




# Do competitive contexts make a difference?: the effect of the end of proportional coalitions on party fragmentation (2016-2020)

Contextos competitivos fazem diferença?: o efeito do fim das coligações proporcionais sobre a fragmentação partidária (2016-2020)

¿Los contextos competitivos marcan la diferencia?: el efecto del fin de las coaliciones proporcionales en la fragmentación partidaria (2016-2020)

Bruno Marques Schaefer<sup>i</sup> <sup>1</sup>, Wagner Pralon Mancuso<sup>ii</sup> <sup>2</sup> and Silvana Krause<sup>iii</sup> <sup>3</sup>

<sup>1</sup>Institute of Social and Political Studies, State University of Rio de Janeiro.

<sup>2</sup>University of São Paulo.

<sup>3</sup>Federal University of Rio Grande do Sul.

## Abstract

This article investigates how the approval of Constitutional Amendment no. 97/2017, which prohibited proportional coalitions, reduced party fragmentation in Brazilian municipal chambers. The hypothesis raised is that the previous competitive context had an impact on the intensity of the reduction in the effective number of parties (ENP) between the 2016 and 2020 elections. Data from legislative electoral disputes at the municipal level in both elections were used, along with statistical techniques such as cluster analysis and ordinary least squares regression. The results indicate that, on average, there was a reduction in the ENP in Brazilian municipal chambers after the prohibition of proportional coalitions. However, the intensity of this reduction was greater in municipalities where parties were more intensely allied in the legislative competition. These data demonstrate that the configuration of the political competition market in previous elections is relevant for analyzing the degree of fragmentation observed in future elections conducted under new rules.

**Keywords:** Legislative Branch; proportional pre-electoral coalitions; party fragmentation; OLS regression; cluster analysis.

## Resumo

Neste artigo, é investigado como a aprovação da Emenda Constitucional n.º 97/2017, que proibiu as coligações proporcionais, reduziu a fragmentação partidária nas câmaras municipais brasileiras. A hipótese levantada é que o contexto competitivo anterior teve impacto na intensidade da redução do número efetivo de partidos (NEP) entre os pleitos de 2016 e 2020. Foram utilizados dados das disputas eleitorais legislativas ao nível municipal nos dois pleitos, além de técnicas estatísticas como análise de *clusters* e regressão de mínimos quadrados ordinários. Os resultados indicam que, em média, houve uma redução no NEP nas câmaras municipais brasileiras após a proibição das coligações proporcionais. No entanto, a intensidade dessa redução foi maior nos municípios em que os partidos se coligavam mais intensamente na disputa para o Legislativo. Esses dados demonstram que a configuração do mercado de competição política em eleições anteriores é relevante para a análise do grau de fragmentação observado em eleições futuras, que são realizadas sob novas regras.

**Palavras-chave:** Poder Legislativo; coligações proporcionais; fragmentação partidária; regressão MQO; análise de *clusters*.

<sup>i</sup>E-mail: brunomschaefer@gmail.com

<sup>ii</sup>E-mail: pralon@usp.br

<sup>iii</sup>E-mail: krausesilvana@yahoo.com.br



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
**Corresponding author:**  
Bruno Marques Schaefer

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## Resumen

En este *paper* se investiga cómo la aprobación de la Enmienda Constitucional n° 97/2017, que prohibió las coaliciones proporcionales, redujo la fragmentación partidaria en las cámaras municipales brasileñas. La hipótesis planteada es que el contexto competitivo anterior tuvo un impacto en la intensidad de la reducción del número efectivo de partidos (NEP) entre las elecciones de 2016 y 2020. Se utilizaron datos de las disputas electorales legislativas a nivel municipal en ambos períodos, junto con técnicas estadísticas como el análisis de *clusters* y la regresión de mínimos cuadrados ordinarios. Los resultados indican que, en promedio, hubo una reducción en el NEP en las cámaras municipales brasileñas después de la prohibición de las coaliciones proporcionales. Sin embargo, la intensidad de esta reducción fue mayor en los municipios donde los partidos se aliaron más intensamente en la competencia legislativa. Estos datos demuestran que la configuración del mercado de competencia política en elecciones anteriores es relevante para analizar el grado de fragmentación observado en elecciones futuras, que se llevan a cabo bajo nuevas reglas.

**Palabras clave:** Poder Legislativo; coaliciones proporcionales; fragmentación partidaria; regresión MCO; análisis de conglomerados.

