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GEOGRAPHICAL POSITIONING AND MARKET RESOURCES IN BENIN BORDER COMMUNES

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ABSTRACT: *Space is not neutral and its dynamism depends on the activities that take place on the one hand and interactions between actors on the other. This work analyzes the dynamics of border areas across municipalities. Border municipalities are mainly characterized by strong trading networks that influence the tax base. Assuming that market infrastructures influence the tax, base and using the panel data on municipalities' revenues, the results show that the autocorrelation is not located at specific locations, such as in the municipality of Grand popo in southwestern Benin. Local self-government of municipalities is a challenge to decentralization. It is necessary to strengthen market networks, develop a more effective strategy for mobilizing and broadening the tax burden and, finally, raise the awareness of actors to learn their rights and duties by paying taxes. remains a challenge.*

KEYWORDS: Spatial Analyse, Municipalities, Correlation, Market Resources, Positioning

JEL Code: R12, R38. H25. H71

INTRODUCTION

The space is not neutral and even less economically neutral according to the work of several economists like Aydalot (1985), Hotteling (1929), Marshall (1920), François Perroux (1955, 1961). In the price, is the price and the request are a transaction in a space point. There is no economic life without space.

For Krugman (1991), the development of economics of the works, the commercial network and the industrial "These factors have been improved. Much work on the theories of endogenous growth (Romer 1986, Lucas 1988, Barro 1990) has also played an important role in transport infrastructure on economic growth. These generate externalities for the economy as a whole. Infrastructure as a measure of the economic efficiency that conditions development. The quality of infrastructure supporting the development of road or lagoon infrastructure, markets and bus stations ..., is linked to the development of trade, thus strongly determine the weight of the contribution of the border to the economy.

Trade is the main activity that takes place in a dynamic border area. The economic positioning of a territory influences its local economy. Border areas have long been of great interest in the regional analysis because the border contributes to the economic emergence of the activities carried out. It refers to the boundary that separates two national territories, with reference to all the political, social, spatial, historical and identity dimensions contained in the separation (Fouchier 1991, Grimson 2003, quoted by Poschet 2006). The border area is therefore "a spatial and social entity that implies special relations because of the existence of a border" (Poschet, 2006, p. 8). Igue (1995) distinguishes low-speed border areas, alternative border areas and national peripheries.

Border dynamics are characterized by local, demographic and economic dynamics, which induce the idea of a change through the development of a particular process (Poschet, 2006). The local dynamics of the border are based on the merchant network, which is an interconnected set of components and interrelations that allows the circulation of goods. These main components are traders, carriers and buyers. To make transactions, they rely on each other to the extent that they are all intertwined.

Border dynamics refer to activities, flows, and changes that are observed at the level of spaces with particular characteristics and geographical situations. Igue (1995) shows that the Beninese communes bordering Nigeria are very dynamic thanks to the commercial activities, the flows of people and goods and the different changes observed on these spaces.

Indeed, Benin being border with Nigeria, Burkina-Faso, Niger and Togo, the border municipalities of Benin, are the illustration. These municipalities are mostly dynamic areas because they owe their dynamism to their proximity to the border. They are a place of transit, passage and exchange of both agricultural and manufactured products from Nigeria, northern countries or manufactured in the municipality.

According to several authors, it is the national peripheries that lead to the development of dynamic border regions (Bennafla, 2003). Such dynamic border areas have developed mainly between Nigeria and its neighbors, between Ghana and its neighbors, The Gambia and Senegal, Mauritania and Senegal (Igue, 1995, 2010). Studies by Dillé (2000) on the commune of Koné in Niger, border in Nigeria; Kambale (2005) on the Kasindi area in Congo, bordering Uganda; Diallo (2006) in the municipality of Rosso Senegal bordering Mauritania; de Poschet (2006) on the border cities of Haiti and the Dominican Republic; and Igue (2010) on the Ifangni-Igolo zone in Benin, bordering Nigeria, all lead to the same conclusion.

Today, in the context of decentralization, where national development depends on the development of each municipality, a good spatial planning policy is needed for the optimal use of the local area. It is therefore important for each municipality to make the most of its potential by creating better conditions for the development of trade, a favorite activity in border areas. The dynamics of border territories is also due to several factors,poles of attraction, transit and transit points where thousands of people and goods circulate, where economic activities such as agriculture, handicrafts, trade, transport, foreign exchange (Igue, 2010, Dillé 2000, Diallo 2006).

The increase in population, which is not necessarily linked to the internal growth of the population, and is considered as the consequence of migratory movements towards localities that offer better economic opportunities. Thus, modest villages become localities of 10,000 to 20,000 inhabitants. Despite their size, these new agglomerations are mainly placing of frequentation and most traders do not live there. As a result, economic spin-offs are reflected in larger urban centers. In this way, cross-border trade primarily consolidates urban centers in the interior of the country, while exploiting border markets whose lack of permanence, stability and financial spin-off prevents the development of border areas. Peter Njikamp (2000) finds it difficult for border communities to take advantage of their long-term position unless they are able to integrate a network economy with the necessary skills.

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Borders are opportunities and places of exchange, insofar as they constitute spatial discontinuities and delimit spaces often linked by culture, history, geography, currency and the economic potentialities that give rise dynamic spaces.

This work analyzes the share of the commercial networks on operating revenues and the spatial self-correlation of municipalities to deduce the best-situated municipalities that influence each other in relation to the commercial networks. We assume that revenues from the commercial networks influence the operating revenue of the border municipalities.

