ELECTORAL PERFORMANCE OF PARLIAMENTARIANS AND ALLOCATION OF RESOURCES IN MUNICIPALITIES: EFFECT OF INFORMAL DISTRICTS

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Abstract: This research seeks to investigate the effect produced by the vote of federal representatives elected in the states of Paraíba and Pernambuco, and their behavior regarding the presentation and execution of amendments. The data were collected in the date base of the Superior Electoral Court – TSE (2014 general elections in Brazil) and the respective legislature, using data from the amendments submitted by the referred parliamentarians in the years 2016, 2017 and 2018, data available in the database *Siga Brasil* of the Federal Senate. Through descriptive statistics, the study made it possible to expose an overview of the representatives' profile and their actions in relation to the presentation of amendments. Such analyses made it possible to consider that the distinction between amendments directed to municipalities and states, in their entirety, may be associated with the pattern of distribution of votes obtained by representatives.

Keywords: Amendments; Legislature; Representatives; Votes.

1 Introduction

There is a consolidated discussion in political science about the relationship between the type of voting of those elected to the Brazilian parliament and the incentives created to allocate resources to states and municipalities through the provision of budgetary amendments. Thus, it is called parliamentary behavior and its electoral connection and, in the field of analysis of Brazilian political institutions, it considers the existence of informal districts, because of the combination of an open list electoral system and proportional representation (AMES, 2003).

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The reference that has been used to support explanations about this empirical phenomenon called informal districts is considered between the electoral dominance of representatives in certain contiguous municipalities and their efforts to allocate resources to these locations through the budget amendments.

In view of the aspects of Brazil's electoral system that flows into the multiparty system, minority governments are shaping the political game. The alternative to prevent possible obstacles in the decision process comes from the recognition by the Executive that should expand its parliamentary base. For that, coalition formation becomes a *sine qua non* condition for political stability. Power sharing with the parties goes through several strategies, distribution of ministerial portfolios and parliamentary amendments to the Executive's budget are considered important bargaining instruments in the Executive's relationship with the Legislative (BATISTA, 2017; ABRANCHES, 2018; AMORIM NETO, 2006; PEREIRA; MUELLER, 2004).

Bertholini and Pereira (2017) created a government cost index calling attention to assumptions for the efficiency of coalition presidentialism. According to the authors, the size of the coalition, the ideological heterogeneity and the proportional allocation of power between parties make a difference in the performance of the Executive-Legislative relationship and especially in the feasibility of management by the President.

Brazilian political scientists have debated a lot about the consequences of electoral rules and the multiparty system on the behavior presented by parliamentarians (NICOLAU, 2017). It is important to remember that the literature on this topic is divided between those who claim that the sharp dispersion of power plays a big role in the institutional difficulties that the country is experiencing and defend that this dispersion only indicates that the government should be a coalition and not has determination of decision paralysis. Therefore, the importance of the parties and leaders that are part of the coalition indicates the strategies for composition of framework in the government (ABRANCHES, 2018).

Since the re-democratization of Brazil, policy scholars have focused on the power of the Legislative Branch in the execution of the Executive Branch's plans. With the 1988 Federal Constitution, parliament assumes an important place to be able to interfere in the planning and allocation of public resources. Notwithstanding, even obtaining this power gain, the way of relating to the Executive Branch determines this influence.

Studies on the effects of multipartyism in countries of democratic reconstruction such as Brazil point the way out of clashes and conflicts between the Executive and the Legislative. That is how coalition Presidentialism was called, which in an articulation, the Executive and Legislative find incentives for cooperation (ABRANCHES, 2018). Since then, the constitutional provision that authorizes individual or collective amendment allows relations between the Executive and the Legislative to be based on the trade-*off* amendments and parliamentary

support. In this sense, amendments to the Executive's budget have occupied an important place in studies on the relationship between the Executive-Legislative and on electoral performance and its power to allocate resources to its electoral bases.

Observation of the voting advantages that certain representatives present in certain municipalities are considered to describe how the votes are distributed across the territory of the federative unit. Thus, spatial distribution of the vote is the term used by the literature in political science to identify voting patterns of the representatives.

The term informal districts is used by Ames (2003) to characterize the domination or concentration of votes of representatives in a municipality or set of contiguous municipalities. In this case, although the Brazilian electoral system has a high district magnitude, the vote of representatives can assume a distribution that allows identifying strongholds.

To adopt the theories that discuss the parliamentary behavior and electoral connection, this research seeks to investigate the effect produced by the vote of the elected federal representatives (2014-2018) in the states of Paraíba and Pernambuco and their behavior regarding the presentation and execution of amendments. The choice and delimitation of the empirical field are justified because these are neighboring states belonging to the same region, socioeconomic conditions and political culture, but with particularities in relation to the quantity and size of the municipalities, details are presented in the methodology. Thus, we tried to explain, from the comparative method, similarities and differences in the distribution of votes and in the efforts of parliamentarians to allocate resources to municipalities and the state in its total territorial dimension.

The state of Paraíba has 223 municipalities, while Pernambuco has a smaller number, with 185 municipalities; however, Paraíba municipalities are largely small in population and electoral terms. In this sense, the distribution of the representative's vote was different in the two states. For Paraiba representatives, the search for votes is due to greater efforts to maximize their vote and depends on penetration in many small municipalities. The multiparty system results in a highly competitive market for electoral success, resulting in a type of dispersed-shared voting. In this case, expenditure is required to cover the entire state. The text presents a clipping from a broader research that seeks to compare the behavior of federal and state representatives that includes other states regarding their links with municipalities.

The objective of this research is to investigate how federal representatives of the referred states have used the device of amendments to the Union budget. To this end, it was sought to ascertain how the variation between amendments submitted and executed occurs and how the vote of each representative in each municipality can direct the allocation of resources.

The collected data also allowed us to observe and interpret how the distinction between amendments directed to municipalities and the state in its entirety can be associated with the distribution pattern of representative's votes. It is understood that the identification of the

weight of the municipalities in the allocation of resources is directly related to the electoral advantages of the representatives in the municipalities.

The data were collected from the Superior Electoral Court (TSE) databases, a repository of data on general elections in Brazil in 2014 (BRASIL, 2019), and the respective legislature, using data from the amendments presented by the referred parliamentarians in the years 2016, 2017 and 2018, data available at the *Siga Brasil* (Follow Brazil) database of the Federal Senate. Through descriptive statistics, the study made it possible to expose an overview of the representative's profile and their actions in relation to the presentation of amendments to the Union budget to benefit states and municipalities. The *Tabwin* program was used for making maps to identify the voting and allocation of resources to the municipalities.

2. Theoretical Reference

As the literature explains, studies on political behavior have become limited by neglecting the importance of institutions to coordinate the actions of political actors. In this sense, the criticisms led to the attempt to consider the rules of the political game as a conductive field for the unveiling of political systems, not simply at the macro level, but as arrangements that are designed by actions oriented by rationality, historical trajectories (*path dependence*) and world vision (values) of societies (HALL; TAYLOR, 2003).

In this sense, the so-called new institutionalism is born, which gains prominence in the construction of explanations in studies on the political system. The central issue in the new institutionalist approach assumes that political institutions are the result of interaction between actors and their field of activity, constituted as a political game. In this sense, the analysis of the Executive-Legislative relationship in Brazil, were based on approaches that emphasize the articulation between institutional design and the field of action of politicians. In this sense, studies on the functioning of the North American Congress have become a reference to reveal how presidentialism, as a system of separation between branches, presents proactive and reactive behaviors in the Executive-Legislative relationship. (LIMONGI, 1994).