## 1 Introduction

Constitutional Amendment No. 97/2017 became a milestone in Brazilian electoral legislation, with the aim of curbing party fragmentation in the country's legislative houses. To this end, it made access to the party fund and free radio and television advertising conditional on the parties' minimum performance in the elections to the Chamber of Deputies. It also forbade party coalitions in proportional elections<sup>1</sup>. This amendment defined that this ban would apply to the city councils from the 2020 elections.

This article seeks to answer two questions. The first is: has the end of coalitions really reduced party fragmentation in municipal legislatures? The second question is: did the effect of the end of the coalitions vary in intensity according to the electoral strategy previously adopted by the local political elites, and was it greater in the localities where the parties allied more to compete?

There are two hypotheses that guide the study and will be investigated: a) the ban on co-connections has reduced the effective number of parties (ENP) in Brazilian municipal councils; and b) the reduction has been more intense in municipalities where the parties had most coalitions in the previous elections for councilors.

To test this effect, a comparison is made between municipalities with higher and lower proportions of coalitions, considering the 2016 election results. Using clustering, Brazilian municipalities are divided into these two groups. This technique aims to measure the effect of the end of coalitions by grasping the local context of the competitive environment in which electoral disputes take place (Krause; Mancuso; Schaefer, 2022). Multivariate linear regression is then used to control the ENP reducing effect of the model's main variable (the end of coalitions) by the effect of a set of other potentially relevant variables.

In order to achieve the proposed objectives, Section 2 deals with the theoretical debate on the causes of party fragmentation, in general, and on the effect of proportional coalitions, in particular. Section 3 presents the method used in the research. In Section 4, the results found are presented and discussed. Finally, Section 5 presents conclusions and final considerations.

1 Two changes that occurred after the enactment of Constitutional Amendment No. 97/2017 may mitigate its effect of reducing party fragmentation in the legislative houses: the creation of party federations and the end of the requirement that a party reach the electoral quota in order to compete for the distribution of seats in proportional elections. On the one hand, Law No. 14,208/2021 allows party federations of national scope, bringing together two or more political parties, to participate in proportional elections. Unlike the old coalitions, which were extinguished after the election, parties united in a federation must remain affiliated to it for at least four years. On the other hand, Law No. 14,211/2021 allows parties that have obtained at least 80% of the electoral quotient (and candidates who have obtained at least 20% of that quotient) to compete for the distribution of the remaining seats in the proportional elections. The rule in force for the 2020 municipal election was even more permissive in this respect (Law No. 13,488/2017), as it allowed all parties participating in the election to compete for the distribution of these seats.

## 2 Theoretical framework

### 2.1 Studies on coalitions

The literature on electoral coalitions is extensive and consolidated in international and Brazilian political science. As for the international literature, the lines of research focus on: (i) explain what motivates parties to enter into coalitions (Golder, 2006; Shin, 2019), (ii) identify the ideological profiles of the coalitions (Hendrawan; Berenschot; Aspinall, 2021; Magyar, 2022), and (iii) assessing the coalitions' operating logic (Gandhi; Reuter, 2013; Ibenskas, 2016), as well as their effects (Debus, 2007; Plescia, 2017), in different institutional, political and socioeconomic contexts.

Research on the Brazilian case is especially dedicated to investigating alliances in proportional elections and seeks to answer three questions: (i) what motivates them? (Krause; Dantas; Miguel, 2010; Krause; Machado; Miguel, 2017); (ii) under what circumstances are they successful? (Krause; Dantas; Miguel, 2010; Krause; Machado; Miguel, 2017; Krause; Mancuso; Schaefer, 2022); and (iii) what are their impacts on the parties and the political system as a whole? As this article also focuses on the last question, special attention is paid here to the literature that seeks to answer it. In this case, the literature focuses mainly on four dimensions: the degree of nationalization of the Brazilian party system, the quality of political representation, the issue of governability and party fragmentation.

With regard to the effects of alliances on the dynamics of the nationalization of the party system, it should first be pointed out that electoral alliances offer a proxy for diagnoses of the nationalization of parties and the party system in the Brazilian case. This is because they make it possible to observe the level of alignment and cohesion of the parties with their partners in the local, regional and national geographic dimensions (Borges, 2015), contributing to the debate on the Brazilian tradition of regional party subsystems (Lima Junior, 1983). Sandes-Freitas (2013), for example, points out that the presidential dispute between PT and PSDB constituted a kind of cleavage in disputes at other levels. In this sense, the Brazilian parties, until the 2014 election, aligned themselves in blocs around these two main parties: on the PT side, to a greater or lesser extent, PCdoB, PSB and PDT; on the PSDB side, DEM, and these blocs formed alliances in the municipalities, especially in the largest cities.

