RBGDR

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DISTRIBUÇÃO ESPACIAL DAS ATIVIDADES ECONÔMICAS E DESIGUALDADES REGIONAIS: UMA ANÁLISE SOBRE OS MUNICÍPIOS BAIANOS

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ABSTRACT

Faced with the low performance of the Bahian economy in recent years, this paper aims to analyze the evolution of behavioral patterns and spatial groupings in the municipalities of Bahia, related to their economic activities and GDP per capita. The Municipal Economic Activity Index, INDICA, is used, which classifies activities in banking activity, trade openness, tax collection and labor market. The descriptive analysis of the variables and the Exploratory Spatial Data Analysis (ESDA) showed, respectively, the economic inequality of Bahian municipalities and the spatial concentration of per capita GDP and economic activities in the West and in the Metropolitan Region of Salvador, while in the semi-arid region the opposite occurs. Few changes occurred in the spatial distribution of the variables between 2014 and 2019 and, in the external openness variable, there was only formation of clusters of municipalities with low growth, which shows that stagnation can be accompanied by contracture of activities already established.

Keywords: Economic Growth. Regional Inequalities. Spatial Econometrics. Bahia. Public policy.

RESUMO

Diante do baixo desempenho da economia baiana nos últimos anos, este trabalho tem por objetivo analisar a evolução de padrões de comportamento e agrupamentos espaciais nos municípios da Bahia, relacionados às suas atividades econômicas e ao PIB per capita. Lança-se mão do Índice de Atividade Econômica Municipal, INDICA, que classifica as atividades em atividade bancária, abertura externa, arrecadação fiscal e mercado de trabalho. A análise descritiva das variáveis e a Análise Exploratória de Dados Espaciais (AEDE) mostraram, respectivamente, a desigualdade econômica dos municípios baianos e a concentração espacial do PIB per capita e das atividades econômicas no Oeste e na Região Metropolitana de Salvador, enquanto na região semiárida ocorre o oposto. Poucas mudanças ocorreram na distribuição espacial das variáveis entre 2014 e 2019 e, na variável abertura externa, apenas houve formação de agrupamentos de municípios com baixo crescimento, o que evidencia que a estagnação pode ser acompanhada de contratura das atividades já fixadas.

Palavras-chave: Crescimento Econômico. Desigualdades Regionais. Econometria Espacial. Bahia. Políticas Públicas.

INTRODUCTION

The issue of regional inequalities has gained prominence in economic analyses. This is because high levels of inequality tend to lead some economies to grow below their potential capacity or even introduce mechanisms that generate discontinuities in productive activities, resulting in stagnation or regression of economies (ALONSO; AMARAL, 2005). In addition, economic activities in a geographic unit can positively or negatively influence its neighbors (ANSELIN, 1999). Thus, identifying the spatial distribution of economic activities is fundamental to understanding the sources of agglomeration economies and mapping the main characteristics of clusters and the benefits provided by the concentration of these activities. This understanding allows for the development of planning strategies to boost local economic growth (SILVA; PEROBELLI; ARAÚJO JÚNIOR, 2020).

Based on this, the objective of this work is to analyze the evolution of behavioral patterns and spatial groupings in the municipalities of Bahia, in relation to their economic activities and the Gross Domestic Product (GDP) per capita. For this purpose, the Municipal Economic Activity Index, named INDICA, is used, which is an outsourcing project of the State University of Santa Cruz, in Portuguese, Universidade Estadual de Santa Cruz (UESC). INDICA provides data at a more disaggregated level and with a shorter time lag compared to other indicators. The study focuses on four little-explored economic activities: Labor Market, Trade Openness, Tax Collection, and Banking Activity.

Bahia is a state that has experienced a decline in economic dynamism, moving from the 6th to the 8th position among the country's economies in the period from 2010 to 2019. Although it returned to the 7th position in 2020 (IBGE, 2022), this indicates that other states have achieved comparatively higher economic growth. Furthermore, according to Guerra (2017), despite the transformation of the Bahian economy through the growth process, the state has not yet managed to reverse the historical framework of social and regional inequalities that characterize its economic

evolution. Consequently, there is an economic and population concentration on the coast and extreme west of Bahia, while the center of the state, specifically the semi-arid region, remains socially and economically disadvantaged (GUERRA, 2017).

Therefore, the objective proposed here is to trace a typology of municipal and regional development of economic activities in Bahia. This analysis can help identify policies that, if adopted, would contribute to higher and more harmonious levels of economic activity and per capita GDP in Bahian municipalities. Additionally, exploring the agglomeration economies in the state, based on the aforementioned economic activities, is a subject that has not been scientifically explored, especially using INDICA, which was released only in December 2021. This article is structured into five chapters, in addition to this introduction. The second section addresses economic and regional inequalities. Next, the methodology used and the results are presented. Finally, the article concludes with the final considerations.

ECONOMIC AND REGIONAL INEQUALITIES

Regional inequalities can be attributed to various factors, including endogenous factors (MANKIW et al., 1992), cumulative causal processes (MYRDAL, 1957), economies of scale, and agglomeration (KRUGMAN, 1991), which contribute to the concentration of economic activities in specific regions. The location of these activities is influenced by centripetal and centrifugal forces, which respectively lead to their agglomeration and dispersion among regions. Fisher and Wang (2011) emphasize the importance of considering the spatial context of attributes when studying phenomena, as geographical location plays a crucial role. Additionally, due to the existence of dependence and spatial heterogeneity, economic activities can have positive or negative impacts on other locations beyond their origin (ANSELIN, 1999).

In Brazil, the spatial distribution of economic activity and its impact on regional income inequality have been extensively discussed since the 1990s. Diniz (1994) analyzes the country as a case of "polygonized" development, where new growth poles emerge near existing economic centers, leading to limited decentralization, with the Metropolitan Region of São Paulo as the epicenter. Silveira-Neto and Azzoni (2006) demonstrate the significance of location for per capita income

growth in Brazilian states and identify two geographic clusters in the country: one comprising low-income states in the Northeast and North regions, including Bahia, and another comprising wealthy states in the Southeast and South regions. Resende et al. (2016) find that spatial spillovers in Brazil are geographically limited and that more populated areas are detrimental to economic growth. Finally, Araújo et al. (2019) reveal that externalities influence local and regional dimensions, with specialization having a positive effect and diversification having a negative effect on local growth. However, the industrial diversity of neighboring regions can benefit the local economy. Therefore, economic growth is influenced by the density of specialization in the region.