RESEARCH METHODOLOGY AND DATA STUDY

Research Methodology

To achieve the objectives of the study, we conducted descriptive and explanatory analyzes that verified the assumptions made.

The descriptive analysis based on Principal Component Analysis (PCA) under SPAD version 5, led to a categorization of communes according to the level of dynamism of their market network. This level is measured by the level of staffing in market and road infrastructure and by employment in the trade and transport sector.

PCA is a statistical technique of multidimensional analysis of data of quantitative variables. It leads to approximate graphical representations of the contents of a data table and seeks to identify the similarities and differences between individuals with respect to the variables chosen.

The explanatory analysis was based on an econometric estimation of the level of operating revenue in the Benin border communes and the level of revenue from the merchant network in these communes in order to determine the explanatory variables for each of them. There are 36 border municipalities in Benin. Regardless of the municipality, operating revenue consists of receipts from the merchant network (RRM), other services, taxes and duties (PSIT), subsidies for the economy. Central State for the operation of these communes (SEFC) and other elements. The level of the components of operating revenue thus determines the level of the latter. This relationship can be econometrically established as follows:

$$\ln(RF_i) = \square_0 + \square_1 \ln(RRM_i) + \square_2 \ln(PSIT_i) + \square_3 \ln(SEFC_i) + \varepsilon_{1i} \qquad \text{(i)}$$

ln is the logarithm neperien and ε_{1i} the error term.

The estimation of this model allows us to verify the first hypothesis according to which the revenues of the merchant network have a positive influence on the operating revenue of the border communes of Eastern Benin.

In Fourth Meetings of Theo Quant: Besancon, February 11 and 12, 1999 by Presses Universitaires Franc-Comtoises (2001), on the basis of the study on the effects of the national road network on the departmental economic development in France, Bernard Fritsch establishes a relationship between the national network and levels of economic development.

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This relationship leads us to consider that departmental levels of market production are a function, on the one hand, of departmental endowments in private factors of production (productive capital of the market sectors and employment), on the other hand of the national network; and that with equal allocations to private production factors, two departments with differences in their road equipment will have dissimilar levels of activity. This level of departmental commercial activity has been modeled as an aggregate production function, of the type:

Y = f (K, L, Rn), with:

Y = departmental commercial GDP,

K = productive capital of market sectors,

Employment in the market sectors,

Rn = Departmental allocations on national roads and motorways.

According to the Cobb-Douglas method, in log-linear form, this model is mathematically formulated as follows:

$$\ln(Y) = a_0 + a_1 * \ln(K) + a_2 * \ln(L) + a_3 * \ln(Rn) + \varepsilon_j$$

In order to verify the second hypothesis according to which the level of endowment in road and commercial infrastructures, the nature of the border which crosses the border communes of Eastern Benin determine the level of the receipts of the merchant network, we take the same step as Bernard Fritsch. Thus, we formulate econometrically the following relation:

$$\mathbf{\ln(RRM_i) = \beta_0 + \beta_1 \ln(PL_i) + \beta_2 \ln(DSP_i) + \beta_3 \ln(TD_i) + \varepsilon_{2i}} \qquad \mathbf{(ii)}$$

with:

RRM: revenue from the merchant network;

PL: patents and licenses;

DSP: parking and parking fees;

TD: customs taxes.

Indeed:

- Revenue from the merchant network (RRM) reports on the level of production of the commerce and transport sector in these communes;
- Patents and licenses (PL), paid mainly by traders in these areas, report on employment in the trade sector and the provision of market infrastructures (markets, sheds, warehouses, etc.);

- Parking and parking fees (DSP), paid by the carriers, reflect the level of employment in the transport sector and the provision of transport infrastructure;
- Customs taxes (TD), which are royalties paid to municipalities by the State, make it possible to identify the nature of the border crossing the communes.

Knowing that the dynamism of the merchant network measured by the level of staffing in market and road infrastructure and employment in the trade and transport sector can have a discriminating effect on the level of revenues of the merchant network, we had introduced into the model (ii) an indicator variable (DM) that makes it possible to segment the communes into two groups and to determine if the segmentation criterion is really discriminating. The values taken by the dummy variable are:

$$DM=\begin{cases}1 \text{ if the municipality is most dynamic merchant network group}\\ 0 \text{ if the municipality is not most dynamic merchant network group}\end{cases}$$

Thus, the following equation (ii) becomes:

$$\ln(RRM_i)=\beta_0+\beta_1\ln(PL_i)+\beta_2\ln(DSP_i)+\beta_3\ln(TD_i)+DM+\varepsilon_{2i} \qquad \text{(iii)}$$

Knowing the values of the variables explained and the explanatory variables of the models (i) and (iii) for all Benin's border municipalities in Nigeria, we will estimate the values of the coefficients by multiple regression and judge their statistical significance by the Ordinary Least Squares (OLS) method. The threshold of significance used is 5% and a coefficient will be said significant when the probability associated with it is less than 0.05. Estimates are made in snapshots based on 2013 observations.

The coefficients are the elasticities of the variables explained to the different factors of production (explanatory variables). They measure the relative variation of the revenues of the market network following a 1% variation in the volume of one of the factors of production and make it possible to calculate a marginal productivity, comparable to an implicit economic rate of return of these explanatory variables.

For example, considering equation (iii), this rate of return for TD is equal to β3 * RRM / TD.