Secondly, coalitions are pointed out as producing distortions in political representation (Miguel; Assis, 2016; Nicolau, 2015). Its negative effects can be seen in the proportional election with an open list, which gives voters the freedom to vote directly for a candidate, and not just for the slate. Voting based on a candidate's personal characteristics, or identification with a party, would not be *per se* a deformation in representation. The problem lies in the calculation of the electoral and party quotients of the coalitions, which makes it possible to distort both the wishes of the voters who voted for only one party and those who decided on a candidate. In this sense, both the personal vote and the party line vote, in the way they are included in the calculation of the distribution of coalition mandates, do not always guarantee the meaning and weight of the voter's vote. There is a unanimous assessment in the literature that coalitions open a "window of opportunity" for candidates and parties with lower voting density to achieve greater representation in proportional elections (Maciel; Leandro; Arias, 2018; Melo; Soares, 2016), even if they cannot be identified as the central causes of party fragmentation and its growth in the country (Nascimento, 2018).

Still, regarding the dimension of the quality of representation, it should be noted that electoral coalitions do not offer guarantees of stable employment. The commitments involved in the electoral coalitions are fragile and repeatedly broken (Magyar, 2022). In fact, the association of electoral forces established in the coalition is not always maintained after the election, increasing, on the one hand, the costs of stability in government and, on the other, the unpredictability of the political game. After the election, the previously coalition parties are not obliged to remain united or to act in a cohesive manner within the legislative houses or in their relationship with the Executive Branch.

Thirdly, linked to what was highlighted in the previous paragraph, we discuss the effect

of coalitions on governability, especially in the Executive-Legislative relationship. This is because, on the one hand, there is no guarantee that the coalition parties that won the election to the Executive will remain aligned during the president's term in office. On the other hand, there is also no guarantee that the coalition partners who won the Executive elections will achieve a majority in the legislature. This difficulty in governing is exacerbated when we know that the predominant logic of electoral alliances is not ideological or programmatic proximity (Carreirão; Nascimento, 2010). Finally, governability can be hampered by coalitions because they increase party fragmentation, imposing on the head of the Executive Branch who wants to implement his government agenda the need to negotiate simultaneously with a multitude of dispersed political forces.

## 2.2 Coalitions and party fragmentation

The impact of coalitions on party fragmentation is the fourth element addressed in the investigations, which will be presented from now on. There are several factors listed in the literature as causes of party fragmentation in political systems, such as: the magnitude of districts (Sartori, 1982; Singer; Gershman, 2018), the heterogeneity of society (Cox, 1997; Geys, 2006; Ordeshook; Shvetsova, 1994), the emergence of new party organizations (Singer; Gershman, 2018) and the strategies of political elites (Zucco; Power, 2019).

In the Brazilian debate on the effects of proportional coalitions, there is a common assessment that they are also important causes of party fragmentation in the Chamber of Deputies, in state legislatures (Calvo; Guarnieri; Limongi, 2015; Limongi; Vasselai, 2018; Nicolau, 2015), and in the municipal legislatures (Melo; Soares, 2016).

Coalitions increase party fragmentation in these legislative houses, whose seats are filled through proportional elections, because they make it possible for political parties to be represented that, on their own, would not have enough votes to reach the electoral quotient<sup>2</sup>. The arrangements between large and small parties that form a coalition are based on an exchange. Smaller parties tend to give free electoral advertising time, and other resources to the larger parties in the majoritarian coalitions (Federal Senate, city halls, state governments and Presidency of the Republic) in exchange for an alliance in the proportional coalitions. The mechanical effect that encourages small parties to launch candidacies (fewer votes can turn into seats) adds to the psychological effect on party elites, encouraging parties that would not run under "normal conditions" to do so when they see the possibility of winning a seat.

In fact, since the 2002 elections, the Chamber of Deputies has seen not only a continuous increase in the number of parties with mandates, but also in the dispersion of representation (Krause; Corrêa *et al.*, 2021; Nicolau, 2017). The party fragmentation index measured by the ENP does not calculate the number of parties that have won seats in the legislature, but rather the dispersion/concentration of representation (Laakso; Taagepera, 1979)<sup>3</sup>. It is important to clarify this aspect, because the fact that many parties acquire representation does not necessarily imply the formation of a fragmented party system<sup>4</sup>. In other words, the ENP points out whether many or few parties have significant strength to form majorities and, consequently, to enable or prevent decisions in the representative body.

The fight against party fragmentation was the central argument mobilized in the parliamentary debate that preceded the approval of Constitutional Amendment No. 97, of October 2017, which, from the 2020 municipal elections onwards, banned coalitions in all proportional October 2017, which, from the 2020 municipal elections onwards, banned coalitions in all proportional elections. Although the 2020 municipal election is very recent, there are already studies that attest to the positive effect of the measure on reducing party fragmentation. More de-

2 The electoral quotient is the result of dividing the total valid votes in a given constituency by the number of seats in dispute in that constituency.