In Bahia, studies on regional economic inequalities are limited, with a focus on the distribution of economic activities and convergence analyses. Pessoti and Silva (2011) identified three major areas in the state: the coast, the west, and the semi-arid "core" region, each with distinct characteristics. The coastal and western regions concentrate a significant portion of Bahia's economy, while the economically disadvantaged semi-arid region relies on undercapitalized family farming, practiced under adverse weather conditions, requiring capital investment and positive externalities for its development. However, within the semi-arid region, there are "development islands" and areas with "natural competitive advantages" related to mineral extraction, tourism, and some regions with irrigated and cooperative family farming. These findings align with those of Guerra (2017).

In terms of reducing regional inequalities, Barbosa and Barreto (2016) observed a trend of convergence in GDP per capita among Bahian municipalities between 1996 and 2010. This trend was attributed to tax incentives aimed at promoting the deconcentration of economic activity implemented in the 1990s. However, according to the authors, the incentives resulted in a "diffuse deconcentration," where the concentration shifted away from the economic center, the Metropolitan Region of Salvador (RMS), but towards specific areas such as the Coast and the Center-South of the state, without spreading to other economically disadvantaged areas like the semi-arid region. Santos et al. (2019) also highlighted the challenges of achieving long-term integrated and sustainable development in Bahia, including reducing economic concentration around the RMS and deconcentrating industrial activity in the petrochemical sector. Similar to Barbosa and Barreto (2016), they mentioned the phenomenon of concentrated deconcentration of income in the state,

as the regional gains were concentrated in a few regions near the capital, reinforcing the persistence of significant economic disparities within the state.

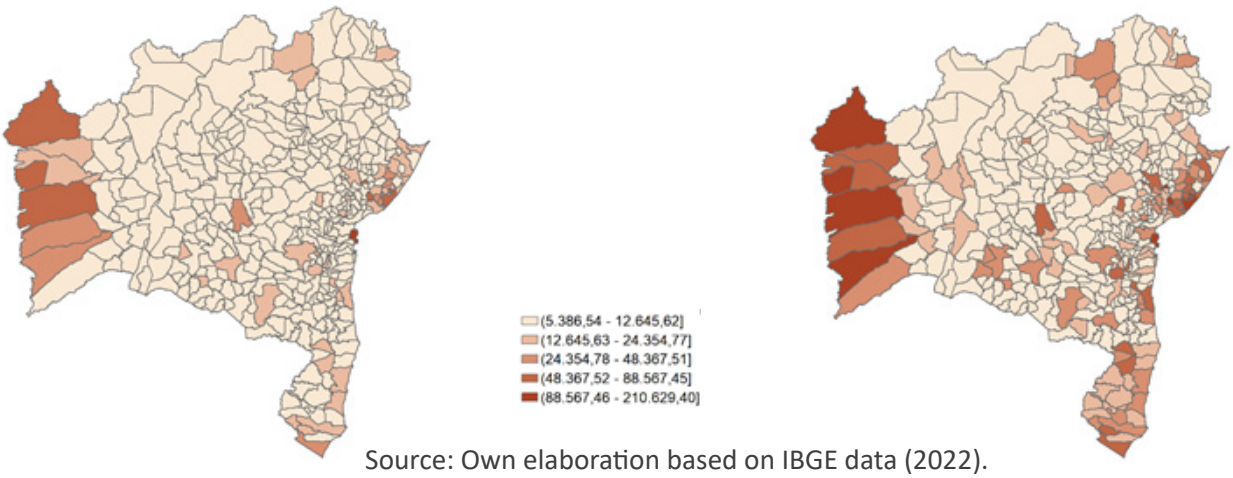
It is evident that regional economic inequalities persist in Brazil and Bahia. Historically, the regions with the highest per capita income levels have been located in the south and southeast of the country. Bahia, as part of the Northeast region and considered a peripheral state within a peripheral country (PESSOTI; SILVA, 2011), is also characterized by the concentration of economic activities along its coast and in the western region, influenced by both centrifugal and centripetal forces within its region. No works were found on Bahia that analyze dependence and spatial heterogeneity, nor that work with the economic activities that this article proposes to do.

METHODOLOGY

Study area

The research focuses on analyzing the 417 municipalities in Bahia between 2014 and 2019. During this period, the concentration of GDP per capita levels remained in the western and southern regions of the state, as well as in the Metropolitan Region of Salvador (RMS), as shown in Figure 1. GDP per capita is a commonly used indicator to measure the level of economic activity in a specific location. While it may not provide a comprehensive assessment of the relationship between economic growth and social well-being, higher income levels are generally associated with an improved quality of life for the population, which is considered a necessary condition.

Figure 1 | GDP per capita of municipalities in Bahia, in R$ (2014-2019)



Source: Own elaboration based on IBGE data (2022).

It is worth noting that Bahia holds a significant position in the Brazilian economy, ranking as the seventh-largest economy in the country with a GDP of over R$ 305 billion in 2020. It also had the seventh-highest tax revenue in 2017, surpassing R$ 25 billion. The state exhibits a substantial presence in the banking sector, with 865 branches and credit operations exceeding R$ 80 billion in 2021, placing it at the sixth and ninth positions, respectively, among Brazilian states (IBGE, 2022). Additionally, Bahia stands out as the only state in the Northeast region among the nine largest exporters in Brazil, contributing to 49.55% of the region's exports in 2022 until November (BRASIL, 2022).

On the other hand, in 2022, only 43.9% of the Bahian population over 14 years of age was employed in formal work and the state ranked 22nd in the country in nominal household income per capita (R$843.00) in 2021, and the same position in the Human Development Index (0.660) among the 26 Brazilian states, in 2010 (IBGE, 2022). This contrasting reality, of being positioned among one of the largest economies in the country and presenting levels of economic activity concentrated in a few areas, in addition to some of the worst social indicators, shoe the importance of better understanding the regional inequalities that make up Bahia.

Pessoti and Pessoti (2019) highlight the factors that may be contributing to the loss of economic dynamism in the state. Among them, it is possible to list the sectorial concentration of the economy, with a high participation of the services sector in the GDP, which, however, is characterized by low productivity, competitiveness and technological intensity – such as, the real estate segment, the commerce and public administration - and weak integration with other productive sectors. In addition, the production logic is completely exogenous, focused on primary goods, especially grains, and intermediate goods (chemicals, petrochemicals and metallurgy) to supply final goods producing markets located in the Southeast and South regions of Brazil, and China abroad. Added to this are the difficulties encountered by infrastructure, especially transport and the problem of drought, which, since 2012, has plagued the state with one of the most severe droughts in the last hundred years, reducing the production of several agricultural crops.