The use of analytical tools used by legislative studies to explain the functioning of the North American Congress, started to be used in analyses on the organization and functioning of the Brazilian Congress, while preserving the peculiarities of the two realities. While North American presidentialism works with a predominance of Two-party system, there are two possibilities for the Executive-Legislative relationship: unified government or divided government[5].

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[5] The unified government corresponds to the model in which the president's party has a majority in the two Legislative Houses: House of Representatives and Senate, whereas the government divided into the President's party does not have a majority in either House or both. In the Brazilian presidentialism typical of multiparty politics, according to this perspective, the government is always divided and the coalition becomes essential.

In the Brazilian multiparty presidentialism, governance can only be guaranteed by expanding the president's base. Therefore, any prospect of reform based on the Executive's preferences will have to be negotiated. In these terms, the new institutionalist approach assumes that laws, rules and procedures are part of institutional and organizational arrangements to limit and constrain political behavior. Even if the president is ensured by broad constitutional powers, he will have to rely on congressional approval (LIMONGI, 1994).

To explain the interaction between rules, actors and the political game, new institutionalist studies on the functioning of the North American Congress, built three major strands: distributive, informational and partisan version. To this end, it explains significant differences in parliamentary behavior, namely: distributive parliamentary behavior is guided by the incentives of the electoral arena, which is committed to strengthening ties with its district, ensuring resources for carrying out works that will benefit its voters; in turn, parliamentary informational behavior is guided by the incentives of the centrality of the commissions and their decision-making power on specialized topics; already in party behavior, the party has mechanisms to control the legislative process by appointing leaders to strategic positions (LIMONGI, 1994).

The distributive version gained evidence in the studies of Mayhew (1974), because it sought to explain how parliamentarians secured their reelections. According to this distributive version, the representatives have the objective of being re-elected and to obtain success, they seek to strengthen ties with their voters. This is also because in the North American electoral system, voting is uninominal and the relationship between representatives and voters is permanent. In this case, the articulation between the electoral arena and the parliamentary arena is given directly.

Even considering other mechanisms that explain the dynamics of the decision-making process, the distributive version is interested in explaining how the parliamentarian's relationship with his/her electorate occurs. In this sense, the research presented here sought to detect how this distributive logic can be reproduced in the Brazilian political system. When taking Ames (2003) definition of informal district, it is considered that "the voting pattern of representatives can assume the following typology: dispersed-shared, dispersed-dominant, concentrated-shared and concentrated-dominant" (AMES, 2003, p. 65).

Therefore, the use of the analytical model by Ames (2003) to identify a voting pattern by the denomination of informal district will be investigated based on the votes of the federal representatives of Paraíba and Pernambuco and thus detect its articulation with the presentation and execution of the parliamentary amendments to the Union budget.

The fundamentals of the distributive version consider parliamentary behavior centralized in legislative activities that result in benefits visibly directed to its electorate or strongholds. The idea of parochial behavior comes from the relationship that representatives

establish with localities, whose connotation is equivalent to the clerical representation in their parish. This understanding also alludes to the beginnings of North American politics in which leaders distributed benefits to voters to ensure electoral success. *Pork barril*[6] behavior means the distribution of resources and benefits to specific individuals or groups to obtain electoral support.

However, one must understand types of public policies based on different implementation strategies. Borges (2010) referred to a typology associated with two dimensions of the public policy implementation process, they are: resource allocation criteria and type of benefits produced.

Thus, Borges (2010) understands that the discussion about the electoral arena, federalism and public policies can lead to different results in the empirical reality. Therefore, to explain how public policies are formulated and implemented in federal states, the reasons for the political competition that may occurs between party and local political elites and between member states, municipalities and the Union must be considered. Thus, different types reproduced are possible, as shown in Chart 1:

Chart 1 – Analysis of Electoral Arena

Type of benefit	Allocation Criteria	
	Party-political	Universalist
Private	Patronage (I)	Focus (III)
Public	Distributive (II)	Universalism (IV)

Source: Borges (2010) p. 131.

This discussion by Borges (2010) helps to understand how competition in the electoral arena can direct choices in the decision-making process. Regarding the device of the amendments to the budget, the parliamentarian's attribution to interfere in the Union Budget can be seen from the two aspects of the competition. Competition can take place between federative entities to allocate resources from the Union to take to their states and competition between local leaders to take resources to their voters. However, both types can fit into distributive behavior. They are policies, whose allocation criterion is party political, but to produce public goods.

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[6] This term alludes to the distribution of food in exchange for votes, thus making the so-called clientelist policies stand out. Nevertheless, the distributive political definition differs from clientelism by the type of goods produced. While in clientelism the resource allocation criterion is party political and the goods produced are private; in distributive politics the resource allocation criterion is party political, but the goods produced are public, non-exclusive and non-rival. This means: there is a distinction, for example, between distributing basic food baskets to a determined constituency and allocating resources to build a dam in a given municipality.

In this sense, it becomes possible the bench behavior through collective amendments through which the allocation of resources is directed to the states, as well as, the individual amendments that represent the parliamentarian's effort to bring resources to certain municipalities, as well as also for the entire state. So it remains to be seen, how this behavior can be associated with the parliamentary electoral performance according to those types of voting defined by Ames (2003). Research on the relationship between the electoral arena and the parliamentary arena in Brazil emphasizes the effects of electoral rules, such as the open list system and the excessive number of parties, in the intensification of competition established between candidates even from the same party (NICOLAU, 2017; MAINWARING, 1991).

The parliamentarian who seeks re-election may find himself/herself in an advantageous position if he can count on support from local political groups. For this, the use of parliamentary amendments to the budget has been a recurring strategy in the Brazilian parliament, because in an attempt to minimize and even cancel competition in their electoral holdings, representatives use individual amendments as a way of allocating resources to certain municipalities to meet the demands of voter groups and thus ensure the maintenance of their electoral bases, as well as the conquest of new strongholds (AMES, 2003; CARVALHO, 2003).

Ames (2003) studied the Brazilian electoral system and the pattern of political competition developed in Brazil and came to detect the main obstacles to governance in the country, focusing on the existing relations between national political institutions, especially the rules and practices of electoral and parliamentary politics and the probability of the Executive adopting the resources available to obtain support in the legislative arena to carry out actions under its government program.

Ames (2003) also considers that Brazil lives in a permanent crisis of governance, because the political institutions themselves create conditions that encourage politicians to think only about their personal gains and to concentrate their proposals and resources to a specific group of voters or to their political sponsors, as seen in the distributive version. In addition, the author points out that, although presidents have schedule power, because of the decree powers, as well as requesting urgency to vote on bills of their own, it needs a lot of skill to form a stable parliamentary majority and sustain their program of government.

In this sense, Ames (2003) considers that the institutional weakness of the electoral model and party system comes from the system itself: 1. There are important and successful electorally parties spread across the ideological spectrum; 2. Party leaders have little control over their members, and many representatives spend much of their time looking for nominations and bills of specific interest to their constituencies; 3. Brazilian parties are unlikely to come together to approve issues of national interest, and as a consequence Congress in general does not invest seriously in the most serious economic and social problems; 4. Brazilian parliamentarians have sufficient incentives to engage in personal gain. Thus, he concludes that

the concern with his personal gains is the result of institutional variables is relevant for Brazilian representatives.