The estimation by the OLS method is based on fundamental assumptions. For this, the validation tests will be performed before interpreting the estimated coefficients. This is how the following tests will be performed:

- Test of normality of the residues: It is on this test that rests the validity of the other tests consequently the errors must follow a normal law for the validity of these last ones.
- Heteroscedasticity test of residues;

- Autocorrelation test to put us in the perfume that no bias has slipped into the estimation of the parameters.

Estimates are made under Eviews 7.

To better understand the theoretical results of our study, we went to Ifangni commune, for example, to see how the merchant network in general and the road and market infrastructures in particular.

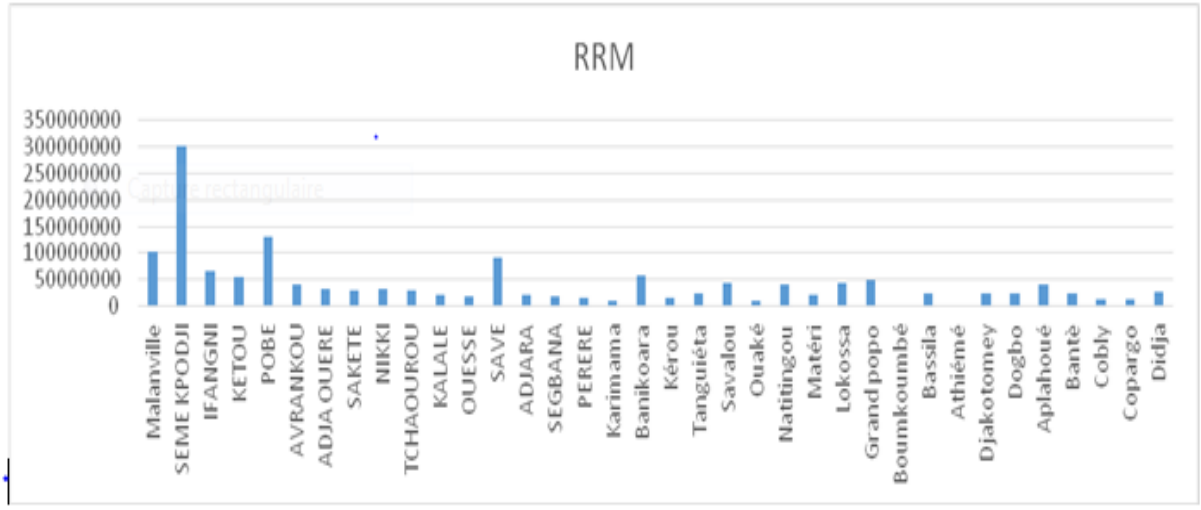
Data Study and Sources

Regional science and economic geography analyze conducted at the subnational level are often hampered by the lack of readily available data. You have to build your own databases using multiple sources. Thus, the 2013 administrative accounts of the thirty-six communes of Benin bordering Nigeria, obtained at the National Commission of Local Finance (CONAFIL), served as a basis for obtaining the data used in this study. The operating revenue was directly extracted from the administrative accounts when all the other data were obtained by summation of different data. The table below summarizes the composition of these data.

See Table 1 in Annex

PRESENTATION AND ANALYSIS OF RESULTS

Descriptive analysis



Graph 1: **Recipes of the Commercial Network of Border Municipalities of Benin in 2013**

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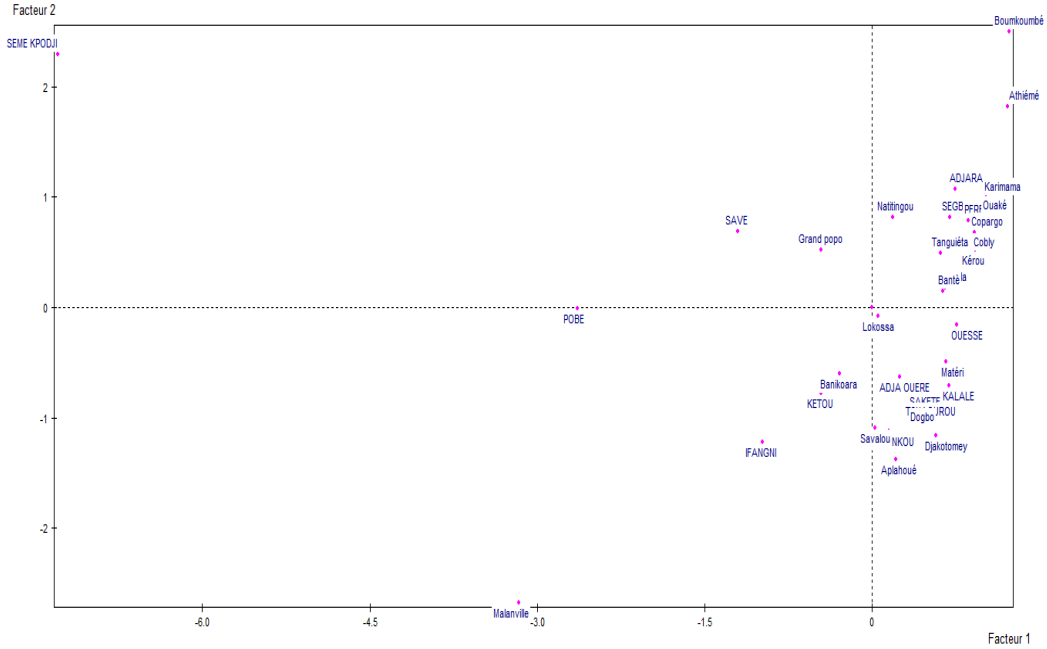


Graph 2: Categorization of Communes According to their level of Dynamism of the Merchant Network

The analysis of graph 1 shows that the municipality of Sèmè-Podji has the highest level of revenue of the merchant network. In addition, from the graph 2 we notice that the municipality of SèméPodji is the most dynamic commune

Factors Explaining the Revenue Level of the Merchant Network in the Communes

Results of Estimation Model

See Table 2 and 3 Annex

Table 2 presenting the results of the model (i) shows that this model appears correctly adjusted because the coefficient of determination (R2) is close to 1 and the critical probability of the Fisher F-statistic is less than 0.05 and even 0.01. The explanatory variables SEFC and PSIT are not significant at the 5% level. Only the RRM variable is.