Another rather worrying data is the regional concentration. The ten most economically prominent municipalities concentrated 48.6% of Bahia's GDP in 2020. Of these, the first four are in the RMS: Salvador, which represented 19.3% of the state economy; Camaçari, where the Petrochemical Complex is located, which is the biggest change in the productive structure of Bahia; Feira de Santana, with emphasis on the ruLLer and tire industry; and São Francisco do Conde, which has the second largest oil refinery in the country. Lauro de Freitas (7th position), Simões Filho (9th position) and Candeias (10th position) are also in the RMS. In the West, there are Luís Eduardo Magalhães (6th position) and Barreiras (8th position), with emphasis on the production of grains for export. Finally, the municipality of Vitória da Conquista (5th position) stands out as a center of educational and health services (IBGE, 2022). These observations indicate that economic activity in Bahia continues to be concentrated in a small number of municipalities and are poorly distributed in territorial space, notably in the coastal region, especially in the Metropolitan Region of Salvador, and in the West of the State. On the other hand, the semi-arid climate, which covers 79.0% of the territory of Bahia, exerts a negative influence on economic activities - especially in water supply, hydroelectric power generation, affecting agricultural, industrial and urban activities (PESSOTI; PESSOTI, 2019).

DATA BASE

The databases used in the research are the Brazilian Institute of Geography and Statistics (IBGE) and the Municipal Economic Activity Index (INDICA). The first is used to obtain per capita GDP, a proxy for the general level of economic activity. INDICA, on the other hand, through the sub-indices, provides information on four economic activities: tax collection, banking activity, labor market and trade openness (Table 1).

Table 1 | Raw data used in the calculation of the INDICA UESC, by municipality and month.

Sub-indexes	Measure	Raw data for the sub-indice construction	Source
Sub-index of Tax Collection (TC)	R$	Sum of state taxes: Tax on Circulation of Goods and Services (ICMS), Tax on Motor Vehicle Ownership (IPVA), Tax on Transfer Cause Mortis and Donation of any Goods or Rights (ITD) and fees.	Data collected on the Bahia State Finance Secretariat Portal (SEFAZ) and deflated by the General Price Index - Internal Availability (IGP-DI), Brazil.
Sub-index of Banking Activity (BA)	R$	Sum of the entries that make up the assets (cash, bank deposits, financing, etc.) and liabilities (public services, savings deposits, etc.) of financial institutions.	Data obtained from the System of Banking Statistics by Municipality (ESTBAN), Central Bank of Brazil, and deflated by the General Price Index - Market (IGP-M), Brazil.
Sub-index of Labor Market (LM)	Number of formal jobs	Balance of formal jobs in agriculture, industry and services (hired workers minus dismissed workers) in a given month plus the number of formal jobs in the previous month.	General Register of Employees and Unemployed (CAGED) and Annual Social Information List (RAIS). Values deflated by the National Consumer Price Index (INPC), Brazil.
Sub-index de Trade Openness (TO)	US$	Sum of product exports and imports.	Data obtained from Comex Stat, Ministry of Economy, and deflated by the Wholesale Price Index (IPA), USA.

Source: Own elaboration based on data from UESC (2022).

In short, the Banking Activity (BA) data are a proxy for the availability of potential income to be spent; Labor Market data (LM) are a proxy for income formation (latent demand); the Tax Collection (TC) scales the recent result of the economy (effective demand); and trade openness data (TO) are a proxy for local competitiveness capacity (PEROBELLI et al., 2017). After calculating and deflating the sub-indexes, as shown in Table 1, they are logarithmized to adjust the scale and stabilize the variance, leading to a log-normal distribution[1]. Then, the sub-indexes undergo normalization by the maximum value of each sub-index, which allows each sub-index to acquire values from 0 to 1, establishing a ranking between the locations, where the municipality that obtains a value of 1 is

1 As the logarithm of zero is undefined, add 1 to the subscripts before the logarithmic transformation.

the one that has the greatest prominence in that area dimension. The calculation of global INDICA values is the result of the average of the sub-indices.

It is important to highlight that, as the INDICA is calculated monthly and GDP per capita has annual information, an annual average of the monthly sub-indexes was calculated and the analyzes are carried out based on the averages. Furthermore, the time period of the survey starts in 2014, which is the initial year of the INDICA database, and the final period is 2019, as this is the most recent year of data available for GDP, since it was decided not to model the exogenous shock of COVID-19, which occurred from mid-2020.

DESCRIPTIVE ANALYSIS OF VARIABLES

The descriptive statistics of the work is carried out using position and dispersion measures. The position measure used is the arithmetic mean, obtained by the sum of the observations divided by the total number of them (HOFFMANN, 2017):

$$\bar{X} = \frac{1}{n} \sum_{i=1}^{n} x_i \qquad (01)$$

On that x_i= generic observation value; n= number of observations.

The dispersion measures used are the amplitude and the standard deviation, which aim to highlight the degree of homogeneity or heterogeneity between the values that make up the set. The amplitude equals the difference between the largest and smallest value observed in the data set. The standard deviation, on the other hand, measures the dispersion of the data around its mean (HOFFMANN, 2017), as denoted in the following expression:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}} \quad \text{(For the population)} \qquad (02)$$

On that: x_i= generic observation value; $\bar{x}$= average observed.

EXPLORATORY SPATIAL DATA ANALYSIS (ESDA)

Exploratory Spatial Data Analysis (ESDA) can be defined as the collection of techniques to describe and visualize spatial distributions, identify atypical locations (spatial outliers), discover patterns of spatial association (spatial clusters) and suggest different spatial forms of instability or not-stationarity. The central element for the ESDA is the concept of spatial autocorrelation, that is, the phenomenon where similarity of location is matched by similarity of value (correlation) (ANSELIN, 1999).

