number of immigrants and intra-regional migrants, coming from the core of the APC and those bound to it, broken down according to origin and destination in other municipalities of the respective RI. Thus, this variable indicates the proportion that the migration proceeding from the core represents in the migration to the core; 2nd) The Distance Weighted Average of the migration vectors coming from the core of each APC bound to the municipalities of each RI. This variable weight was defined by the number of migrants in each migratory vector (the vector representing the migratory trajectories in the migration matrix of inter-municipal origin/destination) in the five-year periods of 1986/1991, 1995/2000 and 2005/2010. This study used the migration obtained by the fixed date variable. According to Carvalho and Rigotti (1998), a fixed date migrant is defined as a person who resided in different locations at the beginning and the end of the five-year period under consideration. The values for each of these variables were converted into an index (I_v^d), given by the following expression:

$$I_v^d = \frac{v_i - v_{min}}{v_{max} - v_{min}}$$

$$v_i = \textbf{enésimo valor observado na Variável "v"}$$
$$v_{min} = \textbf{valor minimo observado na Variável "v"}$$
$$v_{max} = \textbf{valor máximo observado na Variável "v"}$$

This procedure allowed the standardization of the unit and the scale of analysis of the variables. As the maximum and minimum values of reference were established considering the three periods analyzed, it was possible both to establish benchmarks between the different RIs of each APC and evaluate changes in the time scale. The values between 0 and 1 represent, in that order, the situations of lesser and greater spatial dispersion in the three decades evaluated (1991, 2000 and 2010). They reflect regional differences and temporal changes that represent the growth or lack of growth in each variable. Aggregating the scores related to two variables of each dimension, obtained by a simple arithmetic average, allowed the proposal of two Indices of Spatial Dispersion of the Population, the ISDP, that evaluates the dispersal of the dimension of stock; and the IDEP that indicates the variations in the dimension of flow.

Figure 1: Regions of Influence of the cores of APCs in Brazil
Source: Extracted and adapted from IBGE (2008).

Table 1 - Resident population, number of municipalities and the total area of the Regions of Influence of the cores of the APCs, Brazil 2010

REGICs/APCS	Resident Population		Municipalities		Area (x 1000)	
	Nº	%	Nº	%	Km²	%
Belém	7.914.205	4,15	149	2,68	1.306	15,33
Belo Horizonte	13.668.431	7,17	560	10,06	369	4,33
Brasília	4.941.351	2,59	92	1,65	286	3,36
Cuiabá	3.001.572	1,57	133	2,39	815	9,57
Curitiba	16.669.382	8,74	695	12,49	295	3,47
Fortaleza	21.526.957	11,29	803	14,43	792	9,30
Goiânia	6.434.593	3,37	347	6,24	653	7,66
Manaus	3.775.687	1,98	72	1,29	1.612	18,93
Porto Alegre	10.651.632	5,58	490	8,81	269	3,15
Recife	16.262.589	8,53	523	9,40	252	2,96
Salvador	14.093.979	7,39	431	7,74	341	4,01
São Paulo	47.597.847	24,95	894	16,06	757	8,89
Rio de Janeiro	21.727.716	11,39	293	5,27	139	1,64
Porto Velho	2.489.858	1,31	83	1,49	629	7,39
Total	190.755.799	100,00	5.565	100,00	8.517	100,00

Source: IBGE, Demographic Census 2010. Own Organization

With adaptations and methodological applications, as proposed in this work, the RIs of the cores of the APCs in Brazil provide more than one important spatial area of regional analysis. While it may raise broader methodological and conceptual questions, both theoretical and methodological, the RIs represent an approximate picture that reflects the relations of interdependence that are established in space, where the spatial movements of the workforce play a particularly important role, especially at a time where the spatial redistribution process of the population is becoming more relevant. Taking the municipality as the spatial unit of analysis, according to the political-administrative division in each period, including subsequent spatial clusters (regional aggregations), it is possible to identify and map the indicators of the distribution and spatial dispersion of the population. The results, while not conclusive and circumscribed in a specific time interval (three census decades) can be useful not only for the analysis of regional migration dynamics but also the preparation and discussion of public policies, including those aimed at overcoming the regional inequalities which have long been characteristic of the Brazilian reality.