The author shows that the campaign strategies used by candidates for representatives in the open list proportional representation system are adopted to win votes in municipalities. The budget amendments proposed by representatives during their legislature can prove to be an efficient resource to ensure votes necessary for their re-election. This research used this model of analysis to ascertain the articulation between the electoral arena and the legislative arena and the use of the device of amendments to the Union budget by the states of Paraíba and Pernambuco in the National Congress.

Although there is a range of studies on this articulation between the electoral arena and the parliamentary arena, this way of explaining the behavior of parliamentarians has generated debate and disagreement among authors of Brazilian political science. Another way of interpreting this articulation comes from another interpretation of the incentives for cooperation in the parliamentary arena to the detriment of the individualistic behavior of the electoral arena. This interpretation gains centrality with the works of Figueiredo; Limongi (1996; 1999; 2002). According to these authors, legislative work is organized based on party logic, so that distributive policies have limited scope. Nevertheless, the provisions of parliamentary amendments are considered the window of opportunity for parliamentarians to enter into negotiations with the Executive branch to make the demands of their allies and voters viable.

The presentation and possible execution of the amendments are part of the strategies to establish electoral support and maintain its bases in subsequent elections. Pereira; Mueller (2002; 2003) consider that the main importance of individual amendments to the budget is due to their effects on future votes. Thus, they demonstrated that the executions of the amendments had positive effects in the re-election of the parliamentarian.

Carvalho (2003) discusses this theme of the articulation between the electoral arena and the parliamentary arena, making some considerations. With regard to the amendments devices it tests hypotheses based on the distributive model and concludes that the constitutions of varied formation will provide different incentive structures for representatives, which will, as a result, privilege different objectives in the legislative arena (CARVALHO, 2003, p. 24).

The spatial distribution or geography of the vote can be summarized as follows: a) although the Executive is assured by strong constitutional powers and with the possibility of articulation in the college of leaders and constitutes a centralized internal structure of the Legislative, this institutional design is not sufficient to create a barrier of connection between parliamentary arena and electoral arena; b) in Brazil, there are several incentives coming from the electoral arena; thus, there is a multiplicity of design of the electoral connection in the country, that is, there are realities that point towards parochialism in others towards legislative universalism; c) the spatial distribution of the vote has strong incentives to define the legislators'

strategies to ensure re-election, showing the nature of the degree of competitiveness of the political market in which they operate e; d) the distributive model for the situation in Brazil has limitations, due to the diversity of electoral connection that exists here, therefore, it is not possible to explain the Brazilian legislative behavior only from the distributive perspective nor from the party monopoly.

Based on the studies carried out on the theme, this research presented here did not aim to understand the reasons for the reelection of parliamentarians, but to investigate to what extent the federal representatives of Paraíba and Pernambuco have been using the constitutional provisions to allocate resources to the municipalities. Through individual budget amendments and how this behavior can be associated with election results for the same legislature. For this, the following is a descriptive analysis of the data obtained.

3. Methodology

The research makes a descriptive analysis on the relationship between the vote of federal representatives in the municipalities and the presentation/execution of parliamentary amendments to the Union budget. For this purpose, research work was carried out on secondary sources and made it possible to design the parliamentary behavior of representatives from the states of Paraíba and Pernambuco regarding the use and destination of resources obtained through individual budget amendments.

The sources of research on electoral results were the databases of the TSE repository and *Siga Brasil* Budget Portal of the Federal Senate, whose information concerns the characteristics of the candidates and their votes in all municipalities in Paraíba and Pernambuco and information about all amendments presented by each parliamentarian during the legislature analyzed. For data treatment, descriptive statistics and maps of states were used, identifying the vote of each federal representative in each municipality and directing resources through amendments.

The maps were made using the *Tabiwn* software and allow identifying the percentage of the representative's vote in each municipality, using variation of the vote through colors, which vary between municipalities that appear without coloring, indicating zero vote, to municipalities that appear with variation in color intensity, indicating an increasing form in the percentage of voting. The allocation of resources was identified through circles that vary in size in an increasing way according to the number of amendments.

The research makes use of the comparative method (LANDMAN, 2003) using few cases to identify similarities and differences between the spatial distribution of the vote and the distribution of individual parliamentary amendments to the Union budget. The analysis allowed comparisons to be made between the performances of representatives from the same state, as

well as between the states analyzed. The delimitation of the empirical field is summarized in Table 1 and shows data stratified by number of municipalities by size of electorate and Municipal Human Development Index (MHDI).

Table 1 – Number of Municipalities by voter range 2019 – Paraíba and Pernambuco

	Medium MHDI	PB Municipalities	%	PB Voters	%	Medium MHDI	PE Municipalities	%	PE Voters	%
Up to 10,000 voters	0,581	157	70,4	784.489	27,8	0,583	37	20	287.221	4,33
From 10,001 to 60,000 voters	0,604	61	27,8	1.081.329	37,3	0,590	132	73	3.004.228	45,3
From 60,001 above voters	0,692	5	2,24	1.030.630	35,6	0,680	16	8,64	3.342.535	50,4
Total	0,625	223	100	2.896.448	100	**0,617**	185	100	6.633.984	100

Source: Prepared by the author, 2020, from data (BRASIL, 2019) and *Atlas do Desenvolvimento Humano no Brasil* (Atlas of Human Development in Brazil) – PNUD.

4 Results and discussion

4.1 Electoral performance and presentation and budget amendments of federal representatives from Paraíba and Pernambuco

Before delineating the framework of the federal legislature of the states of Paraíba and Pernambuco, data on the main characteristics of each parliamentarian are presented. In relation to the federal representatives elected in 2014, shown in tables 2 and 3, the coalitions were responsible for the victorious majority. This demonstrates that in the Brazilian multiparty system, in proportional representation elections, coalitions are the safest way to obtain electoral success. However, they can have damaging effects on the meaning of political representation (NICOLAU, 2017).

Regarding the data for the state of Paraíba, Table 2, only those elected by the *Partido do Movimento Democrático Brasileiro* (Brazilian Democratic Movement Party) - PMDB party presented isolated candidacies. The coalitions that had the *Partido Social Democrático* (Social Democratic Party) - PSB and *Partido da Social Democracia Brasileira* (Brazilian Social Democracy Party) - PSDB, significant acronyms in the state representation, formed alliances composed of 11 and 14 parties, respectively, were successful, conquering a significant number

of federal representatives. This is a fact that explains the strategy of coalitions for small parties that do not reach the electoral quotient.

Table 2 – Federal representatives elected in 2014 in Paraíba

Representative	Party	Elected by*	Coalition
Aguinaldo Veloso Borges Ribeiro	Progressive Party	Elected by QP	PSB / DEM / PRTB / PDT / PRP / PV / PT / PSL / PC do B / PHS / PPL
Benjamim Gomes Maranhão Neto	Solidarity	Elected by average	PSDB / PEN / PR / PTB / PSD / SD / PMN / PPS / PT do B / PTN / PRB / PSDC / PSC / PP
Damião Feliciano da Silva	Democratic Labor Party	Elected by average	PSB / DEM / PRTB / PDT / PRP / PV / PT / PSL / PC do B / PHS / PPL
Efraim de Araújo Morais Filho	Democrats	Elected by QP	PSB / DEM / PRTB / PDT / PRP / PV / PT / PSL / PC do B / PHS / PPL
Hugo Mota Wanderley da Nóbrega	Brazilian Democratic Movement Party	Elected by QP	PMDB
Luiz Albuquerque Couto	Labor Party	Elected by QP	PSB / DEM / PRTB / PDT / PRP / PV / PT / PSL / PC do B / PHS / PPL
Manoel Alves da Silva Júnior	Brazilian Democratic Movement Party	Elected by average	PMDB
Pedro Oliveira Cunha Lima	Brazilian Social Democracy Party	Elected by QP	PSDB / PEN / PR / PTB / PSD / SD / PMN / PPS / PT do B / PTN / PRB / PSDC / PSC / PP
Rômulo José de Gouveia	Social Democratic Party	Elected by QP	PSDB / PEN / PR / PTB / PSD / SD / PMN / PPS / PT do B / PTN / PRB / PSDC / PSC / PP
Veneziano Vital do Rego segundo Neto	Brazilian Democratic Movement Party	Elected by QP	PMDB
José Wellington Roberto	Republic Party	Elected by QP	PSDB / PEN / PR / PTB / PSD / SD / PMN / PPS / PT do B / PTN / PRB / PSDC / PSC / PP
José Wilson Santiago Filho	Brazilian Labor Party	Elected by QP	PSDB / PEN / PR / PTB / PSD / SD / PMN / PPS / PT do B / PTN / PRB /