The way observations for variables elsewhere are incorporated into the regression specification is by combining a matrix of spatial weights with a vector of observations. The spatial weighting matrix is a square matrix of dimension *n* x *n*, where the spatial weights w_{ij} represent the degree of connection between regions according to some proximity criterion, which shows the influence of region *j* on region *i*. In this work, using the Akaike Information Criterion (AIC) (ANSELIN, 2021), the matrix that best suited the data was the geographic matrix of the inverse distance, considering the five nearest neighbors. The idea behind it is that the more distant two regions are, the smaller the interaction between them (ALMEIDA, 2012). Formally:

$$W_{ij} = d_{ij}^{-2}(k) \qquad (03)$$

On that, d_{ij}^{-2} is the distance between the regions i and j and *k*=5, since only the results referring to the 5 nearest neighbors were considered. Once the spatial matrix was defined, it was decided to use the so-called Moran's I indicator – global and local – univariate as the first ESDA instrument. The global Moran I statistic tests the randomness of the spatial distribution of the variable under study globally, according to the algebraic notation below:

$$I = \frac{n}{S_0} \frac{\Sigma_i \Sigma_j w_{ij} z_i z_j}{\Sigma_{i=1}^{n} z^2{}_i} \qquad (04)$$

On that: n is the number of regions; z denotes the values of the interest variable standardized; W_{ij} refers to region i and to region j; S_0 is the sum of the elements of the matrix of spatial weights W. According to Almeida (2012), Moran's I provides three types of information. The significance level provides information about the data being randomly distributed or not. The positive sign of

the statistic, as long as it is significant, indicates that the data are concentrated across regions, while the negative sign points to data dispersion. The magnitude of the statistic provides the strength of the spatial autocorrelation, with the closer to 1, the stronger the concentration; the closer to -1, the more scattered the data. In order to also capture local patterns of spatial autocorrelation, in turn, the work addresses the local I of Moran – Local Indicator of Spatial Association (LISA). The Moran's coefficient I_i for a standardized variable *y*, observed in the region z_i, can be expressed by:

$$I_i = z_i \sum_{j=1}^{J} w_{ij} z_j \qquad (05)$$

The combination of data from the Moran scatterplot and information from the significance map of the local association measures gives rise to the LISA cluster map. In this study, to verify the existence of spatial clusters, Moran's I and the LISA cluster map are used for the sub-indexes TO, TC, LM, BA and GDP per capita.

RESULTS AND DISCUSSIONS

Table 1 shows, based on the descriptive analysis, the diversity of Bahian municipalities. This heterogeneity is stronger in the Trade Openness sub-index because its standard deviation is greater than its mean, as well as in the GDP per capita variable. It is also observed that the amplitude present in the variables is quite large, with emphasis on GDP per capita, TO and BA. About these last two variables, it is important to mention that they have a considerable amount of zeros (1602 and 832, respectively) of the total of 2,502 observations.

Table 1 | Statistics for GDP per capita and sub-indices TC, BA, LM and TO of municipalities in Bahia

Variable	Average	Standard deviation	Minimum	Maximum
GDP *per capita* (R$)	11,428.95	14,174.31	3,081.72	296,621.30
TO (*rank*)	0.13	0.24	0	1
TC (*rank*)	0.59	0.09	0.43	1
BA (*rank*)	0.48	0.34	0	1
LM (*rank*)	0.53	0.08	0.29	1

Note: TO= Trade Openness Sub-Index; TC= Tax Collection Sub-Index; BA = Banking Activity Sub-Index; LM= Labor Market Sub-Index.

Source: Own elaboration.

It should be added that the best results are found in the RMS or in regions close to it. The GDP per capita in 2014 was higher in Cairu (R$ 102,032.08), in the region of intermediate influence of Santo Antônio de Jesus, which, since 2008, started the production of natural gas in the Manati field (GUERRA, 2017). In 2019, the variable was higher in São Francisco do Conde (R$210,629.40), where the second largest oil refinery in Brazil is located. In addition, Camaçari was the municipality that led the trade openness activity (TO= 1) in both years, while the capital Salvador led the classification for tax collection (TC = 1), banking activity (BA = 1) and labor market (LM=1).

On the other hand, the lowest GDP per capita in Bahia in 2014 and 2019 was in the same municipality, Nova Triunfo (R$3,081.72 and R$5,386.54, respectively), in the intermediate region of Paulo Afonso. As for the tax collection rank, Pedrão, in the intermediate region of Salvador, presented the lowest value in 2014 (TC = 0.43) and Ibiquera, in the region of Feira de Santana, in 2019 (TC = 0.45). The LM, in turn, was lower in Jussara (LM = 0.35), in the intermediate region of Irecê, and, in 2019, in Ibiquera (LM = 0.40). Considering that a large number of municipalities, as mentioned above, had zero values in the trade openness and banking activity rank, and that Ibiquera is in this group, it can be concluded that this is the municipality in Bahia with the lowest volume of economic activities in 2019. Ibiquera, therefore, deserves special attention, as does the municipality of Nova Triunfo, which maintained the lowest GDP per capita between 2014 and 2019.

Table 2 shows the results of the overall Moran's I in the years 2014 and 2019. It is noted that the banking activity variable did not show significant results, which confirms the null hypothesis for this activity. On the other hand, for all other variables, Moran's I values were significant and positive, indicating positive autocorrelation, that is, there are spatial clusters. Regarding the growth rates of the variables in the period considered, the results were significant only for GDP per capita and tax collection and, to a lesser extent, for banking activity. For these three variables there are spatial groupings of growth rates.

Table 2 | Global Moran indices for GDP per capita and Sub-indexes TC, BA, LM and TO of Bahian municipalities in the years 2014 and 2019

Variable	Year		2014/2019 Growth Rate
	2014	2019	
GDP *per capita*	0.405***	0.350***	0.067***
TO	0.256***	0.203***	-0.030
TC	0.185***	0.181***	0.070***
BA	0.005	0.008	0.040*
LM	0.185***	0.193***	0.011