SPATIAL DISPERSION OF THE POPULATION IN BRAZIL: SOME EMPIRICAL EVIDENCE

When considering the results regarding the distribution of the population (variable stock), an initial observation concerns the higher proportion of the population living outside the cores of the APCs, except for the case of Brasilia, which shows values above 50% in the three decades. However, when comparing the values in the three censuses it is apparent that the percentage of the population living in the RIs only grew in the APCs of Belém, Cuiabá, Fortaleza, Goiânia, Porto Alegre, Recife, Rio de Janeiro and São Paulo. Although this increased participation of RI in regional stocks is, in principle, a general indicator of dispersion in these cases, it is only in the case of Brasília, Porto Velho and Rio de Janeiro that there was an increase in the distance arising from the displacement of the gravitational center of the population concentration, represented by the weighted mean center (WMC) relative to the core of the respective APC. However, they are the effects of the strong population growth of major cities located in areas close to the core of the APCs, usually covering

distances less than 100 km (except for cases of the RIs of Fortaleza and Goiânia that are a distance superior to 200 km). These associated parameters indicate that a considerable part of the RIs of the APCs in the country have experienced a growth of the demographic weight in municipalities closest to major regional centers, including those located on the periphery of metropolitan areas.

In general, the results of the analysis of the flow indicators (intra-regional migration), indicate a more defined picture of population dispersion, although regional characteristics should be observed. This fact can be observed when comparing the values of the migration ratio given by dividing immigrants in RIs coming from the core by the migrants of RIs headed to the core of each APC. Except for the APCs of Porto Alegre, Recife, Rio de Janeiro and São Paulo, there has been a growth in the migration ratio, which shows the relative (and, in many cases, absolute) growth in the migration from the cores to their respective IRs. However, the case of São Paulo is noteworthy as it has the highest relative decline, even though there was a negative migration balance in exchanges involving the core of the APCs. In the five-year period 2005/2010, for example, for each migrant bound to the core, four were moving in the opposite direction (to the municipalities of the RI).

Table 2 - Resident population in the Regions of Influence (RIs), number and percentage of the Population of the Core of the APC and the Distance of the Core in relation to the Weighted Mean Center (WMC) - Brazil 1991, 2000 and 2010

RIs/APCs	Population of RI (in thousands)			Population of RI/ Population of Core (%)			Distance Core => CMP (km)		
	1991	2000	2010	1991	2000	2010	1991	2000	2010
Belém	3.779	5.110	6.521	75,22	79,96	82,39	167,26	151,61	154,86
Belo Horizonte	9.053	10.299	11.293	81,76	82,15	82,62	79,39	71,38	67,88
Brasília	1.531	1.993	2.371	48,88	49,29	47,99	153,71	129,93	117,56
Cuiabá	1.615	2.000	2.450	80,04	80,54	81,64	124,27	133,87	143,47
Curitiba	11.670	13.317	14.917	89,87	89,35	89,49	155,21	141,85	134,16
Fortaleza	14.634	16.743	19.075	89,22	88,66	88,61	289,96	285,86	284,55
Goiânia	3.614	4.324	5.133	79,67	79,82	79,77	214,75	211,64	209,29
Manaus	1.188	1.607	1.974	54,01	53,34	52,27	127,57	128,50	122,86
Porto Alegre	7.816	8.780	9.242	86,08	86,58	86,77	113,72	106,45	100,45
Porto Velho	1.407	1.754	2.061	83,03	83,98	82,79	161,14	169,70	174,03
Recife	12.048	13.305	14.725	90,27	90,34	90,54	156,64	154,52	154,56
Rio de Janeiro	11.772	13.677	15.407	68,23	70,01	70,91	104,11	106,80	108,77
Salvador	9.638	10.613	11.418	82,28	81,29	81,02	89,23	83,13	79,78
São Paulo	26.722	32.141	36.344	73,48	75,49	76,36	146,85	144,92	146,42