See Table 4 and 5 Annex

Analysis of the data in Tables 3 and 4 shows that the variables PL, TD are significant at 5% or even 1% and that the model [2] appears correctly adjusted with a high coefficient of determination (R2) and the critical probability of the Fisher's F-statistic is less than 0.01. Only the explanatory variable DSP is not significant at the 5% level.

Results Interpretation

The revenue level of the merchant network is explained by the licenses and the customs taxes, all other things being equal. Parking and parking fees have no effect on the level of

these revenues at a time when a 1% increase in licenses and customs duties, respectively, leads to an increase of 0.55% and 0.87% respectively. revenue from the merchant network

Comparison of Spatial Autocorrelation between Municipalities

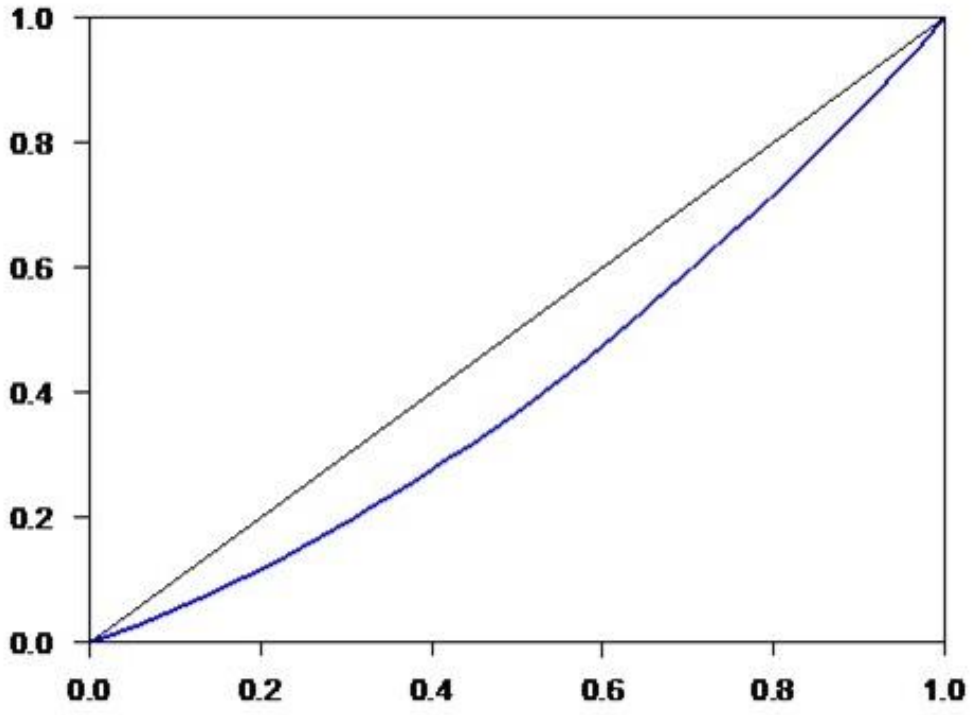
Spatial Dispersion of VAT Values at Customs Lines (TD)

See Table 6 in Annex

Coefficient of variation = 0.30 so low dispersion of values around the mean.

The low spatial dispersion of VAT collected at the customs cordon is revealed in the table. The standard deviation is 2357111 and the coefficient of variation 0.3056 remains low. This result expresses the small dispersion of the municipalities in the tax related to the customs cordon. This dispersion is characterized by the following statistics: Minimum 3078000, Maximum 12070000. 1st Qu 5902000 or 25% of the communes mobilizes the customs cordon 5 902 000 CFA francs on average, 50% of the communes mobilize 7 819 000 CFA francs for an average level of annual mobilization of customs duties of 7,711,000 CFA francs; 75% of municipalities each show a tax mobilization at the customs cordon of less than or equal to 9509000 cfa.

The GINI 0.1732309 index confirms the low dispersion of this customs tax by the border communes of the Republic of Benin as shown by the LORENZ curve.