			PSDC / PSC / PP

* They assume the following nomenclatures: QP = Party Quotient; EM= Elected by average; EL= Elected by roll-call vote; SP= Substitute who is taking office in the current legislature.

Table 2 showed how coalitions became a common artifice in the desire to maximize the candidates' vote without worrying about schedule affinities from the ideological spectrum. This configuration of coalitions in applications by proportional rules came to be seen as a focal point to give meaning to the difficulties of representation (NICOLAU, 2017). In this case, the design of excessive multipartyism came to be seen as problematic and feasible to change. In these terms, the criticisms produced a desired effect, the prohibition of coalitions in elections for the House of Representatives and other legislative houses of the states and municipalities came in handy.

Regarding the state of Pernambuco, Table 3, no party presented an isolated candidacy, with the majority of representatives elected, 18 out of 25 by the coalition headed by the PSB, with only 7 representatives from other coalitions being left out. This means that the coalition with a strong presence of the PSB is justified by the command of its expressive leadership of the Former Governor Eduardo Campos, in the 2014 elections, as it reaches a significant bench, reaching to occupy 72% of the total number of seats in the state in Congress.

Table 3 – Federal representatives elected in 2014 in Pernambuco

Representative	Party	Elected by *	Coalition
Adalberto Cavalcanti Rodrigues	Brazilian Labor Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B
André Carlos Alves de Paula Filho	Social Democratic Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Anderson Ferreira Rodrigues	PR	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Heberte Lamark Gomes da Silva	Brazilian Social Democracy Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC

Bruno Cavalcanti de Araújo	Brazilian Social Democracy Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Daniel Pires Coelho	Brazilian Social Democracy Party		PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Danilo Jorge de Barros Cabral	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Eduardo Henrique da Fonte de Albuquerque Silva	Progressive Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Fernando Coelho Filho	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Felipe Augusto Lyra Carreras	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Luiz Gonzaga Patriota	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Jarbas de Andrade Vasconcelos	Brazilian Democratic Movement Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
João Fernando Pontual Coutinho	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC

Jorge Wicks Côrte Real	Brazilian Labor Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B
Kaio César de Moura Maniçoba Ferraz	Humanist Solidarity Party	Elected by QP	PSDC / PTN / PRP / PSL / PHS / PRTB
Luciana Barbosa de Oliveira Santos	PC do B	Elected by Average	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Marinaldo Rosendo de Albuquerque	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
José Mendonça Bezerra Filho	Democrats	Elected by Average	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Francisco Eurico da Silva	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Ricardo Teobaldo Cavalcanti	Brazilian Labor Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B
Sebastião Ignácio de Oliveira Júnior	Republic Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Silvio Serafim Costa	Christian Social Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B
Francisco Tadeu Barbosa de Alencar	Brazilian Socialist Party	Elected by QP	PSB / PMDB / PC do B / PV / PR / PSD / PPS / PSDB / SD / PPL / DEM / PROS / PP / PEN / PTC
Wolney Queiroz Maciel	Democratic Labor Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B
Zeca Cavalcante	Brazilian Labor Party	Elected by QP	PTB / PT / PSC / PDT / PRB / PT do B

Source: Electoral Superior Court, 2019.

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* They assume the following nomenclatures: QP = Party Quotient; EM= Elected by average; EL= Elected by roll-call vote; SP= Substitute who is taking office in the current legislature.

Tables 4 and 5 below show an overview of the number of legislatures by number of federal representatives in the two states analyzed. This demonstration allows us to see how the reelection of representatives from Paraíba in the 2014 elections appears with greater visibility. The Pernambuco bench has a significant renovation rate approaching half.

Table 4 – Number of Legislatures of the Paraíba representative's

Number of Legislatures	Number of Federal Representatives	%
1	2	16,6%
2	4	33,33%
3	3	25%
4	2	16,6%
5	1	8,33%

Source: Electoral Superior Court, 2019.

Tables 4 and 5 represent the number of legislatures per representative. It is noted that there are a variety of representative with more than one legislature. The data reveal that there is a difference between the two states, in terms of bench innovation. While the Paraíba bench showed approximately 17% in the novice rate in the House of Representatives, the Pernambuco bench showed a 44% rate.

Table 5 – Number of Legislatures of Pernambuco representative's

Number of Legislatures	Number of Federal Representatives	%
1	11	44%
2	5	20%
3	6	24%
5	2	8%
7	1	4%

Source: Electoral Superior Court, 2019.

In turn, there are a variety of candidates seeking re-election in the Federal Legislative Branch, state of Paraíba 58% of the elected federal representatives represent those who occupy between the second and third legislatures. While the rate of more experienced parliamentarians, being representatives in 4 legislatures, also reaches approximately 17%. Regarding the data from Pernambuco, the trajectory of the legislative experience varies, that is, those

representatives who occupied between the second and third legislatures also represent 44% of the bench.

Thus, it can be said that the majority of the bench in Paraiba already occupied seats in previous legislatures, ranging from 2 to 5 legislatures. Regarding the Pernambuco bench, as the novice rate represented a considerable percentage of 44%, that is, of the 25 representatives elected in 2014, 11 occupied a seat in the House of Representatives for the first time, so 56% of the Pernambuco representatives already held legislative experience ranging from 2 to 7 legislatures.

4.2 Individual amendments of representatives from Paraíba and Pernambuco

The power to change the Union's budget is one of the significant changes that the 1988 Constitution brought to rescue the strategic place of the Legislative Branch in the allocation of resources to other entities of the federation, be they, states or municipalities. In this sense, the research sought to visualize how the state benches of Paraíba and Pernambuco to make the interests of its voters viable have used this device.

In this sense, it was possible to detect the intensity in the use of this device by the parliamentarians of the Paraiba and Pernambuco benches and their spatial distribution. In the same way, it was possible to find out how these amendments can be linked to the vote of representatives in the municipalities and throughout the state.

Tables 6 and 7 show the amounts of individual amendments to the budget of each federal representatives in the two states analyzed, in which it can be seen that the device of the amendments is widely used by the two benches of the two states. However, there are fluctuations between presentation and execution, this means that the presentation does not always result in the allocation of resources to the federal entities [7].

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[7] The imposing budget represents today a conquest of the Legislative Branch that managed to force the Executive to execute the amendments presented by the parliamentarians.