Source: IBGE, Demographic Census 1991, 2000 and 2010. Own Organization

Nevertheless, the figures for the Weighted Standard Distance (WSD), derived from inter-municipal migratory vectors with the weight defined by the volume of migrants in each period do not confirm a widespread expansion of spatial dispersion. For the cases of Cuiabá, Manaus, Porto Velho, Rio de Janeiro, Salvador and São Paulo there was a fall in the WSD. This drop is not a result of lower migration flows to cities farther away, but is instead an absolute and relative growth of the emigration from the core to municipalities closer to cores of the RIs of each APC. As shown in Figures 2, 3 and 4 there is a significant increase in migration to the municipalities close to the regional centers, especially in the cases of the APCs of São Paulo and Rio de Janeiro. In São Paulo eight municipalities received more than 10,000 immigrants from the state capital in the five-year period 2005-2010, namely: Guarulhos, Praia Grande, São Bernardo do Campo, Itaquaquecetuba,

Osasco, Taboão da Serra, Santo André and Cotia. The vast majority are located in the metropolitan periphery or in surrounding areas. In the other APCs, the municipalities that received more than 10,000 migrants coming from the core in the same five-year period were: Ananindeua (Belém), Contagem and Ribeirão das Neves (Belo Horizonte), Águas Lindas de Goiás and Valparaíso de Goiás (Brasília), São José dos Pinhais and Colombo (Curitiba), Caucaia (Fortaleza), Aparecida de Goiânia (Goiânia), Viamão (Porto Alegre), Jaboatão dos Guararapes (Recife), Lauro de Freitas and Camaçari (Salvador), Duque de Caxias, Nova Iguaçu and Niterói (Rio de Janeiro).

Table 3 - Number of Immigrants, Migration ratio and Weighted Standard Distance (WSD) of migration flows from the core of the APCs - Brazil 1986/1991, 1995/2000 and 2005/2010

RIs/APCS	Nº of Immigrants (I)			Migration Ratio (MR) (I/MR)			DPP of the Migration Vectors (km)		
	1986/1991	1995/2000	2005/2010	1986/1991	1995/2000	2005/2010	1986/1991	1995/2000	2005/2010
Belém	57.428	92.008	79.565	1,01	1,90	2,21	134,52	117,46	142,42
Belo Horizonte	168.843	194.723	159.872	2,05	2,26	2,23	66,96	69,45	80,46
Brasília	53.378	95.016	71.626	1,72	3,32	2,17	77,57	69,30	86,52
Cuiabá	16.686	29.918	26.784	0,81	1,47	1,78	209,76	191,18	176,04
Curitiba	99.890	132.740	129.275	1,09	1,34	2,04	116,05	115,99	131,73
Fortaleza	90.692	103.510	99.426	0,83	1,32	1,52	119,35	132,83	137,81
Goiânia	90.015	101.231	92.979	1,56	1,47	1,82	120,41	129,56	158,56
Manaus	13.118	30.885	34.106	0,53	0,83	0,81	303,29	334,79	273,10
Porto Alegre	109.120	100.611	83.808	1,84	1,48	1,50	91,58	90,55	97,10
Porto Velho	5.665	12.097	10.112	0,32	0,95	0,49	365,81	278,78	261,25
Recife	110.179	100.730	89.746	2,66	2,33	2,13	52,12	59,97	74,46
Rio de Janeiro	191.498	221.781	182.450	4,27	3,54	3,37	87,35	81,25	87,24
Salvador	64.608	91.711	100.547	0,74	1,11	1,49	125,11	120,62	110,95
São Paulo	618.097	677.161	512.493	7,16	5,71	4,40	136,58	123,18	116,28

Source: IBGE, Demographic Census 1991, 2000 and 2010. Own Organization

The analysis of the aggregated results of the Indices of the Spatial Dispersal of the Population, shown in Figure 5, indicate a different picture. As regards the stock size (IDEPe), the RIs with highest dispersion are Fortaleza, Recife and Goiânia. These are regions with a high proportion of the population outside the core, although they involve metropolises with significant population volumes that have shown a rapid pace of population growth in recent decades. In a different situation, with lower dispersion levels, Manaus and Brasilia are significant. In the case of Manaus, the historical and geographical features of the region, with a large territorial extension, define a high level of metropolitan primacy; there is also a low-level structuring of the urban network. When temporal variations are observed, the cases of Rio de Janeiro and Belém stand out. These are regions that despite showing high levels of dispersion have experienced a spatial redistribution process of the population, given the economic expansion of municipalities on the periphery or even those furthest from the center, as in the specific case of the expansion of the northern Rio de Janeiro due to the influx of labor for mining and related activities.