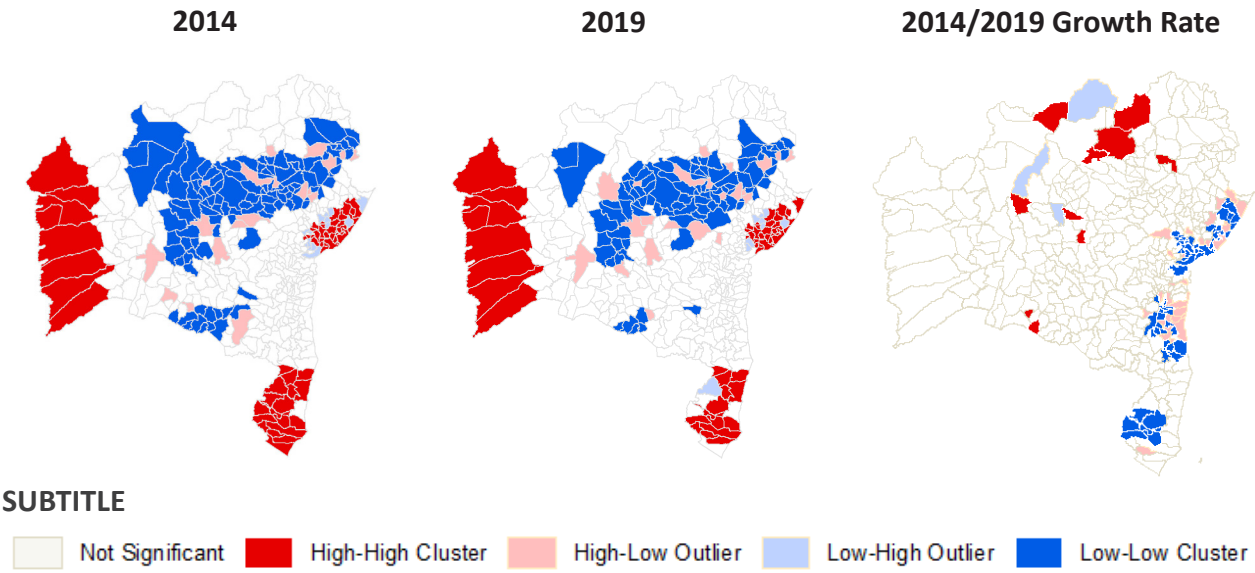
Note: TO= External Opening Sub-Index; TC= Tax Collection Sub-Index; BA = Banking Activity Sub-Index; LM= Labor Market Sub-Index.
Note: Significance level: *10%, **5%, ***1%.

Source: Own elaboration.

From the results of Table 2, it is observed that there were no significant changes in Bahia between 2014 and 2019. It is possible to see that, in the analyzed period, Moran's I for GDP per capita, trade openness and tax collection had a slight reduction. As for the labor market variable, there was an increase in statistics in 2019 in relation to the values of 2014 - municipalities with a high (low) number of jobs now have, respectively, a greater number of neighbors with a high (low) number of neighbors with formal jobs.

In addition, the four types of activities have the potential to generate economic growth. Therefore, the "desirable optimum" of Moran's I would be the presence of spatial clusters of the high-high type, representing municipalities with a large volume of economic activities (GDP per capita) neighboring municipalities with also a high level of economic activity (GDP per capita). With this, there would be a more equitable and dynamic distribution of economic growth and its determinants in the territory. To verify whether this situation actually occurs, it is necessary to analyze the spatial groupings from the local Moran's I, as shown in Figure 2 for the GDP per capita variable.

Figure 2 | Spatial groupings of the GDP per capita variable for municipalities in Bahia, years 2014 and 2019



Note: Values corrected for December 2014 prices by the Extended Consumer Price Index (IPCA/IBGE).

Source: Own elaboration, based on UESC data (2022).

Areas in red represent municipalities with high GDP per capita and neighbors with high GDP per capita (HH); dark blue areas represent municipalities with low GDP per capita and neighbors with low GDP per capita (LL); areas in pink represent municipalities with high GDP per capita and neighbors with low GDP per capita (HL); and the areas in light blue represent municipalities with low GDP per capita and neighbors with high GDP per capita (LH).

The HH spatial groupings, in the two years analyzed, are located mainly in municipalities in the intermediate regions of Barreiras, Salvador and Ilhéus-Itabuna. This evidences the permanence of only three large "prosperity islands" in the state - the RMS, which concentrates a large volume of industrial activity in the state; the Extreme South, highlight in the production of eucalyptus; and the West, which has stood out in the export of commodities (GUERRA, 2017). The spatial clusters of low GDP per capita (LL) permeate the semi-arid region of Bahia, in the intermediate regions of Paulo Afonso, Feira de Santana, Irecê, Guanambi and Vitória da Conquista, both in 2014 and in 2019. Municipalities with low GDP per capita neighbors of those with high GDP per capita (LH), in turn,

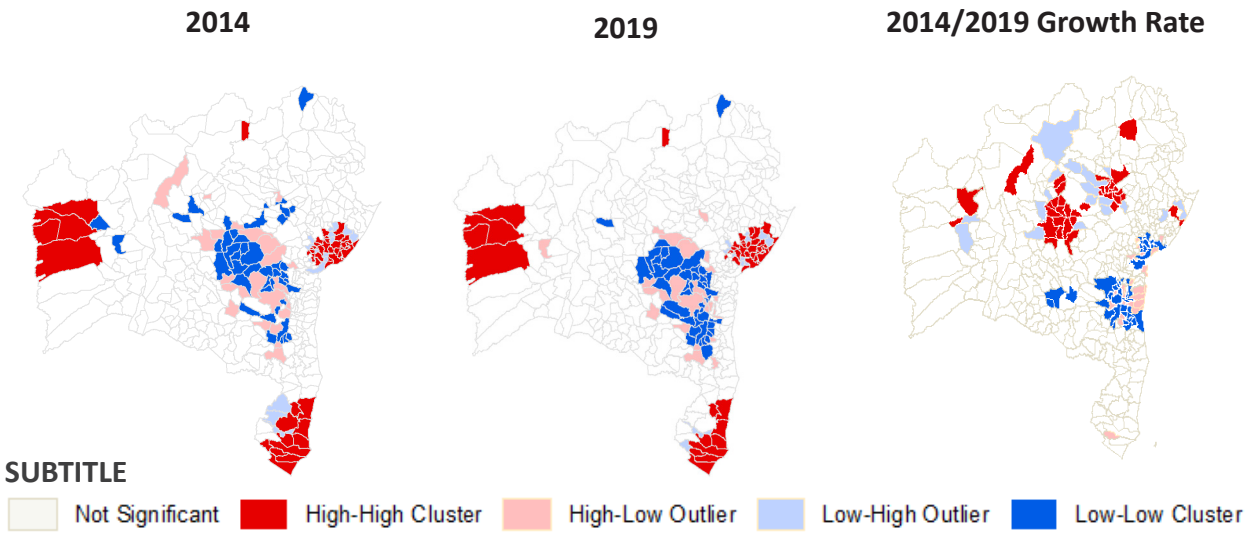
are mostly located around the RMS, which can be explained by the polarizing effect that large urban centers have on the smaller municipalities that are in their vicinity. Finally, type HL municipalities are spread across the central region of the state, but do not form clusters as they are isolated from other high-low municipalities.