3 The calculation of the ENP is explained in Section 3.

4 Example: In two particular party systems, there are five parties represented in parliament. However, there are fundamental differences between them in the formation of majorities: Parliament A – PX = 60%, PY = 30%, PZ = 5% PH = 2,5%, PL = 2,5%. Parliament B – PX = 20%, PY = 20%, PZ = 20%, PH = 20%, PL = 20%.

scriptive works, such as Passadore and Forigo (2021), Matheus (2021) and Melo, Pessoa Júnior and Soares (2021), point out that there was a significant reduction in ENP in local councils between 2016 and 2020. This reduction was greater in smaller municipalities, which have proportionally higher electoral quotient levels (Matheus, 2021; Melo; Pessoa Júnior; Soares, 2021; Passadore; Forigo, 2021). To put it another way, in small municipalities (for example, with 9 councilor seats up for grabs), the percentage of votes needed to exceed the electoral quota is proportionally higher than in larger municipalities. In Upanema, RN, for example, the 2020 electoral quotient was 1,084 votes (9,759 valid votes, divided by nine seats), or 11.11% of the total; while in Rio de Janeiro, RJ, the electoral quotient was 50,929 votes, or 1.92% of the total valid votes.

Other works, such as Santana, Vasquez and Sandes-Freitas (2021), Speck (2022) and Krause, Mancuso and Schaefer (2022), in turn, propose models to explain the mechanisms behind the decline in party membership. Santana, Vasquez and Sandes-Freitas (2021, p. 96) demonstrate, by applying the discontinuous regression technique, that in municipalities with similar magnitudes (similar number of councilors): “(...) los valores del NEPL<sup>5</sup> en los municipios brasileños en 2016 fueron 1,882 (constante), más altos que los encontrados en 2020”. Speck (2022) points out that the ban on coalitions has had psychological and mechanical effects on parties and voters. In the first case, there seems to have been greater parsimony when it came to launching candidates for smaller parties, given the increased chance of failure without the possibility of alliances; and in the second case, there was a reduction in the number of parties that achieved political representation on the municipal councils. Again, the effect is mediated by the magnitude of the districts: larger effects in smaller municipalities (Santana; Vasquez; Sandes-Freitas, 2021).

Krause, Mancuso and Schaefer (2022), in turn, introduce a variable hitherto ignored in the evaluation of the effect of the ban on coalitions on the ENP of municipal councils. These authors include the variable “proportion of parties coalesced in the previous election” in order to ascertain the extent to which the previous electoral strategies of local political elites interact with institutional and socioeconomic variables to produce greater or lesser party fragmentation in the future. The study’s hypothesis is that the ban on coalitions reduced party fragmentation more in the municipalities where the parties had most coalitions in the previous election. In other words, they adopt the assumption that the past competitive context matters for the effect of institutional reform in the future. The study’s findings confirm the authors’ initial hypothesis and show that the reduction in the ENP was significantly greater in the municipalities where the parties were most closely allied in the previous election.

This paper follows the same path, assessing the extent to which the municipal competitive context helps to explain the mechanisms for reducing party fragmentation in Brazil. The difference with the previous work is that the comparison now takes place between two different groups of municipalities: those with a higher or lower proportion of coalition parties in 2016. This dichotomization procedure provides analytical gains (Costa; Arraes; Guimarães, 2015; Ribeiro; Borba; Fuks, 2022) because it allows us to see more clearly the importance of the local competitive context as a factor affecting the effect of the ban on coalitions on party fragmentation.

### 3 Method

#### 3.1 Comparison between groups

The comparative analysis between municipalities with the highest and lowest proportion of coalitions in the 2016 elections was conducted to assess the intensity of the effect of the ban on coalitions on party fragmentation in the city councils of the two groups of Brazilian municipalities. The indicator adopted to measure party fragmentation was the ENP in municipal councils, which was considered the dependent variable of interest. The ENP values were

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<sup>5</sup> Effective number of legislative parties.



calculated for all Brazilian municipalities with information available on the [Open Data Portal of the Superior Electoral Court \(TSE\)](#) in the years 2016 (when party coalitions for proportional elections were still allowed) and 2020 (when such coalitions had already been banned). The data was collected from the [TSE Open Data Portal](#), and the ENP values were calculated for both years of interest. The comparison was made between municipalities with different proportions of coalitions in 2016 because the aim of the work is to assess whether the effect of the new rule on the subsequent election varied according to the political context of the municipalities in the immediately preceding election.