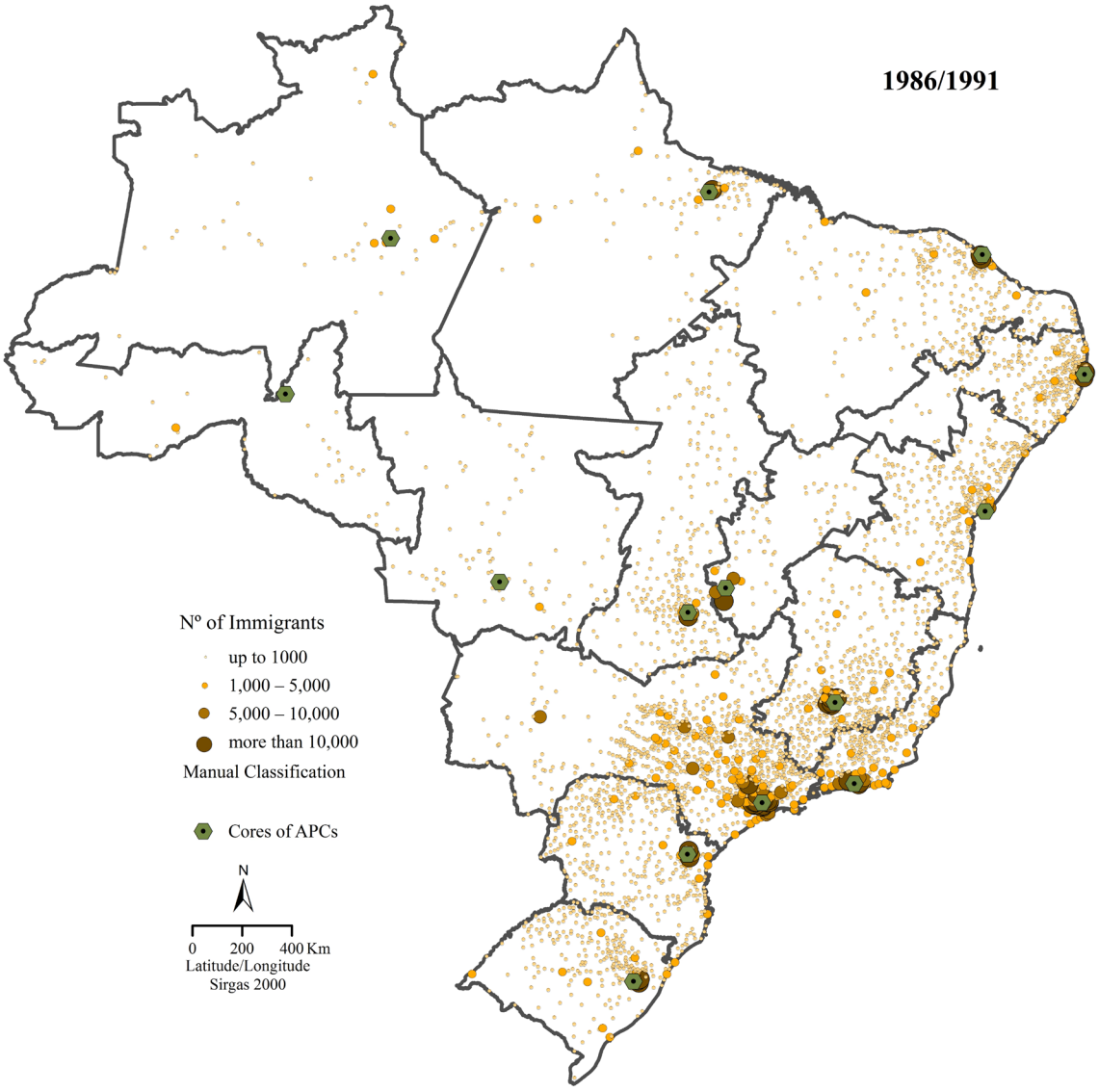

Figure 2 - Number of immigrants coming from the core of the APCs residing in the municipalities of each RI, fixed migration data 1986/1991
Source: IBGE, Census 1991 (sample data).