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Table 6 – Total amendments submitted and executed by representative/year Paraíba[8]

Representative's name	Total amendments submitted			Triennial Total	Total amendments made			Triennial Total
	2016	2017	2018		2016	2017	2018	
Aguinaldo Ribeiro	10	7	11	**28**	7	7	11	**25**
Benjamim Maranhão	15	10	12	**37**	13	10	12	**35**
Damião Feliciano	25	7	20	**52**	16	7	20	**43**
Efraim Filho	21	12	18	**61**	20	12	18	**50**
Hugo Mota	12	5	10	**27**	6	5	10	**21**
Luiz Couto	18	12	22	**52**	15	11	22	**48**
Manoel Júnior	9	16	0	**25**	9	16	0	**25**
Pedro Cunha Lima	24	9	21	**54**	20	9	21	**50**
Rômulo Gouveia	21	8	13	**42**	19	8	13	**40**
Veneziano Vital	18	0	20	**38**	14	0	20	**34**
Wellington Roberto	20	16	15	**51**	10	15	15	**40**
Wilson Filho	17	8	15	**40**	12	8	15	**35**
Total				**507**				**446**

Source: Siga Brasil – (BRASIL, 2019).

Table 6 demonstrates the frank use of amendments by all parliamentarians in Paraíba throughout the triennium term of the legislature. Of the total amendments individually by all parliamentarians resulted in 507 presented and 446 executed, a significant number. That is, in the subtraction operation between presentation and execution in relative terms it reaches the level of 12%, while 88% of the total amendments of all parliamentarians allocated resources in state and municipalities. This proves to be a valuable tool for elected officials to strengthen ties with voters. Table 7 referring to the feasibility of amendments by federal representatives from Pernambuco, the data reveal similarities, 898 presented, 767 were executed, reaching the mark of 85%.

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[8] It is worth mentioning that the Executive Branch presents the planning of the annual Budget in a year that precedes its execution. In this sense, the parliamentarians elected in 2014 presented and voted on the budget proposal for the years 2016, 2017 and 2018.

Table 7 – Total amendments submitted and executed by representative/year Pernambuco

Representative's name	Total amendments submitted			Triennial Total	Total amendments made			Triennial Total
	2016	2017	2018		2016	2017	2018	
Adalberto Cavalcanti	15	7	16	**38**	14	7	16	**37**
André de Paula	0	11	17	**28**	0	8	16	**24**
Anderson Ferreira	9	7	0	**16**	9	6	0	**15**
Betinho Gomes	19	4	15	**38**	11	3	10	**24**
Bruno Araújo	15	3	4	**22**	14	3	4	**21**
Daniel Coelho	10	6	12	**28**	9	4	11	**24**
Danilo Cabral	0	12	13	**25**	0	8	13	**21**
Eduardo da Fonte	12	20	15	**47**	11	13	13	**37**
Fernando Coelho Filho	10	6	11	**27**	8	6	11	**25**
Felipe Carreras	0	0	16	**16**	0	0	15	**15**
Gonzaga Patriota	23	23	20	**66**	17	21	19	**57**
Jarbas Vasconcelos	8	9	16	**33**	7	6	15	**28**
João Fernando Coutinho	18	12	12	**42**	13	8	12	**33**
Jorge Côrte Real	23	25	24	**72**	20	14	23	**57**
Kaio Maniçoba	14	14	11	**39**	13	12	11	**36**
Luciana Santos	25	23	22	**70**	17	17	20	**54**
Marinaldo Rosendo	12	17	12	**41**	11	14	11	**36**
Mendonça Filho	6	0	8	**14**	6	0	8	**14**
Pastor Eurico	5	11	10	**26**	5	11	9	**25**
Ricardo Teobaldo	8	8	11	**27**	7	7	11	**25**
Sebastião Oliveira	0	0	0	**0**	0	0	0	**0**
Silvio Costa	25	20	24	**69**	24	16	24	**64**
Tadeu Alencar	21	19	13	**53**	20	14	13	**47**
Wolney Queiroz	12	9	8	**29**	5	9	7	**21**
Zeca Cavalcanti	13	12	7	**32**	10	10	7	**27**
Total				**898**				**767**

Source: Siga Brasil – (BRASIL, 2019).

However, the data indicate that this difference has no pattern, because the amendments of each parliamentarian have been implemented more for years and years that are less implemented, this for the two empirical fields of analysis.

The data in Tables 8 and 9 show the number of amendments made by the Executive that were presented individually by each representative each year. In the two benches, the individual amendments were widely used.

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Table 8 - Number of budgetary amendments made per representative/year Paraíba

Representative	Party	Year			Total	Average	Detour
		2016	2017	2018			
Aguinaldo Ribeiro	PP	07	07	11	25	8,33	1,78
Benjamim Maranhão	PSB	13	10	12	35	11,67	1,11
Dr. Damião	PDT	16	07	20	43	14,33	4,89
Efraim Filho	Democrats	20	12	18	50	16,67	3,11
Hugo Mota	PMDB	06	05	10	21	7	2,00
Luiz Couto	PT	15	11	22	48	16	4,00
Manoel Júnior	PMDB	09	16	00	25	8,33	5,56
Pedro Cunha Lima	PSDB	20	09	21	50	16,67	5,11
Rômulo Gouveia	PSD	19	08	13	40	13,33	3,78
Veneziano Vital	PMDB	14	00	20	34	11,33	7,56
Wellington Roberto	PR	10	15	15	40	13,33	2,22
Wilson Filho	PTB	12	08	15	35	11,67	2,44

Source: Siga Brasil – (BRASIL, 2019).

Nevertheless, considering the three years, recorded in Tables 8 and 9, there is variation in the average of the amendments of each parliamentarian that were executed. In the totality of the three years of the legislature in the bench of Paraíba the average of the amendments of the representatives varies between 7 and 17, approximately. The average variation in the Pernambuco bench assumes values between 5 and 19.

Table 9 - Number of budgetary amendments made per representative/year Pernambuco

Representative	Party	Year			Total	Average	Detour
		2016	**2017**	**2018**			
Adalberto Cavalcanti	PTB	14	07	16	37	12,33	3,56
André de Paula	PSD	00	08	16	24	8	5,33
Anderson Ferreira	PR	09	06	00	15	5	3,33
Betinho Gomes	PSDB	11	03	10	24	8	3,33
Bruno Araújo	PSDB	14	03	04	21	7	4,67
Daniel Coelho	PSDB	09	04	11	24	8	2,67
Danilo Cabral	PSB	00	08	13	21	7	4,67
Eduardo da Fonte	PP	11	13	13	37	11,67	0,89
Fernando Coelho Filho	PSB	08	06	11	25	8,33	1,78
Felipe Carreras	PSB	00	00	15	15	5	6,67
Gonzaga Patriota	PSB	17	21	19	57	19	1,33
Jarbas Vasconcelos	PMDB	07	06	15	28	9,33	3,78
João Fernando Coutinho	PSB	13	08	12	33	11	2,00
Jorge Côrtes Real	PTB	20	14	23	57	19	3,33
Kaio Maniçoba	PHS	13	12	11	36	12	0,67
Luciana Santos	PC do B	17	17	20	54	18	1,33
Marinaldo Rosendo	PSB	11	14	11	36	12	1,33
Mendonça Filho	DEM	06	00	08	14	4,67	3,11
Pastor Eurico	PSB	05	11	09	25	8,33	2,22
Ricardo Teobaldo	PTB	07	07	11	25	8,33	1,78
Sebastião Oliveira	PR	00	00	00	0	0	0,00
Silvio Costa	PSC	24	16	24	64	21,33	3,56

Tadeu Alencar	PSB	20	14	13	47	15,67	2,89
Wolney Queiroz	PDT	05	09	07	21	7	1,33
Zeca Cavalcante	PTB	10	10	07	27	9	1,33

Source: Siga Brasil – (BRASIL, 2019).