The formula for calculating ENP was created by [Laakso and Taagepera \(1979\)](#) and is shown in Equation 1:

$$N = \frac{1}{\sum_{i=1}^n (p_i^2)} \quad (1)$$

In Equation 1,  $N$  is the ENP;  $n$  is the number of parties with at least one seat in the parliament studied; and  $p_i$  is the proportion of seats held by each party in relation to the total number of seats, expressed in decimal values (for example, 50% corresponds to 0.5, and 1% to 0.01).

To make the comparison, we first calculated the proportion of coalition parties in Brazilian municipalities in the 2016 election. In other words, if, in the municipality of São Francisco de Paula, RS, nine parties entered the race for the City Council, and, of these, eight were in a coalition, the value of the variable is 0.88 (or 88%). Secondly, the municipalities were divided into two groups using clusters K-means analysis. The aim is to group together units of analysis that are similar in the distribution of one or more variables ([Figueiredo Filho \*et al.\*, 2014](#)). The process of applying the clusters analysis generated two groups: group 1, made up of 4,748 municipalities — 85,5% of the total — with the highest proportion of allied parties in the 2016 municipal elections, and group 0, made up of 807 municipalities — 14,5% of the total — with the lowest proportion of allied parties<sup>6</sup>. In group 1, the average proportion of coalition parties was 0.96, while in group 0 this average was 0.73. The “ $t$ ” test indicates that this difference is statistically significant at the 0.001% level, which rules out the null hypothesis that there would be no difference between the two groups formed after the clustering.

### 3.2 Multivariate linear regression

In order to make the findings more robust, ordinary least squares (OLS) linear regression models were used to control the effect of the end of coalitions by the effect of a set of other variables potentially relevant to the ENP of Brazilian city councils.

The independent variables of interest are: “belonging to group 1”, “2020 election” and the interaction term between the two. The first is a dummy variable which assigns the value 1 to municipalities belonging to the group with the highest proportion of allied parties in 2016 and 0 to those belonging to the group with the lowest proportion. The second variable, also dummy, assigns the value 1 to the 2020 election (coalitions prohibited) and the value 0 to the 2016 election (coalitions permitted). The introduction of the interaction term between the two variables seeks to assess what happened to group 1 in the post-prohibition period when compared to group 0, i.e. whether there is a significant difference between the two groups in terms of the reduction of ENP after the Constitutional Amendment No. 97/2017 ([Batista; Domingos, 2017](#); [John; Smith; Zack, 2018](#); [Khandker; Koolwal; Samad, 2009](#)).

The following control variables were also added to the model: firstly, the magnitude of the electoral districts, i.e. the number of seats available in each municipality in the elections to the city councils each year. The values for this variable were obtained from the TSE. This variable was included because an increase in magnitude tends to favor an increase in party fragmentation ([Cox, 1997](#); [Nicolau, 2015](#); [Santana; Vasquez; Sandes-Freitas, 2021](#)).

<sup>6</sup> Dividing continuous variables into categories is a procedure used in other causal effect evaluations ([Costa; Arraes; Guimarães, 2015](#)).

Next, the number of parties that launched candidates for mayor and councilor each year was added. The values for these variables were also obtained from the TSE. These variables represent the level of political supply in each municipality. The hypothesis is that the increased supply of alternatives in the political market tends to contribute to increased party fragmentation. Singer and Gershman (2018) show that party fragmentation increases as the number of parties in the race increases, even when controlling for the magnitude of the district. Here, it was considered that not only the number of parties that contested the seats in the city councils mattered, but also the number of parties that contested the mayoral seats. In fact, the launch of majoritarian candidates can boost party votes in proportional elections — this is known as the coattail-effect (Schaefer; Barbosa, 2020; Soares, 2013).

Finally, the estimated population of the municipalities in each year was also included as a control variable. This information was obtained from the Brazilian Institute of Geography and Statistics (IBGE) to test the hypothesis that party fragmentation increases with population size, and the Municipal Development Index of the Federation of Industries of the State of Rio de Janeiro (IFDM-FIRJAN)<sup>7</sup>, to test the hypothesis that party fragmentation increases with the level of socioeconomic development of the municipalities. Important studies (Geys, 2006; Amorim Neto; Cox, 1997; Ordeshook; Shvetsova, 1994) have suggested that institutional factors are necessary, but insufficient, to explain the degree of fragmentation of a party system. Socioeconomic heterogeneity also plays a role in fragmentation. Thus, the formation of a fragmented multiparty system would depend on the combination of institutional permissiveness and social heterogeneity, for which proxies can be the size of the municipal population and the municipal socioeconomic development index. Figure 1 summarizes the variables in the model.