Graphic 1: Lorenz Curve of Taxes Collected at the Customs Cordon

Spatial Dispersion of Parking Lot Values (DSP)

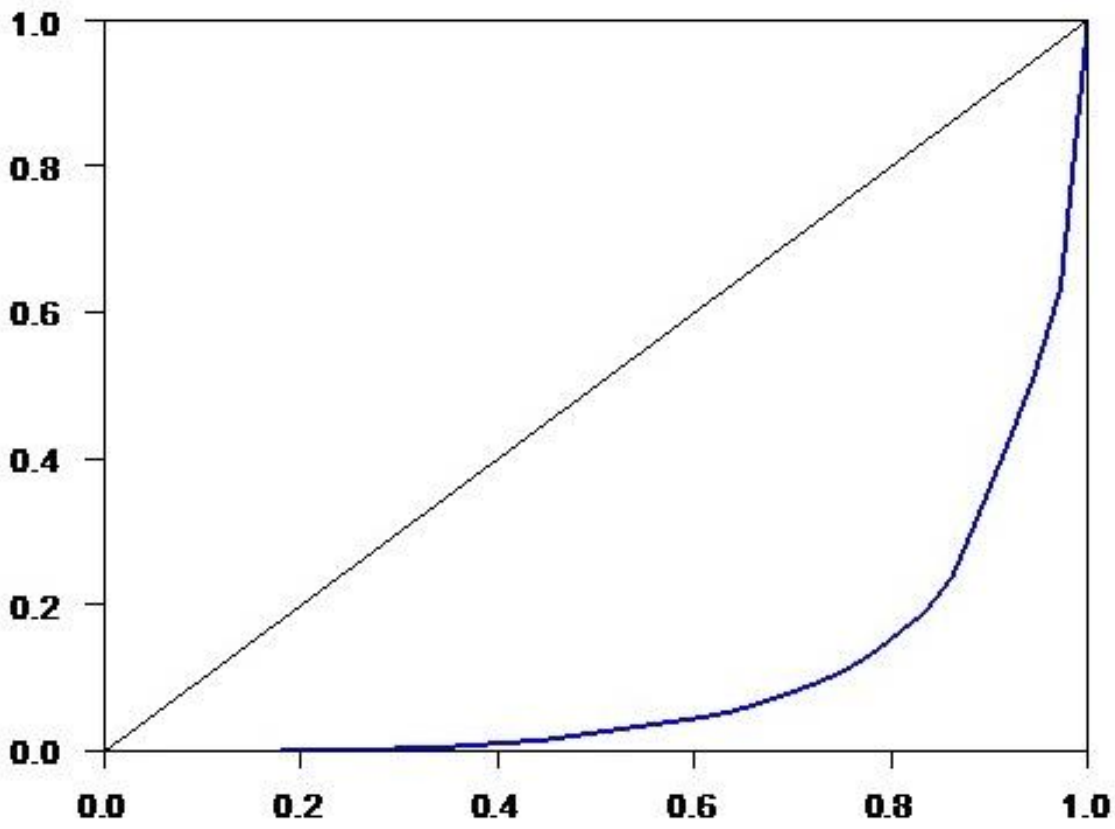
See Table 7 Annex

The coefficient of variation is high 2,36938261 and thus expresses a strong spatial dispersion of the amounts related to parking fees and parking in border municipalities in Benin.

This dispersion is characterized by a minimum of 0; there are border municipalities that could not mobilize an amount related to the parking and parking fee and a maximum value of 63750000

A quarter of the communes mobilize on average 88850 francs, half 898600 with an average of 4843000 which is lower. Subsequently, 75% of municipalities each mobilize on average less than 3274000 for parking and parking rights.

The Gini coefficient is 0.7913494 and confirms this strong dispersion of values around the mean.



Graphic 2: Lorenz Curve of Parking and Parking Fees

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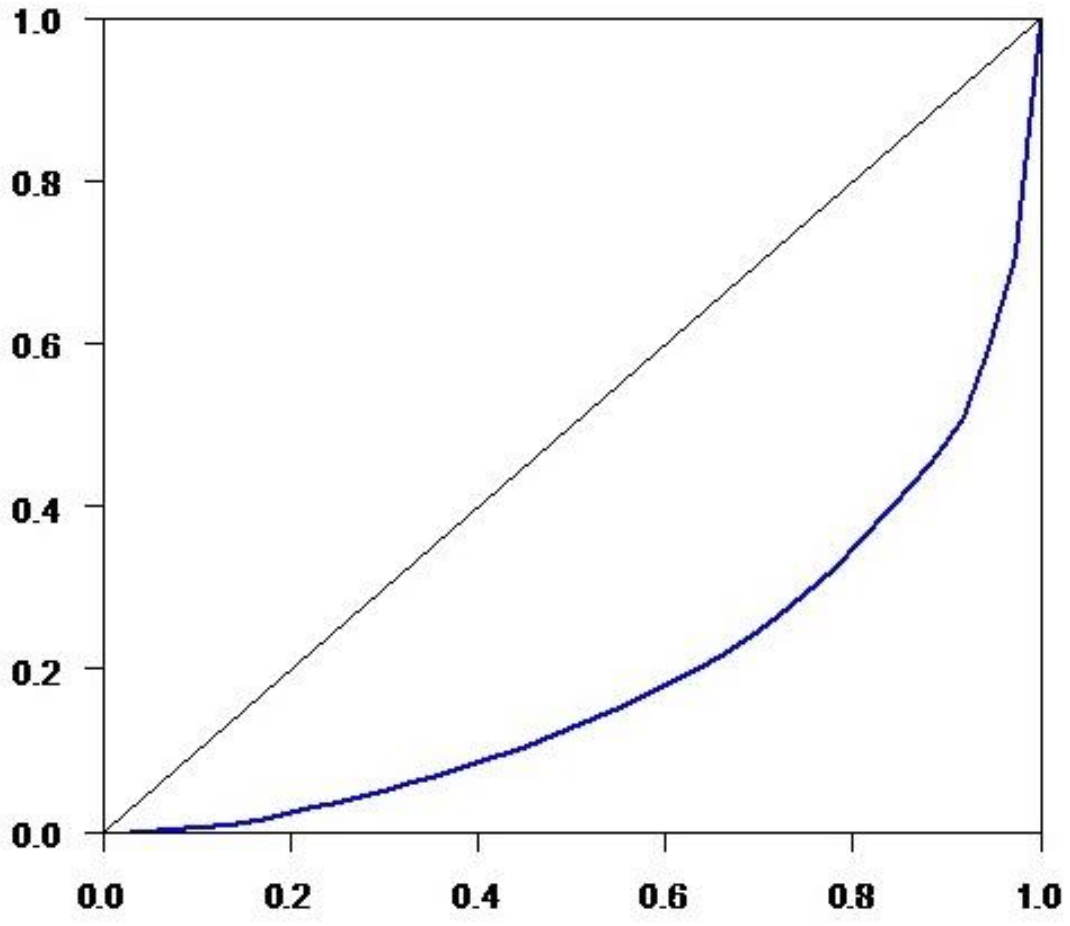
Spatial dispersion of the values of local patents (PL)