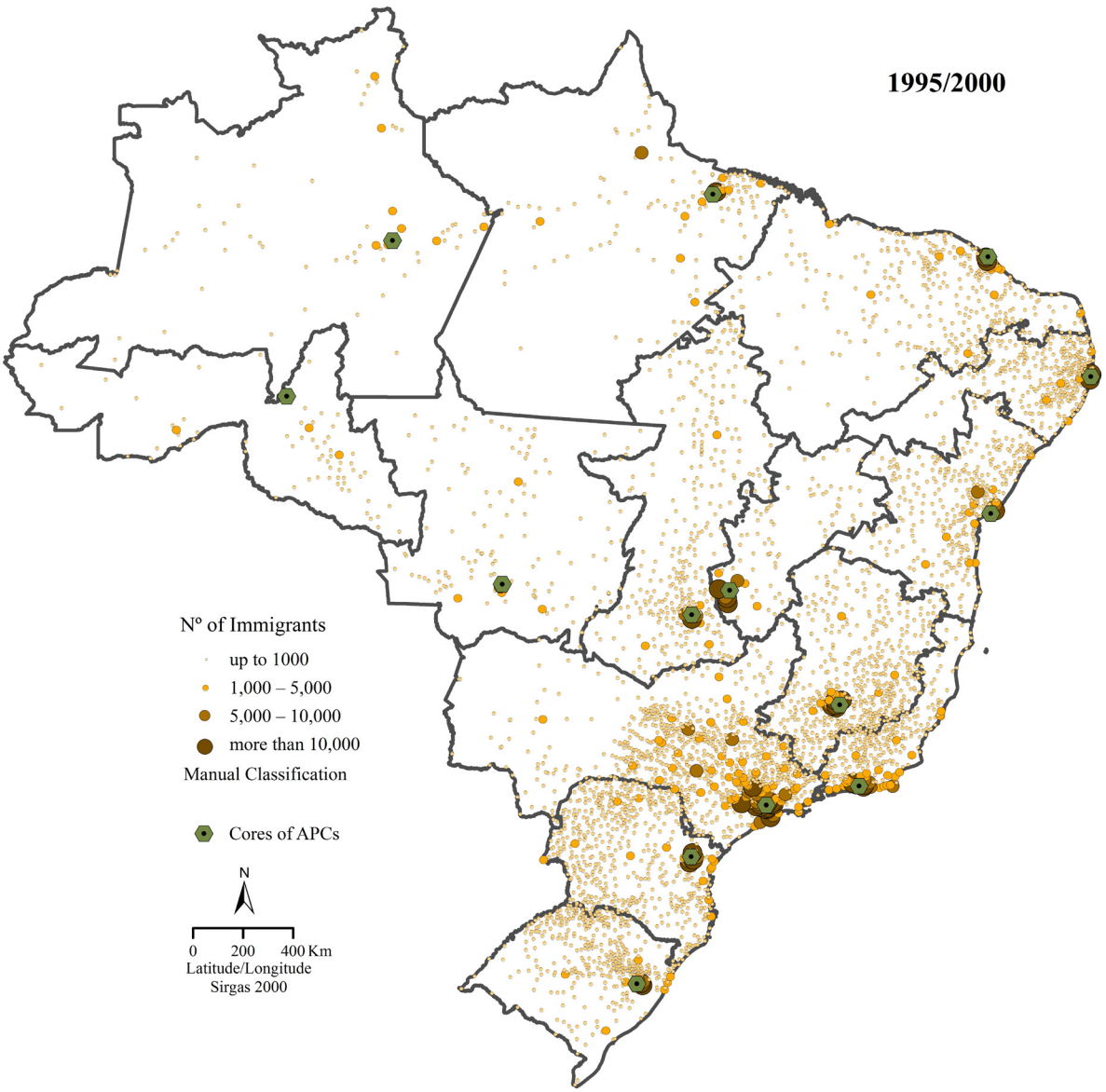

Figure 3 - Number of immigrants coming from the core of the APCs residing in the municipalities of each RI, fixed migration data 1995/2000
Source: IBGE, Census 2000 (sample data).