Figure 1 – Variables of the multivariate linear regression model

Variables	Description	Source
Dependent	ENP	TSE
Independents and controls	Group 1	Clustering from TSE data
	2020 election	TSE
	Group interaction and the 2020 election	TSE
	Magnitude of the districts	TSE
	Parties with councilor candidates	TSE
	Parties with mayoral candidates	TSE
	Estimated population	IBGE
	IFDM	FIRJAN

Source: Own elaboration

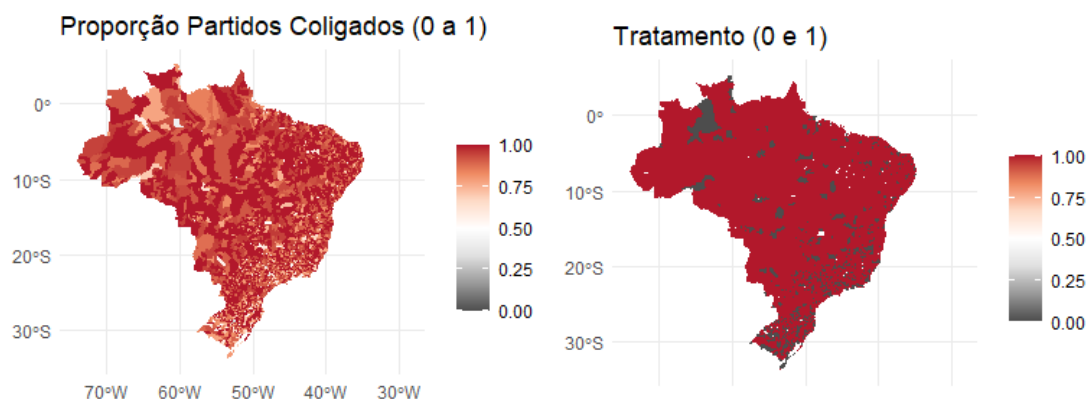
The software R was used to organize the data collected and to carry out the statistical procedures. The databases and the scripts of the statistical operations are available for replication on the Open Science Framework (OSF)<sup>8</sup> portal and on the E-Legis<sup>9</sup> file repository.

#### 4 Presentation and analysis of results

Figure 2 contains two maps of Brazilian territory. The first map shows the variation between the country’s municipalities in terms of the proportion of coalition parties in the 2016 city council elections. The higher the proportion of coalition parties, the more the municipality’s color tends towards red. The lower this proportion, the more the color of the municipality tends towards gray. The second map shows Brazilian municipalities already divided into the two clusters mentioned in the previous paragraph. The red cluster is group 1, with the highest proportion of allied parties, and the gray cluster is the control group, with the lowest proportion of allied parties. In white on both maps are the municipalities for which no data was available.

7 This annual index varies between 0 and 1: the closer it is to 1, the more developed the municipality is. The index tracks the performance of Brazilian municipalities in three dimensions: employment and income, education and health. The IFDM served as proxy for the socioeconomic characteristics of the municipalities.  
8 Accessible via *link* <https://osf.io/8456f/>.  
9 Accessible via *link* <https://github.com/Cefor/E-Legis/tree/main/2024%20-%20n.%2040/artigo%2002>.

Figure 2 – Proportion of allied parties in Brazilian municipalities



Source: Own elaboration, based on TSE data

The average ENP values of the two clusters of municipalities in 2016 are indicated by the letters (a) and (b) in Table 1. Secondly, the average ENP of the chambers of councilors elected in 2020 in the same groups of municipalities was calculated. These values are indicated by the letters (c) and (d) in Table 1. Thirdly, the differences between the average ENP of group 1 and group 0 in the two elections were computed — letters (f) and (g) in Table 1. Finally, in the fourth place, the difference between the differences in average ENP found in the two groups mentioned in the previous step — (h) in Table 1<sup>10</sup> — was subtracted.

Table 1 – Comparison between groups, ENP of city councils, 2016-2020

Groups	2016	2020	Difference
<b>Group 0</b>	5,25 (a)	4,76 (c)	−0,49 (f) (c − a)
<b>Group 1</b>	5,68 (b)	3,96 (d)	−1,72 (g) (d − b)
<b>Difference</b>	0,43 (b − a)	−0,80 (d − c)	(−1,72) − (−0,49) <b>−1,23 (h)</b>

Source: Own elaboration

Table 1 indicates that, on average, there was a reduction in the ENP in municipal councils between 2016 and 2020 in both municipalities belonging to group 1 (a decrease of 1.72 effective parties) and those in group 0 (a decrease of 0.49 effective parties). However, the reduction in ENP was more significant — or, in other words, the impact of the coalition ban on party fragmentation was stronger — in municipalities belonging to group 1, meaning those that had a higher proportion of allied parties in the municipal legislative election of 2016 (a difference of −1.23 effective parties). Figure 3 graphically illustrates these differences. The dotted line indicates what the ENP difference in group 1 would have been between 2016 and 2020 if it had been of the same magnitude as in group 0.