Graph 1 shows a percentage difference in the allocation of individual budgetary amendments for federal representatives in Paraíba. The data call attention to a significant difference between amendments aimed at municipalities and states in the two empirical fields analyzed.

The results of Paraíba indicate that there is a preponderance of amendments destined to the state federative entity, this means that, in Graph 1, 63% of the individual amendments of Paraiba's parliamentarians were destined for the state, without specification to municipal entities, while 37% were destined directly for certain municipalities.

Graph 1 – Percentage difference between amendments of municipalities and the state of Paraíba
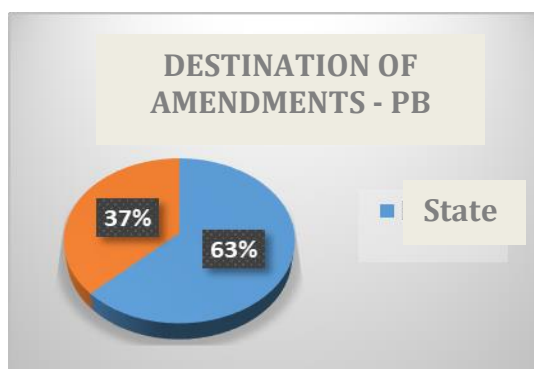
Source: Superior Electoral Court, 2019.

The results of Pernambuco follow the same logic, Graph 2, indicates that 68% of individual budget amendments were directed to the state entity and 32% to certain municipalities. These findings are significant for reflection on the influence of Paraiba and Pernambuco parliamentarians in municipalities based on budgetary amendments. The data suggest that the perspective of connection between the electoral arena and the parliamentary arena for the two empirical fields analyzed based only on parliamentary amendments is not verified. In the next session, maps are presented to superimpose the percentage range of the vote of each representative in each municipality and the allocation of amendments.

Graph 2 – Percentage difference between amendments of municipalities and the state of Pernambuco
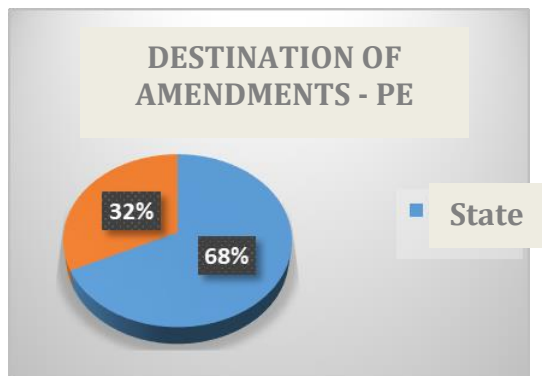
Source: Superior Electoral Court, 2019.

In this sense, it becomes possible to better visualize the electoral connection and the device of the individual amendments of the federal representatives of Paraíba and Pernambuco. From the graphs above, it was possible to raise other questions about distributive behavior in Congress. The parochialism of the representatives of the two states from the amendments is not mostly related to the federal municipal entity, but state.

The willingness to allocate amendments directly to municipalities has less evidence. These data can be related to the type of vote of each representative, which in the typology of Ames (2003), can assume the dispersed-shared type. This type of voting corresponds to the electoral result of candidates who had an extended vote across the state and shared votes with other contestants. These cases imply a very competitive electoral arena.

4.3 Spatial distribution of votes and allocation of resources in municipalities

This session sought to present how the individual vote of each representative in each municipality can be viewed by percentage range of votes and how the amendments intended for the municipalities can be identified. Maps of Paraíba and Pernambuco were prepared for each representative through which it is possible to verify the existence of voting patterns and allocation of amendments for the municipalities.

It is worth noting that although the state of Paraíba is smaller in territorial and population terms, it has more municipalities than the state of Pernambuco, 223 and 185 respectively. Paraíba, therefore, has a larger number of small municipalities. This may explain the difference between the type of voting of federal representatives, dispersed or concentrated, because small municipalities represent less electoral magnitude, the candidate to be elected needs to encompass a larger territorial extension, thus having a greater propensity to disperse voting.

Although the survey produced maps for all representatives, only a few examples are presented for the two states. The choice of representatives was due to the number of amendments, the difference in the distribution of votes and the role of the parliamentarian in the

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two legislative and electoral arenas. The colored regions of the maps correspond to the municipalities where the representative had a vote, so the darker the region the greater the vote. White regions, on the other hand, correspond to municipalities where there was no vote. The amendments are identified by orange circumference, the larger the circle, the greater the number of amendments to that municipality.

Maps 1, 2, 3, 4, and 5 present data on the spatial distribution of the vote and allocation of amendments by parliamentarians in the state of Paraíba. In map 1, referring to the articulation between the vote of representative Aguinaldo Ribeiro (PP) and its amendments, it can be said that there is a tendency to the type of dispersed-shared voting, but containing white regions on the map that present zero votes in some municipalities. Regarding the destination of the amendments, the said representative did not allocate amendments to municipalities where he had a higher percentage of voting, corresponding to darker regions of the map. Thus allocating amendments even to the municipality where there was no vote.

Map 1 - Paraíba – Spatial distribution of the vote and allocation of amendments by representative Aguinaldo Ribeiro (PP).
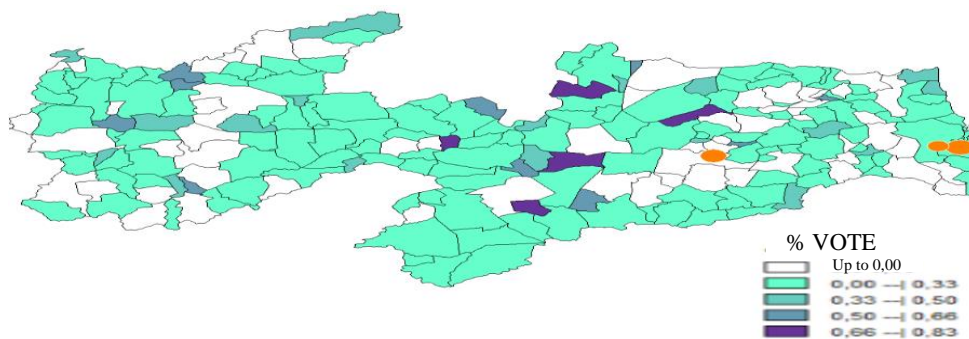
Source: Own elaboration, 2019, based on data (BRASIL, 2019).

On the map 02, referring to the articulation between voting by representative Pedro Cunha Lima (PSDB), there is distinction in the type of voting as well as in the allocation of amendments. The representative has a dispersed-shared vote in almost all the territory of Paraíba and allocated amendments in a dispersed way for municipalities with the highest vote, concentrating a greater amount of amendments for a given region, such as the municipality of Campina Grande and its surroundings