See Table 8 Annex

The coefficient of variation = 1.83 therefore a strong dispersion of values related to local patents around the average in the border communes in the Republic of Benin. This dispersion is characterized by: a minimum of 123100 and a maximum of 270400000. Next, 25% of municipalities mobilize on average an amount of 6807000 linked to the value of local licenses and 50% mobilize an amount of 12490000 CFA francs around an average 25550000 and finally, 75% of municipalities mobilize an average of 26330000 CFA francs of licenses.

The Gini coefficient is 0.6087196 and confirms this strong dispersion of values around the mean.



Graphic 3: Lorenz Curve of Local Patent

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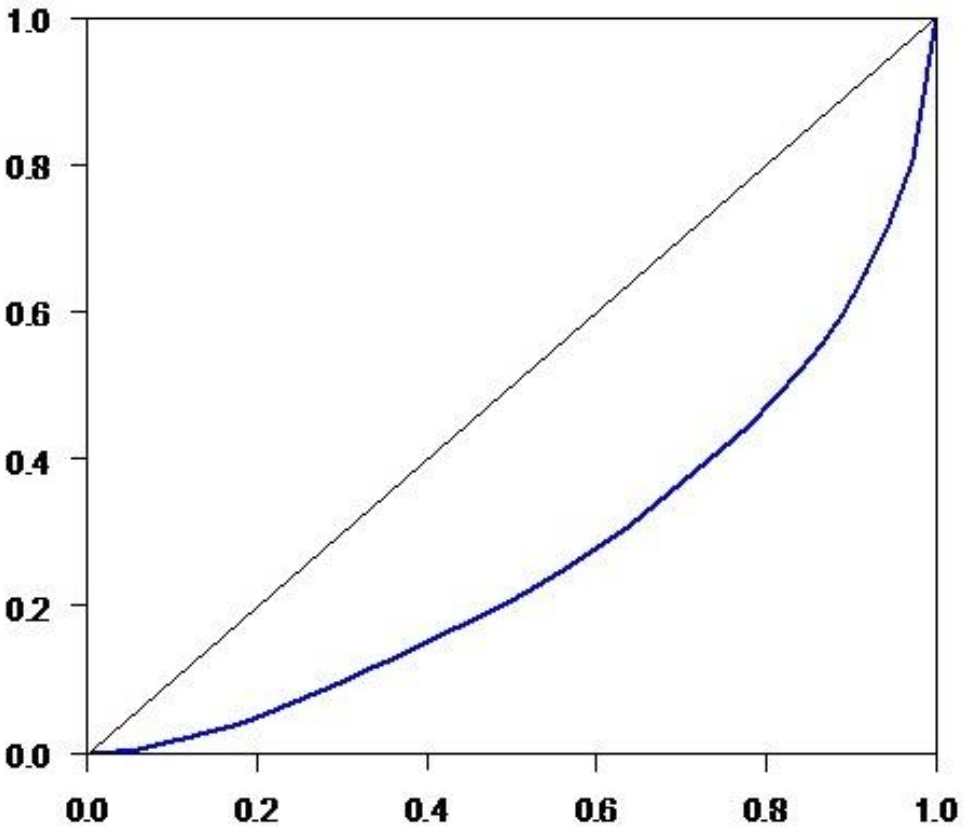
Spatial dispersion of the values of market receipts

See Table 9 Annex

Coefficient of variation = 1.20 so strong dispersion of values around the mean. The value of the Gini index is 0.4605592 and confirms the dispersion of values around the mean.