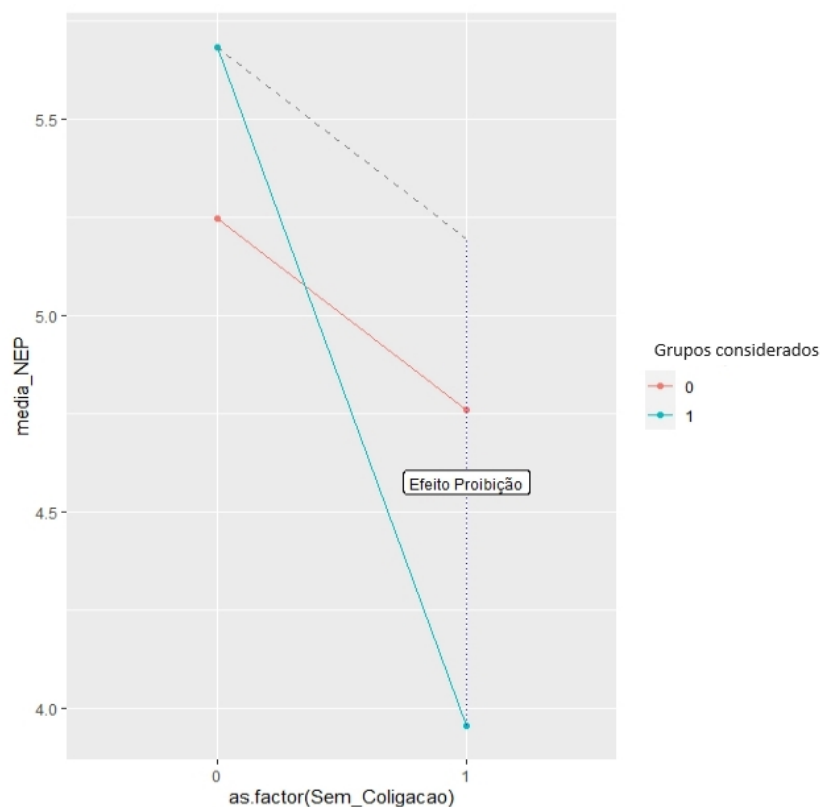
Table 2 shows the descriptive statistics for the variables in the regression model. In the end, the database covers a total of 10,694 cases<sup>11</sup>, stacking up the information from the 2016 and 2020 elections.

<sup>10</sup> Note that the same result is obtained by calculating the difference between the average ENP of the control and treatment groups in the 2016 and 2020 elections.

<sup>11</sup> In the comparison between the two groups presented in the previous section, the number of municipalities was 5,555. In Table 2, the number of municipalities is less than 11,110 because only municipalities for which information on all the variables in the model was available were included.



Figure 3 – Difference between groups 1 and 0, with coalitions (2016) and without coalitions (2020)



Source: Own elaboration, based on TSE data

Table 2 – Descriptive statistics of the variables

Variable	N	Average	Standard deviation	Minimum	Maximum
ENP	10.694	4,86	2,15	1	18,28
Magnitude	10.694	10,40	2,87	9	55
IFDM	10.694	0,69	0,09	0,32	0,90
Population	10.694	36.041	208.293	776	12.325.232
Parties Councilor	10.694	10,61	6,47	1	35
Parties Mayor	10.694	3,21	1,73	1	17
Groups	10.694	-	-	-	-
0	1.642	15,4%	-	-	-
1	9.052	84,6%	-	-	-
Election	10.694	-	-	-	-
2016	5.452	51%	-	-	-
2020	5.242	49%	-	-	-

Source: Own elaboration

Figure 4 contains the results of the multivariate linear regression models. In the first model, there are only the independent variables, while in the second, there are also the controls. Multicollinearity tests<sup>12</sup> indicated no correlation greater than 0.9 between the independent variables; therefore, all variables were included in the models (Figueiredo Filho; Silva; Domingos, 2015). The fit statistics indicate robust models that are superior to the null models<sup>13</sup>.