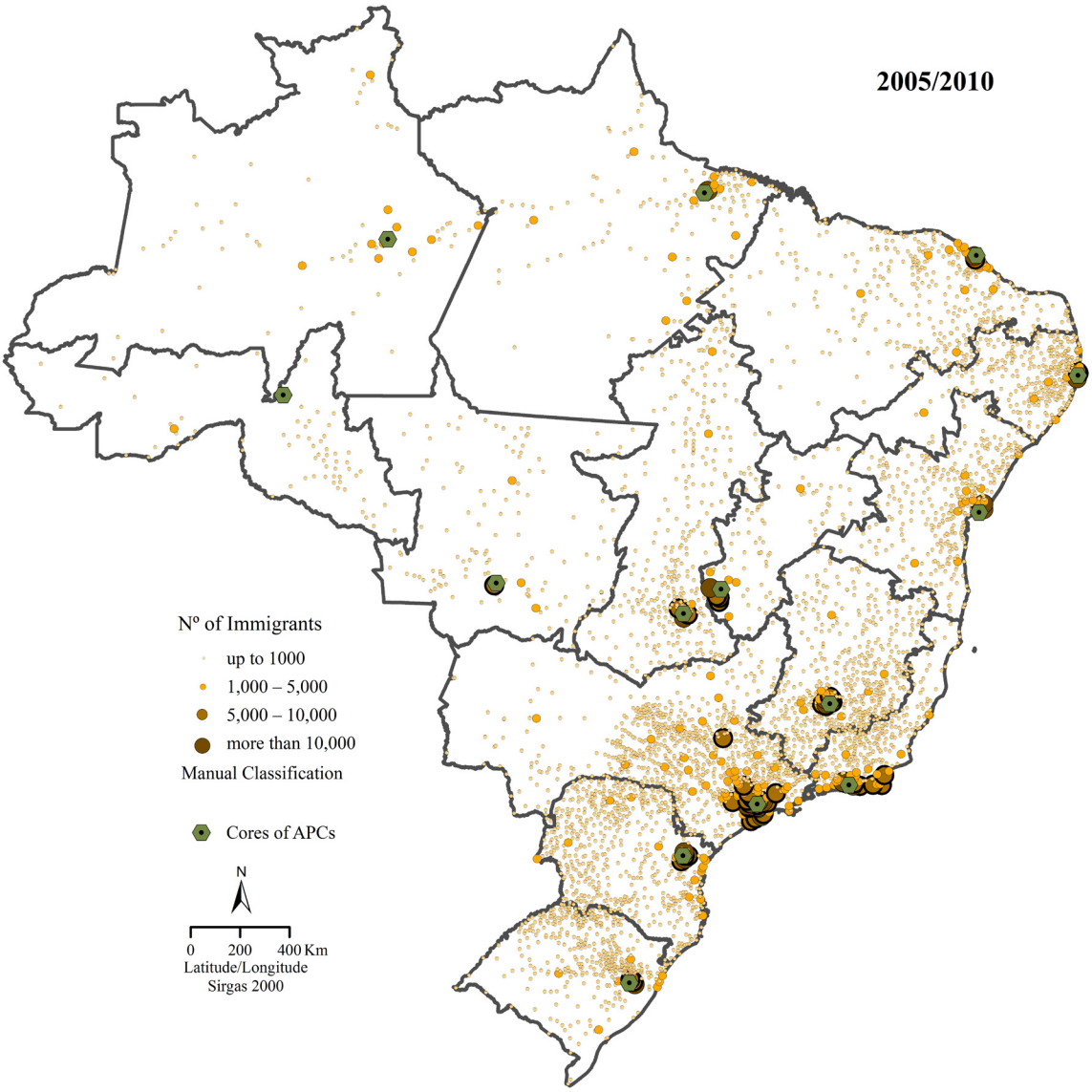

Figure 4 - Number of immigrants coming from the core of the APCs residing in the municipalities of each RI, fixed migration data 1986/1991
Source: IBGE, Census 1991 (sample data).