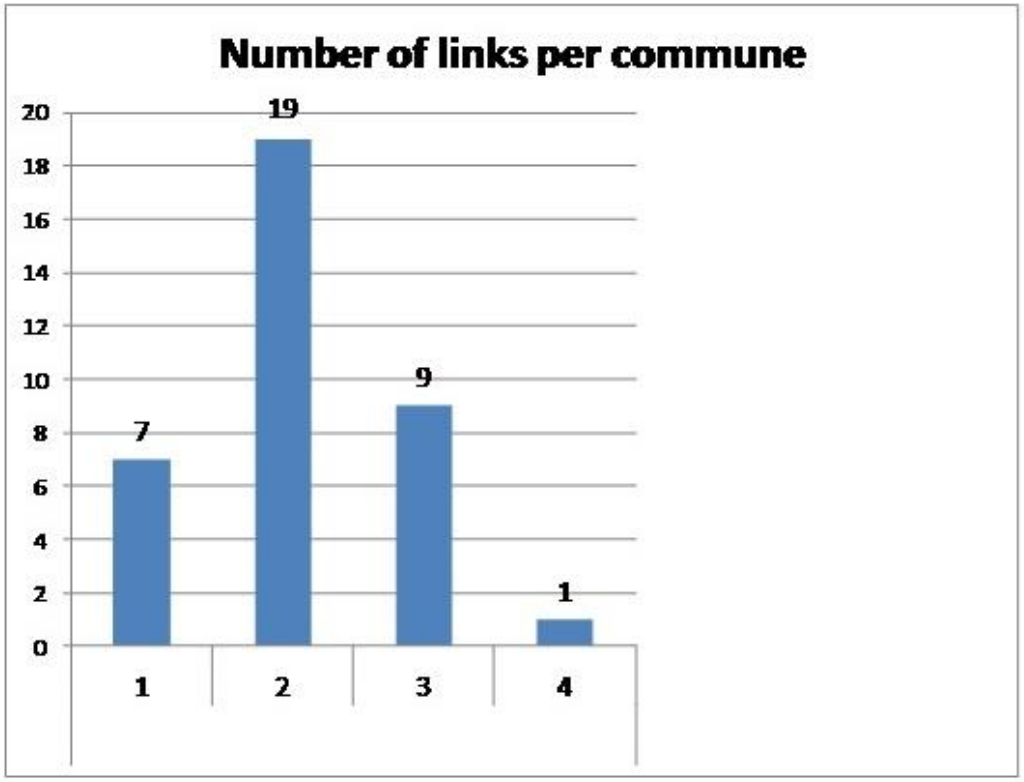
Graphic 4: Lorenz's Curve of Market Recipes

See Table 10 Annex

These results indicate that:

- There are 76 links between the 36 border communes of the Republic of Benin;
- These 76 links represent about 5% of possible crossings between these border municipalities (1296 possible crossings);
- Each border municipality has an average of 2.11 neighboring border communes;
- The neighborhood relationship is high for the municipality of Bassila which has four (04) neighboring border municipalities.

- The neighborhood relationship is very weak for 7 border communes which have only one neighboring border municipality. These are the Material, Natitingou, Grand-Popo, Sèmè-Kpodji, Malanville and Tanguiéta Communes.



Graphic 5: Distribution of the Number of links by Municipality

Assessment of the global spatial autocorrelation of TDs of Commons

Table 11: Global spatial autocorrelation of TD

Moran I Statistic	Expectation	Variance
0.12798301 statistic standard deviate = 1.0028 p-value = 0.3159	-0.02857143	0.02437111

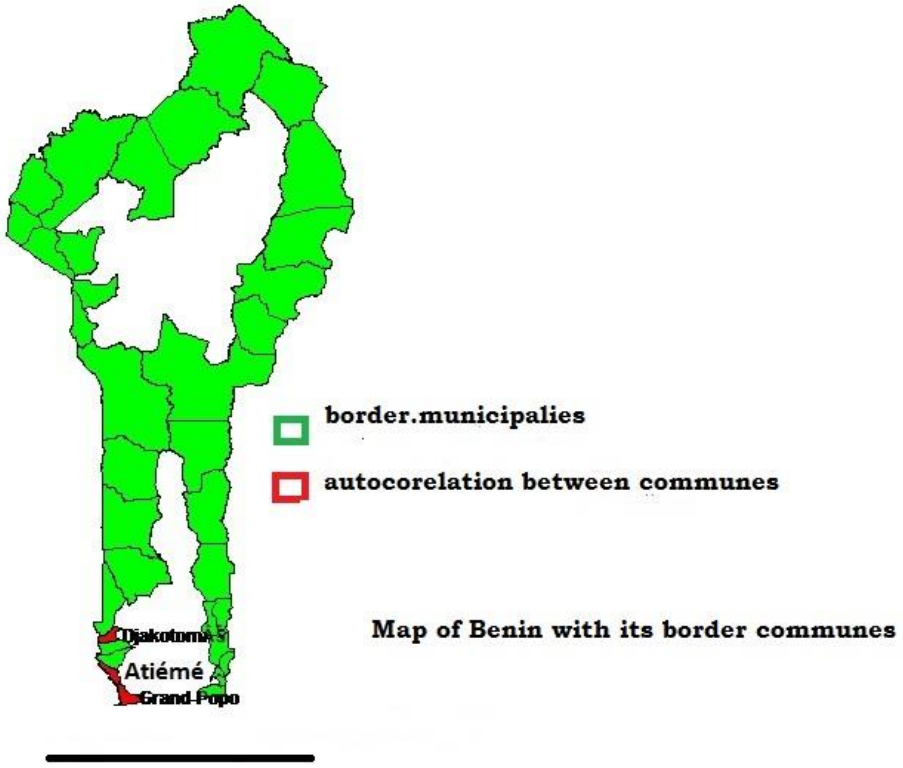
Comments

These results indicate that at the 10% threshold, the CTs of the Commons are not spatially self-correlated significantly (p-value = 0.3159). TD Commons are distributed randomly.

See Table 11

Comments

These results indicate that the communes of Djakotomey, Athiémé and Grand-Popo concentrate in their neighborhood, strong values of Taxes perceived at the customs cordon.