Between 2014 and 2019, some municipalities changed their groupings. For example, Gentio de Ouro, which, in 2016, received funds for the construction of a wind farm, which contributed to a per capita GDP growth of more than 204.42%; and, Paramirim, whose per capita GDP growth was 127.03%. Both passed from LL to HL type groupings. On the other hand, Guaratinga moved from grouping HH to LH and Guanambi ceased to be type HL and did not present a pattern of behavior different from its neighbors. This demonstrates how endogenous factors can promote significant changes in GDP per capita levels.

Furthermore, there is a reduction in the number of municipalities in the low and high GDP per capita groups. Clusters with low GDP per capita summed 108 municipalities in 2014 and, in 2019, there were 83 (decrease of 23.15%); while the high GDP per capita clusters were formed by 56 municipalities in 2014 and 52 in 2019 (a reduction of about 7.14%). This fact explains the change in the overall Moran's I from 0.405 to 0.350 between the aforementioned years, as the groupings became smaller (less concentrated). With the decrease of HH clusters, there was also a distancing from the desired optimal situation.

Figure 2 also shows the groupings formed by the GDP per capita growth rates in the period 2014-2019. It can be seen that the northern region of the state presented marked growth rates, in which in the Extreme South and in the RMS are the municipalities with low economic growth. Therefore, some municipalities in the clusters with lower levels of GDP per capita were able to form clusters with a high growth rate, and the opposite also happened. However, here there is a disproportionality between the HH and LL clusters – the former add up to 10 municipalities, while the latter are around 49. Furthermore, it should be noted that the clusters with a high rate of economic growth did not have large enough results to increase the GDP per capita level groupings in the analyzed period. As for the tax collection activity clusters, the results are shown in Figure 3 below.

Figure 3 | Spatial groupings of the Tax Collection Sub-Index (TC) variable for municipalities in Bahia, years 2014 and 2019



Note: Values corrected for December 2014 prices by the General Price Index - Market (IGP-M), Brazil.

Source: Own elaboration, based on UESC data (2022).

Thus, the HH spatial groupings (high collection) are located in the municipalities of the intermediate regions of Salvador, Barreiras and Ilhéus-Itabuna, starting from the municipality of Santa Cruz de Cabrália. Between the regions of Feira de Santana and Vitória da Conquista, it is possible to identify clusters LL (low municipal revenue) and HL (municipalities with high revenue neighboring municipalities with low revenue). The LH clusters are close to the high-income clusters of Salvador and the Extreme South. It is also noted that the high collection clusters went from 44 to 42 municipalities while the low collection clusters were formed by 45 municipalities in 2014 and 41 in 2019. Therefore, little change occurred between the years analyzed for the tax collection groups, both in terms of quantity and geographic location.

Figure 3 also highlights that, in the analyzed period, there was the formation of the four types of clusters for the tax collection growth rates between the years 2014 and 2019, namely: 35 municipalities form the HH type groupings and 17 are of the type LH and pass through the intermediate regions of Paulo Afonso, Feira de Santana, Irecê and Barreiras; while 28 municipalities are part of the LL clusters and 18 are of the HL type and are concentrated mainly near the coast, in

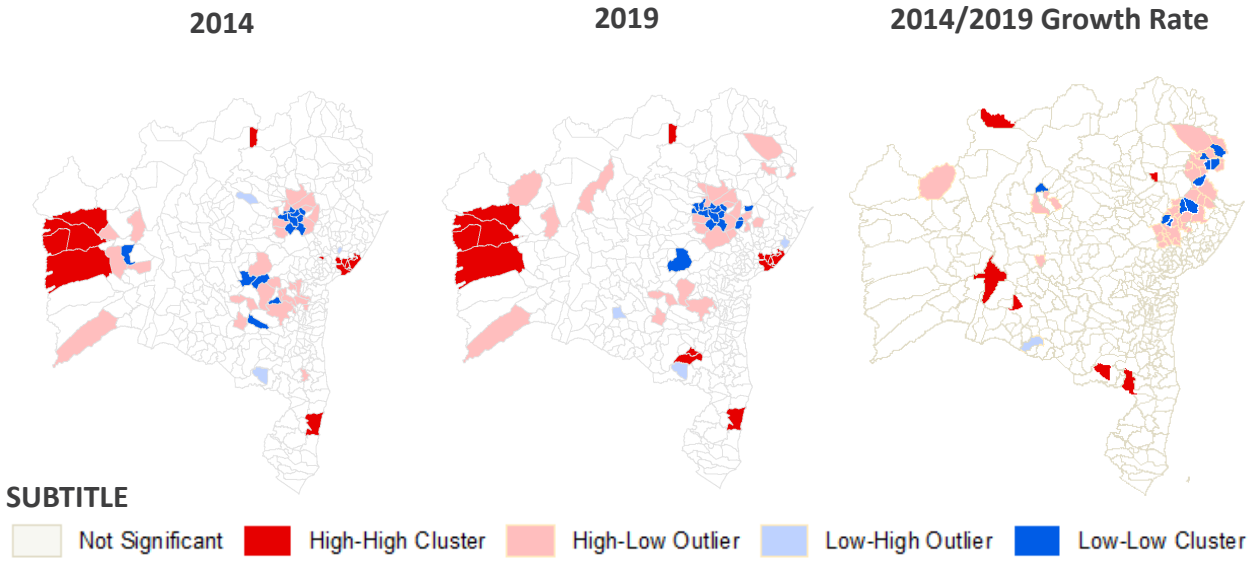
the Intermediate Regions of Salvador, Santo Antônio de Jesus and Ilhéus-Itabuna. Thus, despite the existence of great inequality between nearby municipalities, there is a favorable situation, which is the existence of a larger group of high growth rates of tax collection compared to low growth.

As for banking activity (Figure 4), the clusters with the greatest notoriety are of the HH type and are located in the intermediate regions of Barreiras and Salvador, with the cluster in the west of the state being the same as that which occurs in the TC sub-index. The LL-type municipalities are mainly in the intermediate region of Feira de Santana, while the HL and LH clusters represent some points along the regions of Paulo Afonso, Feira de Santana, Vitória da Conquista and Guanambi. In the analyzed period, the number of municipalities with high banking activity increased from 12 to 16, in which LL type municipalities increased from 13 to 15 (an increase of 36.36%). There was, therefore, a subtle improvement in the spatial distribution of this activity in Bahia and in the desirable optimum, with the increase in HH-type groupings.