Map 2 – Paraíba - Spatial distribution of the vote and allocation of amendments by representative Pedro Cunha Lima (PSDB).
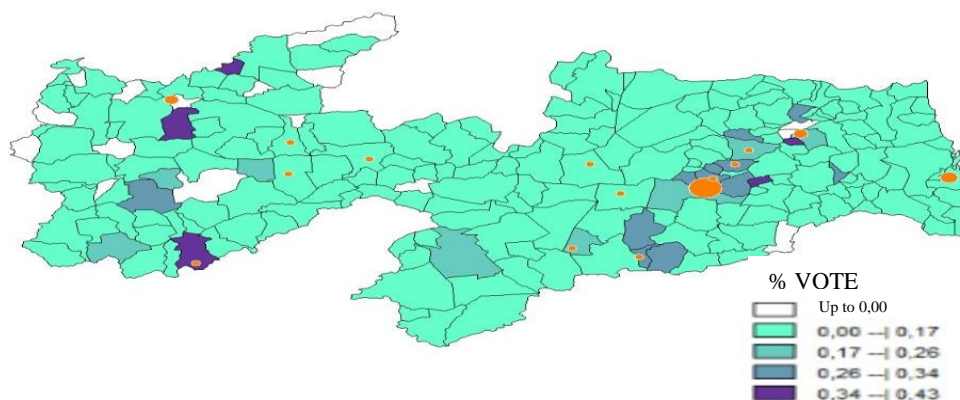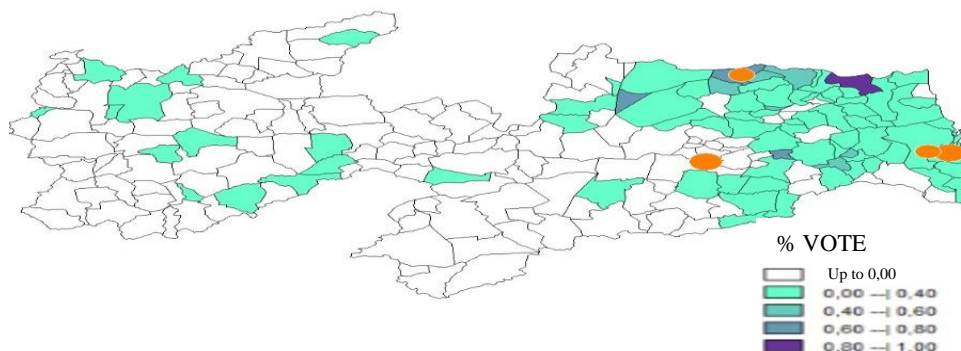

Source: Own elaboration, 2019, based on data (BRASIL, 2019).

On the map 03, referring to the articulation between the vote of representative Benjamin Maranhão (PSB), the distribution of the vote differs from the two previous maps, there is a part of the map of contiguous municipalities where the representative has greater distribution.

However, it does not correspond to the darkest regions and many municipalities where the representative had zero vote. Regarding the allocation of amendments, there is a municipality where Benjamin Maranhão had the highest percentage of votes and did not allocate amendments. Meanwhile, he allocated to the capital where he represents the largest electoral college and which also had a vote. This type of allocation for the largest municipality in the state was also the tendency of representative Aguinaldo Ribeiro and different from the allocation of representative Pedro Cunha Lima, which had a more dispersed vote, but also destined amendments to the metropolitan region, without a doubt, due to the importance of the electoral magnitude.

Map 3- Paraíba - Spatial distribution of the vote and allocation of amendments by representative Benjamin Maranhão (PSB)
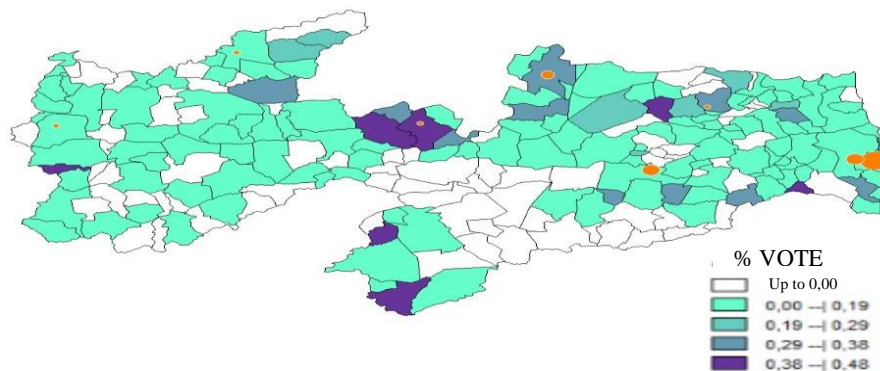

Source: Own elaboration, 2019, based on data (BRASIL, 2019).

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On the maps 4 and 5, related to the articulation between the votes of representatives Efraim Filho (DEM) and Luiz Couto (PT) and the amendments, they have many similarities and some differences. The representatives presented a disperse-shared vote, but Luiz Couto's (PT) vote was more comprehensive, with few white regions on the map.

Regarding the distribution of amendments, there are also similarities, representatives allocated to municipalities where they voted, directing a large part to the metropolitan region, represented by the size of the orange circle in the central east region of the map.

Map 4 - Paraíba - Spatial distribution of the vote and allocation of amendments by representative Efraim Filho (DEM).

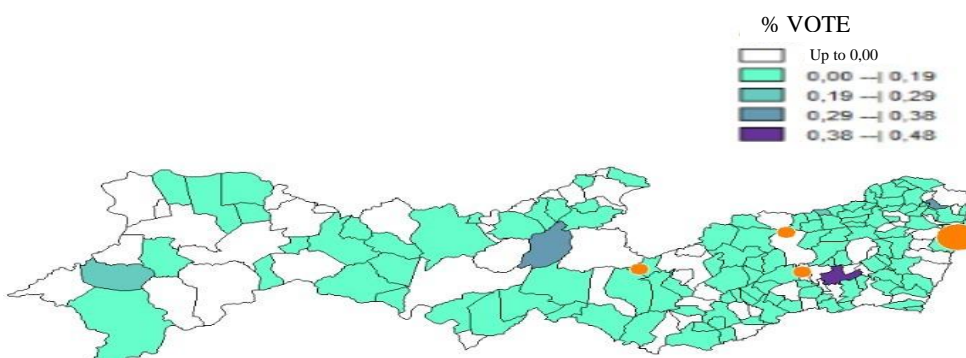**Source:** Own elaboration, 2019, based on data (BRASIL, 2019).

Map 5 - Paraíba – Spatial distribution of the vote and allocation of amendments by representative Luiz Couto (PT).
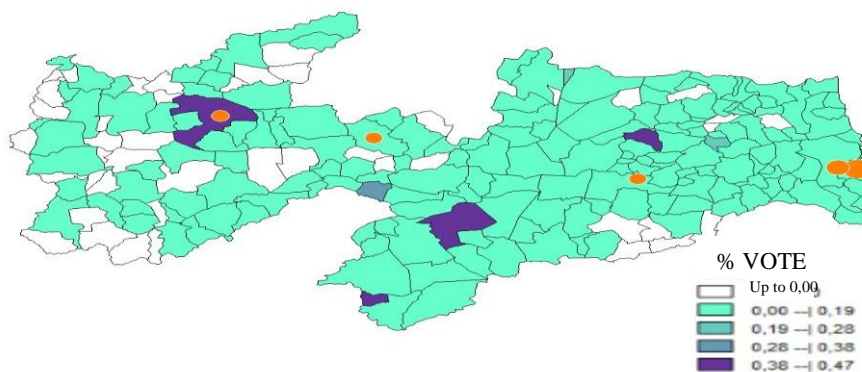
Source: Own elaboration, 2019, based on data (BRASIL, 2019).

These five maps presented, on the state of Paraíba, demonstrate different types of spatial distribution of the vote, as well as different types of resource allocation for the municipalities of Paraíba. Maps 6 and 7, referring to the articulation between voting by representatives and amendments in the state of Pernambuco, allow observing different realities between the performance of representative Fernando Coelho (PSB) and Jarbas Vasconcelos (PMDB).

It can be seen that in the first case, there is a type of voting more concentrated in some distant regions and concentration of amendments to the southwest region with the highest vote, specifically, to the municipality of Petrolina, the representative's electoral base. In the second case, the representative's vote is more dispersed, but with zero voting regions.