Assessment of the global spatial autocorrelation of the CSPs of the Communes

Tableau 12: Global spatial autocorrelation of CsP

Moran I Statistic	Expectation	Variance
0.01875153 standard deviate = 0.30313, p-value = 0.7618	-0.02857143	0.02437111

Comments

These results indicate that the global self correlation is not significant for the DSPs of the border communes.

See Table 12

Comments

These results indicate that as far as PSDs are concerned, none of the Border Communes concentrates in its neighborhood other strong or weak municipalities of PSD.

Assessment of the global spatial autocorrelation of the PLs of the Communes

Tableau 13 Global spatial autocorrelation of PL

Moran I Statistic	Expectation	Variance
-0.01259333 standard deviate = 0.10235, p-value = 0.9185	-0.02857143	0.02437111

Comments

These results indicate that the global self correlation is not significant for the PLs of the border municipalities.

See Table 13

Comments

These results indicate that as far as the PLs are concerned, none of the Border Communes concentrates in its neighborhood, other Border Communes with high or low values of PL.

Appreciation of the global spatial autocorrelation of the RRMs of the Communes

Tableau 14 Global spatial autocorrelation of RRM

Moran I Statistic	Expectation	Variance
-0.01932902 standard deviate = 0.059204, p-value = 0.9528	-0.02857143	0.02437111

Comments

These results indicate that the overall auto correlation is not significant for RRMs in the Commons.

See Table 14 in Annex

Comments

These results indicate that as far as RRMs are concerned, none of the Border Communes concentrates in its neighborhood, other strong or weak municipalities of RRM.

CONCLUSION

The aim of this work is to analyze the impact of the merchant networks of border municipalities and the spatial autocorrelation. The results show that the communes of Djakotomey, Athiémé and Grand-Popo concentrate in their neighborhood, strong values of taxes collected at the customs cordon. Ces résultats corroborent la pensée de Perroux (1961) ; Aydalot (1985) année sur le développement. Le développement émerge à des endroits précis, puis se propage et se diffus dans l'espace. Les innovations spatiales sont localisées.

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ANNEX

Table 1 : Variables used

Data used	**Components**
Operating revenue	Any item included in the operating revenue in the administrative accounts of the communes
Marchant Network Revenue Patents and Licenses	**Patents and licences**
	Border taxes
	Taxe on taxis cities
	Parking fee and parking
	Tax on boats and motorized canoes
	Provision of Services
Provision of Services, Taxes and Taxes	Taxes and Taxes Proceeds of shipments of administrative and other acts
	Royalties in urban planning and environment
	Property taxes on built and undeveloped properties
	Right to market service
	Local DevelopmentTax (TDL)
State subsidies for the operation of the FADeC communes	FADeCWorking
State	State

Source: 2015 Survey

Table 2: Result of the Modeling of Equation (i)

Variables	Coefficients	Probabilities
C	10.07993	0.0000
LOG(RRM)	0.530137	0.0000
LOG(PSIT)	-0.001494	0.9492
LOG(SEFC)	-0.008529	0.5122
R^2=0.591866;	**Prob (F-statistique)= 0.000002**	

Source: 2017, author works

Table 3: Residual Tests on the Model (i)

Test	Probabilities	Decisions
Autocorrelation ofBreusch-Godfrey	**0.9155**	**Non autocorrelation**
Hétéroscédasticity of White	**0.8745**	**Homoscédasticities**

Source: 2017, author works

Table 4: Result of modeling the equation [2]

Variables	Coefficients	Probabilities
C	6.553388	0.0000
LOG(PL)	0.558830	0,0000
LOG(DSP)	0.012442	0.1040
LOG(TD)	0.087867	0.0000
R^2=0.9240;	**Prob (F-statistique)= 0,0000**	

Source: 2017, author works

Table 5: Residual Tests on the Model [2]

Test	Probabilities	Decisions
Autocorrelation of Breusch-Godfrey	0.0299	Non autocorrelation
Hétéroscédasticity of White	0.0884	Homoscédasticity

Source: 2017, author works

Table 6: Spatial dispersion of VAT

Minimum	*3078000*
First Quartile	*5902000*
Median	*7819000*
Mean	*7711000*
Third Quartile	*9509000*
Maximum	*12070000*
Variance	*5.555974e+12*
Standard deviation	*2357111*
Coefficient of variation	*0,30568162*

Source: 2017, author works

Table 7: Spatial dispersion of DSPs

Minimum	*0*
First Quartile	*88850*
Median	*898600*
Mean	*4843000*
Thrid Quartile	*3274000*
Maximum	*63750000*
Variance	*1.316738e+14*
Standard deviation	*11474920*
Coefficient of variation	*2,36938261*

Source :2017, author works

Table 8: Spatial Dispersion of PL

Minimum	*123100*
First Quartile	*6807000*
Median	*12490000*
Mean	*25550000*
Thrid Quartile	*26330000*
Maximum	*270400000*
Variance	*2.186072e+15*
	46755446
Coefficient of variation	*1,82995875*

Source : 2017, author works

Table 9: Spatial dispersion of RRMs

Minimum	*3245000*
First Quartile	*20880000*
Median	*26910000*
Mean	*42970000*
Third Quartile	*44930000*
Maximum	*299300000*
Variance	*2.666469e+15*
Standard deviation	*51637868*
Coefficient of variation	*1,20171906*

Source : 2017, authorworks

Table 10: Results of the Contiguity Matrix (Distribution of the Number of Links)

Number of links	**1**	**2**	**3**	**4**
Nombre of Communes	**7**	**19**	**9**	**1**

Source : 2017, author works