Regarding the growth rate of banking activity in the period 2014-2019, however, only 6 municipalities are type HH and are spread across the semi-arid region of the state. The largest grouping was of the high-low type (municipalities with a high growth rate of banking activity and neighbors with a low growth rate of banking activity), comprising 37 municipalities, and are mostly in a range that cuts through the intermediate regions of Paulo Afonso, Salvador and Feira de Santana. Finally, the cluster of municipalities with a low rate of growth in banking activity totals 10 while only one municipality is of the LH type.

Regarding the labor market sub-index, the HH clusters, as for tax collection, are concentrated in the West, in the Metropolitan Region and in the Extreme South of the state; the LL (low formal employment) and HL clusters cross the intermediate regions of Irecê, Feira de Santana and Vitória da Conquista and the BA municipalities are located in the Ilhéus-Itabuna and Salvador regions. In addition, it appears that, between 2014 and 2019, the number of municipalities in spatial clusters with a high labor market remained at 42 and there was an increase in those with a low labor market - from 62 to 67 municipalities - which demonstrates stagnation of the desirable optimum also for this sub-index (Figure 5).

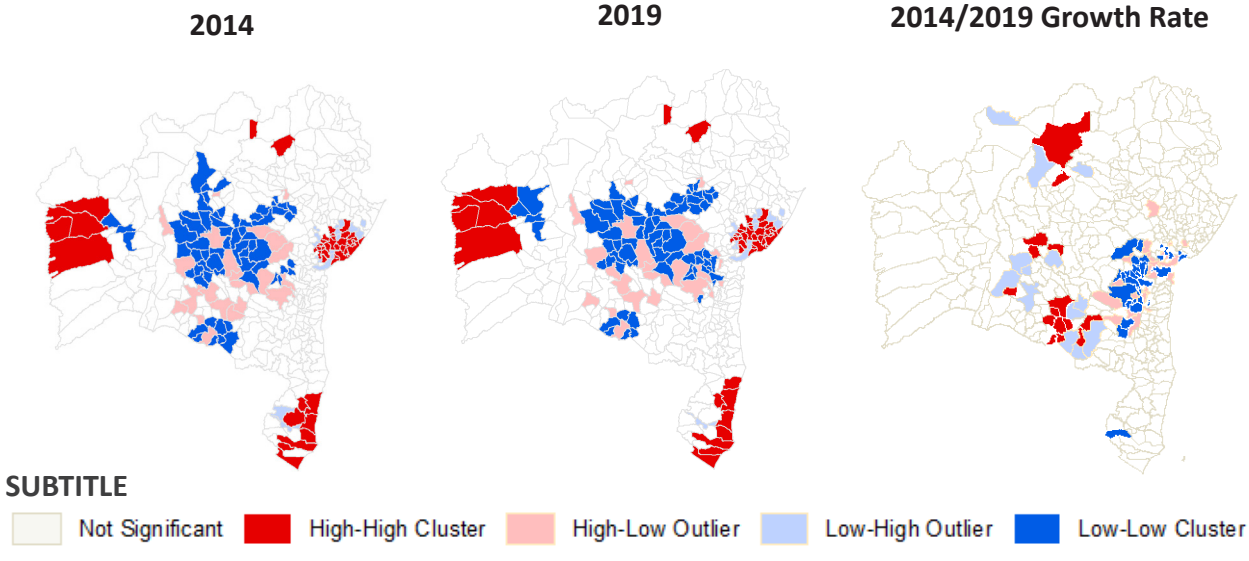
Figure 4 | Spatial groupings of the Banking Activity Sub-Index (BA) variable for municipalities in Bahia, years 2014 and 2019



Note: Values corrected for December 2014 prices by the General Price Index - Market (IGP-M), Brazil.

Source: Own elaboration, based on UESC data (2022).

Figure 5 | Spatial groupings of the Labor Market Sub-Index variable (LM) for Bahian municipalities, years 2014 and 2019

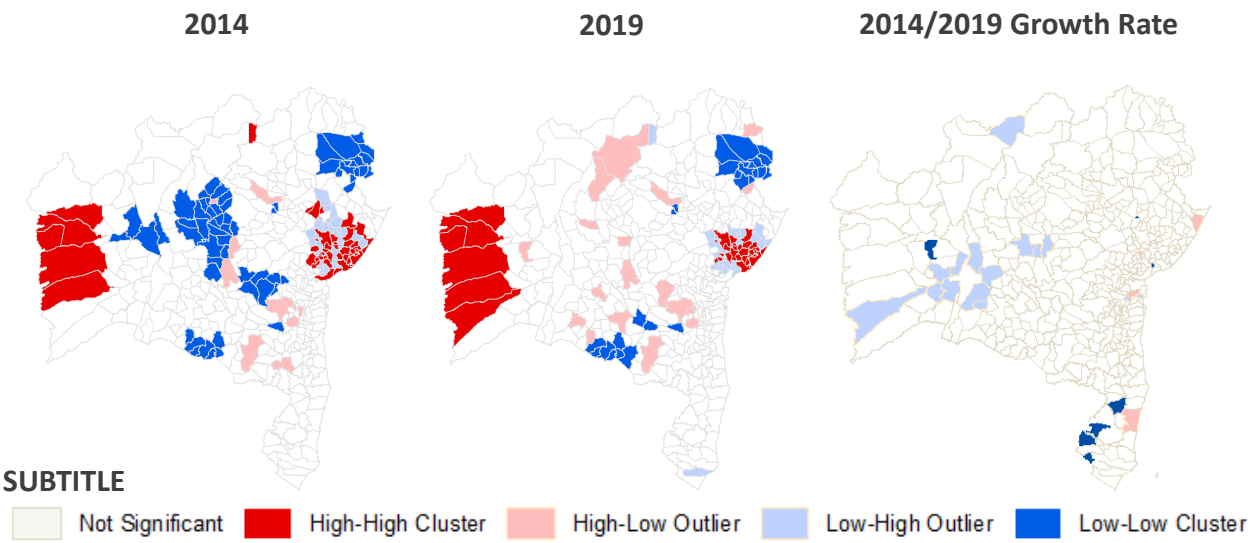


Note: Values corrected for December 2014 prices by the Wholesale Price Index (IPA), USA.

Source: Own elaboration, based on UESC data (2022)..