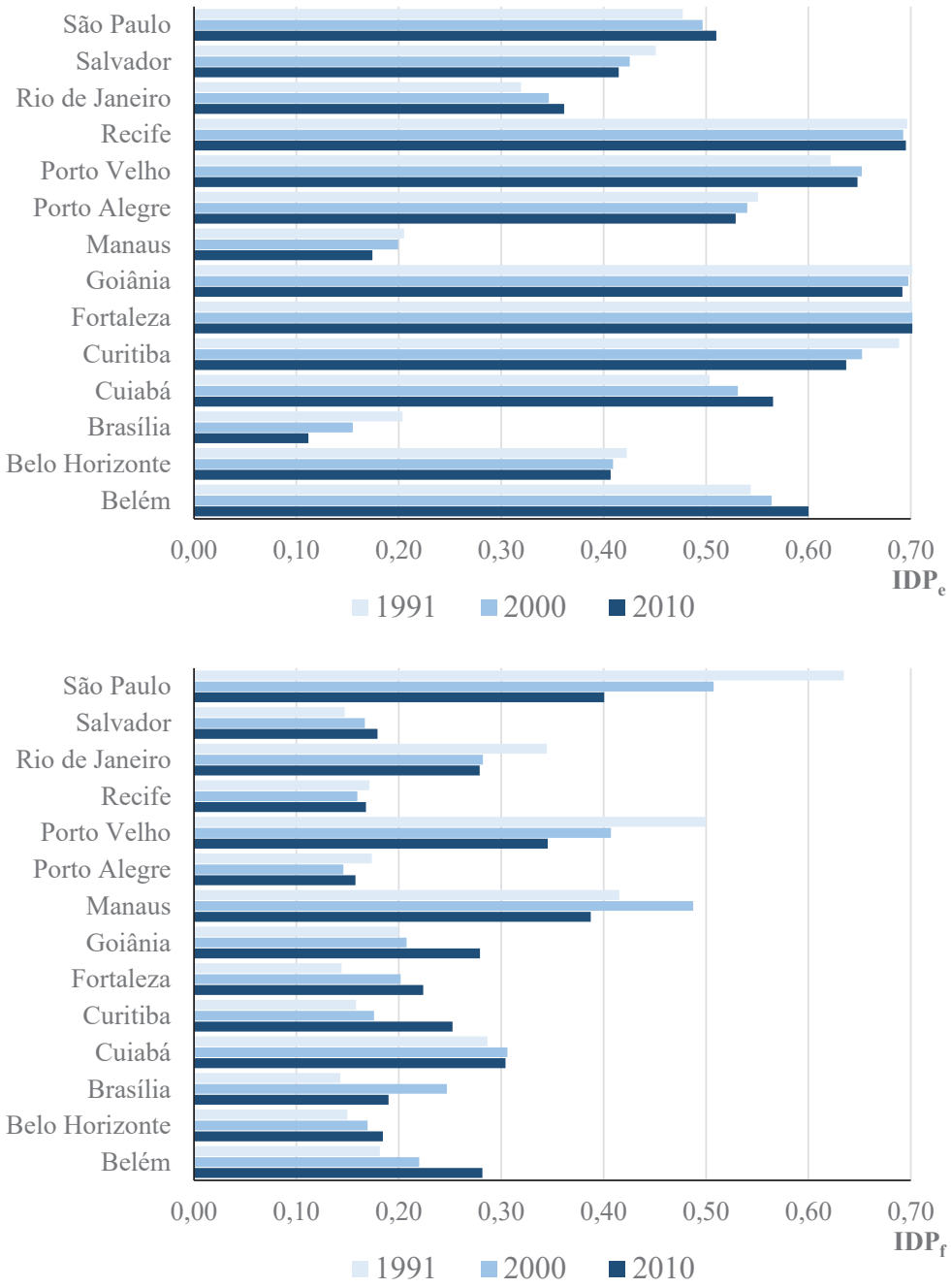

Figure 5 - Population Spatial Dispersion Index (IDEPe and IDEPf) of the RIs of the APCs - Brazil in 1991, 2000 and 2010
Source: IBGE, Demographic Census 1991, 2000 and 2010.