In this case, there is also a distinction in the allocation of amendments, representative Jarbas Vasconcelos, distributed most of the amendments to the metropolitan region, where he started his political trajectory and had a shared vote, but he also did not allocate to regions where he obtained a higher percentage of voting, allocating up to amendments to zero vote region.

Map 6 – Pernambuco - Spatial distribution of the vote and allocation of amendments by representative Fernando Coelho (PSB).
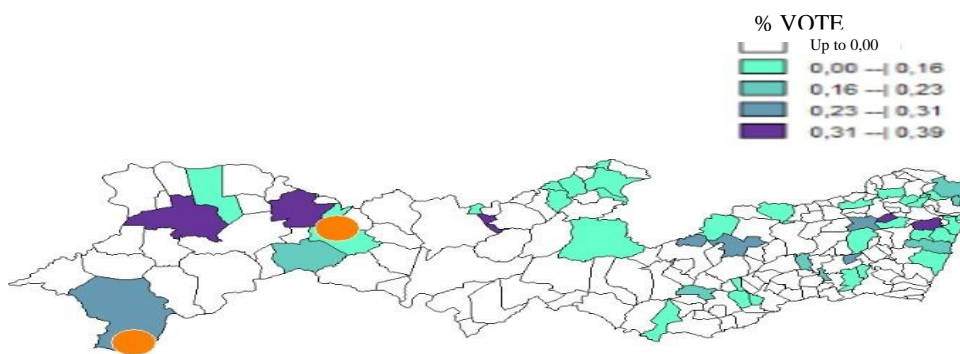
Source: Own elaboration, 2019, based on data (BRASIL, 2019).

It is worth noting that Pernambuco, as it has electoral magnitude and larger municipalities, the candidates' strategies, in relation to Paraíba, are different because they allow the candidate to seek votes in specific regions.
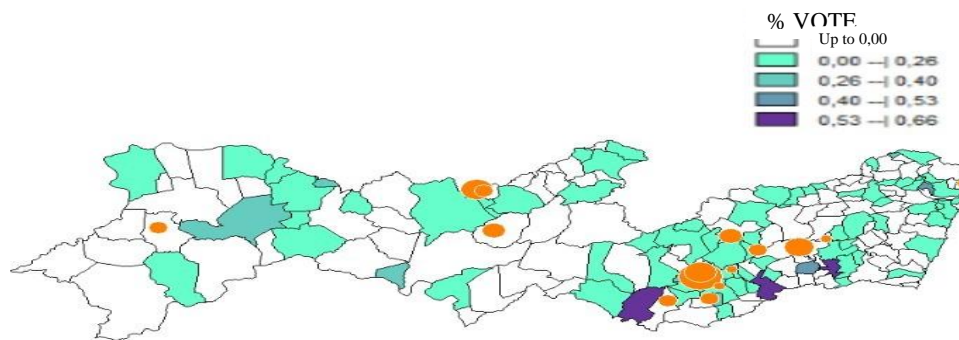
Map 7 – Pernambuco - Spatial distribution of the vote and allocation of amendments by representative Jarbas Vasconcelos (PMDB)

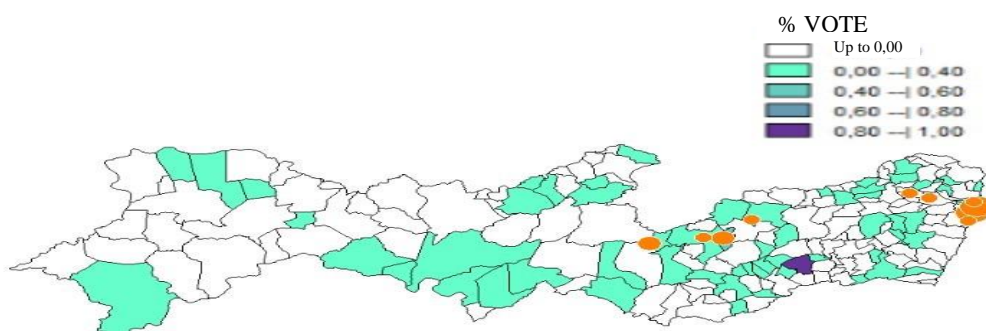**Source:** Own elaboration, 2019, based on data (BRASIL, 2019).

In this sense, the maps demonstrate that the vote of Pernambuco representatives would be closer to the denomination of informal districts, but even so, it still presents weakness as predominant empirical evidence. There are cases in which representatives even receiving a vote in certain regions do not intend amendments, and, in contrast, the allocation to regions where they did not vote. On the maps 8, 9 and 10, about the state of Pernambuco, it is possible to visualize this phenomenon.

Map 8 – Pernambuco - Spatial distribution of the vote and allocation of amendments by representative Silvio Costa (PSC).
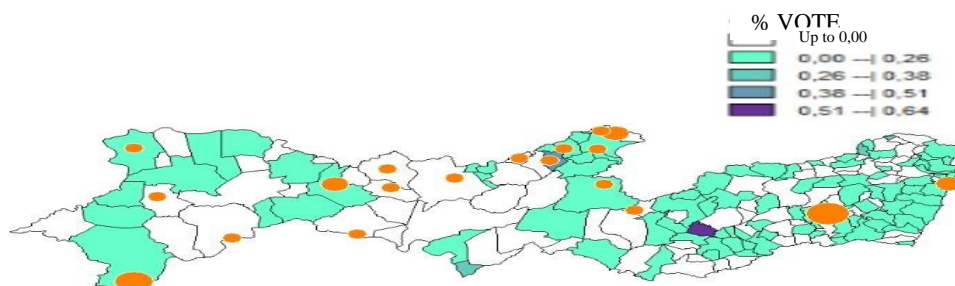

Source: Own elaboration, 2019, based on data (BRASIL, 2019).

Map 9 – Pernambuco - Spatial distribution of the vote and allocation of amendments by representative Luciana Santos (PCdoB).

Source: Own elaboration, 2019, based on data (BRASIL, 2019).

Map 10 – Pernambuco - Spatial distribution of the vote and allocation of amendments by representative Luiz Gonzaga Patriota (PSB).

Source: Own elaboration, 2019, based on data (BRASIL, 2019).

Such data show the dynamic process of voting distribution and the direction of amendments in the state of Pernambuco, which favors the visualization of parliamentarians' positions and the allocation of resources, allowing, in this way, broader analysis scenarios, regarding the allocation of resources in these spaces.

5 Conclusion

The discussion on the relationship between the spatial distribution of the vote and the allocation of resources to the members of the federation is still quite controversial and still needs empirical verification. The research presented here sought to answer some gaps. However, the results presented here are still small enough to assume any claim to generalize the phenomenon and invalidate the meaning of informal districts.

From then on, some reflections are possible as a conclusion and as a guide for future research agendas. It is possible to say that the device of parliamentary amendments to the Union budget is widely used by parliamentarians in the empirical field analyzed. The relationship between voting and amendments cannot be ruled out, but it is necessary to create other indicators to find patterns in this relationship.

With regard to the discussion on parochialism or distributive, the results on the behavior of federal representatives with regard to the allocation of resources to federal entities through individual budget amendments point to some paths: the difference between the percentage of amendments presented to the state as whole, without specification the given municipality is quite representative for the two states.

In this way, the meaning of distributive policy would be more associated with parliamentary behavior that seeks to allocate resources to member states at the expense of more universal interests that would be represented by the Union. This indicates that other flanks for research will allow a more accurate analysis.

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