Furthermore, Figure 5 shows how the groupings are organized for the growth rate of the labor market in the period considered: the HH clusters (high formal employment growth rate) total 15 municipalities, most of which are in the intermediate region of Vitória da Conquista ; the LL clusters (low formal employment growth rate) are formed by 31 municipalities, mainly in the area that goes from the RMS to the intermediate region of Vitória da Conquista; the HL clusters add up to 21 municipalities and intertwine with those of the LL type and the LH clusters correspond to 13 municipalities and are in the intermediate regions of Vitória da Conquista and Guanambi. Therefore, the number of municipalities in the group that had a high rate of growth in formal employment was smaller than that which had a low rate of growth, pointing to a departure from the desirable optimum. The trade openness sub-index clusters, in turn, can be seen in Figure 6.

Figure 6 | Spatial groupings of the Trade Openness Sub-Index (TO) variable for Bahia municipalities, years 2014 and 2019



Note: Values corrected for December 2014 prices by the National Consumer Price Index (INPC), Brazil.

Source: Own elaboration, based on UESC data (2022).

It can be seen that HH (high aperture) spatial clusters are located in the regions of Barreiras and Salvador; the spatial clusters of low aperture (LL) are mostly concentrated in the region of Paulo Afonso; the high-low clusters are in the center of the state – in Vitória da Conquista, which exports coffee; and in the municipalities of Brumado, Jequié, Maracás, Jacobina and Sento Sé, which stand

out in the extraction of ores - and those of the low-high type are located close to the Salvador region. For this sub-index, there was a greater concentration of activity in a few areas during the period considered – there was a reduction of 22.86% in HH-type groupings, which went from 35 to 28 municipalities, and in those with low openness, which ranged from 62 for 27 municipalities (-56.45%). This concentration is even more evident when looking at the clusters of external opening growth rates, as there were no high-high municipalities, only low-high (15 municipalities), low-low (5 municipalities) and high-low (4 municipalities). counties). This is worrisome because it moves away from the desirable optimum, which would be groups of municipalities with a greater predisposition to foreign trade and with growth in competitiveness.

It is possible to see that the spatial distribution of tax collection, banking activity, labor market and trade openness is similar to the GDP per capita groupings in Bahia. However, for the five variables there are high-high clusters in municipalities in the intermediate regions of Barreiras and Salvador, which stand out in terms of economic competitiveness and attractiveness factors: the Far West region, which has stood out in the production of agricultural commodities export; and the Metropolitan Region of Salvador, which historically concentrates a large part of Bahia's economic activity, the industrial sector and the oil industry in São Francisco do Conde.

In the same way, the semi-arid region of Bahia, mainly in the intermediate regions of Feira de Santana and Vitória da Conquista, are common points of the low-low and high-low groupings of the five variables. The low-high clusters in the intermediate region of Salvador, except for banking activity, demonstrate the polarizing effect of this large center on the smaller nearby municipalities. Finally, in the period considered, it was possible to verify that there were no large increases in the formation of high-high type clusters, which would be the desirable optimum, which indicates that no structural transformations occurred between 2014 and 2019.

Such results confirm the heterogeneity that makes up the Bahian space: at the western and eastern ends of the state there are groups of municipalities with a volume of economic activity and neighbors with low economic activity and, in the center of the territory, few municipalities with great economic activity. Therefore, in the most recent period, the Bahian economy continues to

be concentrated in the same regions identified by Pessoti and Silva (2011), Barbosa and Barreto (2016), Guerra (2017), Santos et al. (2019). Furthermore, the clusters of high economic growth rates - despite occurring in areas where there is less economic activity - did not have results large enough to increase the clusters of GDP per capita, tax collection, banking activity and the market. of work in the analyzed period. In the case of rates of change in external openness, only low-growth clusters were found between 2014 and 2019.

These findings also reflect the adoption of ineffective public policies in combating regional inequalities. This is because, with the multiplier effects of investments made in the interior of the state exhausted, especially in the 1990s, and in the absence of an endogenous economic dynamic, the industrialization process was waiting for a new exogenous shock that would overthrow apathy and awaken another period. of optimism (GUERRA, 2017). This, however, did not happen, maintaining large economic voids in the interior of the state, as can be seen by the presence of clusters of low economic activity and of the high-low type. Hence the importance of adequate public policies to reduce regional inequalities in Bahia.

FINAL CONSIDERATIONS

This work sought to analyze the evolution of behavioral patterns and spatial groupings of economic activities in Bahian municipalities. The study was innovative for using a recent database and at a higher level of disaggregation, the INDICA UESC project. Despite the short period of time, the descriptive analysis of the variables and the ESDA showed, respectively, the economic inequality of Bahian municipalities and the spatial concentration of per capita GDP and economic activities in the Far West and in the RMS. On the other hand, in the semi-arid region of Bahia, mainly in the intermediate regions of Feira de Santana and Vitória da Conquista, there is a great “economic void”, with few exceptions. This spatial concentration increased for economic activities between 2014 and 2019, except for tax collection, in addition to the formation of larger clusters of low growth rate, mainly for trade openness. Such information shows that stagnation can be accompanied by contracture of activities already established, requiring a change in the policy adopted to reverse the situation. In addition, they reinforce that the low economic dynamism of Bahia may be influenced

by the high concentration of activities, leaving it up to governments to seek the institution of policies with a regional focus to minimize these processes.

However, the theories used showed that inequalities can be caused by endogenous factors, cumulative causal processes, economies of scale and agglomeration, which lead to the concentration of economic activities in certain regions. This is no different in Bahia. Thus, if based on the New Economic Geography (KRUGMAN, 1991), the deconcentration of the Bahian economy can be encouraged through actions that facilitate connectivity and accessibility to more backward regions - such as the improvement of the road network and air transport, for example -, improving the distribution of production factors, the reduction of transport costs and the mobility of the labor force. Moreover, it is pertinent for governments to think about strengthening endogenous characteristics of municipalities (MANKIW et al., 1992), such as promoting human capital and innovation or strengthening institutions, which can generate, in the long run, sustainable economic development.

It is also worth considering, because in Brazilian politics many want short-term results, that actions to promote improvement in economic activity levels drag on for years or even decades, and require continuity of an economic development project. In addition, these are actions that demand financial investments, being an alternative for groups of poor municipalities, the adoption of collaborative policies, such as public consortia. Finally, it is important to point out that these are general suggestions and that they will certainly be different for different municipalities. As suggestions for future work, spatial econometric models can be applied, in order to verify the effects of these activities on the levels and growth rates of GDP per capita in the municipalities. Another alternative is to estimate the determinants of banking activity, tax collection, the labor market and trade openness.

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