The analysis of the flow rate (IDEPf) identifies a different situation from that observed for the IDEPe. In view of the current migration dynamics in the region, the highest levels of dispersion correspond to the RIs of São Paulo, Manaus and Porto Velho. In the case of São Paulo, already renowned for its size, there has been a cooling of the dispersion trend. However, this does not mean that there is evidence of reconcentration. In fact, there is actually a growth in migration involving municipalities a short and medium distance away, whose higher weight interferes with the indicators of spatial dispersion. At the other end, the lowest dispersion values of migratory flows have been identified in the RIs of Porto Alegre, Recife and Salvador. They are regional centers that still stand out for their high proportion in regional migration destinations. Part of these flows are the result of a rearrangement of the migration dynamic, including the redirection of traditional flows formerly concentrated towards the major metropolitan centers of the country, mainly São Paulo. At least in part, these migratory flows have turned to the region itself, giving a new impetus to current intra-regional flows.

FINAL CONSIDERATIONS

The debate about the spatial dispersion of the population has become recurrent in recent years, due in part to the high explanatory power and the consequences inherent to the demographic dynamics of the Brazilian population. There are many uncertainties about the prevalence of certain spatial distribution patterns of the Brazilian population. The belief in the supposed reversal of polarization or even the hypothesis of spatial de-concentration, as suggested by certain authors and proposed in the classical models of the regional economy, have proved inappropriate in the analysis of the Brazilian situation. The gradual relative decline in the economic and demographic weight of the main urban centers of the country, as well as the slowdown in population growth of the major metropolitan areas, require a deeper evaluation of new trends and patterns in the spatial distribution of the Brazilian population.

The last three decades of the previous century are central to the analysis of Brazilian population dynamics. If the progressive decline in fertility rates was directly responsible for the sharp slowdown in the pace of population growth in the country, internal migrations were critical in the process of spatial redistribution of the population. Even if the metropolises and their Regions of Influence continue attracting significant contingents, the intensification of migration flows has reflected directly on the demographic growth of several urban centers outside the major Brazilian metropolitan regions, making the city network denser in each of their Regions of Influence.

Based empirically on the stock size and population flow, this paper presents an analysis of the distribution of the resident and regional migration population, with an emphasis on flows involving each of the RIs of the APCs in Brazil. The results show that there is not a general trend of increasing spatial dispersion of the population. Although the regional centers that make up the APCs cited herein have mostly experienced a drop in the pace of population growth and losses related to spatial redistribution processes of the population they still exert high level of attraction on the population in each region. The summary table arising from the empirical results presented in this study lead to some general considerations: 1st) if the population stocks and migratory flows do not indicate a process of de-concentration in the classic mold, at least they offer evidence of the early stages of spatial dispersion, more restricted to the less distant periphery; 2nd) IDPEf values, unlike IDPEe, which represents a historical process of greater temporality, provide evidence of possible changes in the trend observed in recent decades, as observed in São Paulo, which showed a high degree of dispersion (despite the fall in momentum). 3rd) the regional migratory dynamic gains relevance in the spatial redistribution process of the population, although long-distance flows, especially the inter-regional ones, continue relevant.

Finally, the possibilities and opportunities offered to studies on the spatial mobility of the population at the regional level are noteworthy. By providing a current picture of urban-regional organization in Brazil, the analysis of stock and flows of people assessed in the analysis established by the RIs of the APCs in the country, also allow an evaluation of the distribution of stocks and flows in a network perspective, considered either in a more specific (urban network) sense or a broader (geographical network) one. In either case it provides an approximate summary of the relationship between the spatial distribution of population and regional organization.

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