The coefficients presented in model 1 (reduced) show that, on average, the municipalities in group 1 have 0.44 more effective parties than the municipalities in the control group. They also show that there was an average reduction of 0.49 effective parties between the 2016 and 2020 elections. The interactive term in model 1 indicates the same thing as Table 1 and Figure 3, i.e., that the fall in ENP in municipalities in group 1 between 2016 and 2020 was 1.23 times greater than the fall in ENP in municipalities in group 0 over the same period.

Figure 4 – Variables of the multivariate linear regression model

Description	Coeficientes	
	Model 1	Model 2
(Intercept)	5,25*** (0,07)	0,33** (0,12)
Group 1	0,44*** (0,08)	0,37*** (0,05)
2020 election	-0,49*** (0,10)	0,47*** (0,07)
Group-treatment interaction x 2020 election	-1,23*** (0,11)	-0,50*** (0,07)
Magnitude	- -	0,12*** (0,01)
Parties Councilor	- -	0,24*** (0,00)
Parties Mayor	- -	-0,01 (0,01)
Population	- -	-0,00*** (0,00)
IFDM	- -	0,72*** (0,13)
R <sup>2</sup>	0,14	0,65
Adj. R <sup>2</sup>	0,14	0,65
Num. obs.	10.694	10.694

Source: Own elaboration

Note: \*\*\*  $p < 0,001$ ; \*\*  $p < 0,01$ ; \*  $p < 0,05$

In model 2 (complete), the coefficient of the interactive term is lower than in the reduced model, but it is still statistically significant. In other words, even when the other variables that potentially also affect party fragmentation are included in the full model, the drop in ENP in the municipalities in group 1 between 2016 and 2020 is still higher than in the municipalities in the control group by 0.50 effective party. In other words, the central hypothesis is confirmed: between 2016 and 2020, the drop in party fragmentation is more pronounced in the group of municipalities where a higher proportion of parties joined forces in the election for councilor, when this practice was allowed. The coefficient for group 1 remains positive and statistically significant (on average, 0.37 more effective party than the control group), while the coefficient of the “2020 Election” variable changes sign, indicating greater fragmentation in that election (an

<sup>12</sup> The multicollinearity tests are shown in Figure 5, in Appendix A.

<sup>13</sup> The robust standard errors are shown in Figure 6, in Appendix A.

average increase of 0.47 effective party between the 2016 and 2020 elections). The sign reversal can be explained by the inclusion of control variables that significantly affect the ENP, as well as the fact that the interaction takes on the value 0. In other words, the value of the coefficient is that of the “2020 Election”, considering the municipalities with the lowest proportion of coalitions.

The effect of most of the control variables follows the expected direction. In this sense, party fragmentation increases with the size of the district (an increase of one seat in the city council leads to an increase of 0.12 in the ENP), with the municipal level of socioeconomic development (an increase of one IFDM unit represents an increase of 0.72 in the ENP), and with the number of parties launching candidates for city council (one more party in this race increases the ENP by 0.24). However, the number of parties launching mayoral candidates had no significant effect on the ENP, and the size of the population had the opposite effect than imagined (the degree of party fragmentation does not accompany the increase in the population).

## 5 Conclusions and final considerations

In general terms, this work has shown that a new rule does not always have a homogeneous effect on the units to which it applies and that its effect can vary according to the local context. More specifically, the article assessed the impact of the end of coalitions on party fragmentation in municipal legislatures in the light of previous local competitive contexts. It was shown that the drop in fragmentation was greater in municipalities where local political elites took greater advantage of the alliance freedom of the previous rule.

Previous work has pointed to the importance of context in explaining the diversity of alliance behavior at different times and in different places, as well as by actors with varying ideological profiles (Peres; Lenine, 2017). We shared the premise that context matters, now to shape the effects of the new rule.

A recent study by Zucco and Power (2019) suggested that part of the party fragmentation in Brazil does not respond to social, political, or electoral cleavages, but is caused endogenously by the strategic and electoral interests of the political elites who reorder themselves into different parties. The results found in this article also point to the importance of the electoral strategies of local political actors as an explanatory factor for the degree of party fragmentation in municipalities. The reduction in party fragmentation was more significant in municipalities whose elites were more willing to enter into electoral alliances when this was permitted by the legal system in force at the time.

Brazilian municipalities vary greatly in terms of various factors, such as population, size of the city council, level of socioeconomic development etc. We tried to show that municipal variation in the internal configuration of the political competition market in previous elections also matters for the degree of fragmentation observed in future elections held under new rules. It is important to emphasize that the variations detected in this study open up a research agenda. However, the diagnosis found applies to the specific context of the introduction of a new electoral rule. It is necessary not only to monitor other municipal elections to assess the trends detected but also to observe state and national elections to analyze the scope of the arguments presented here.

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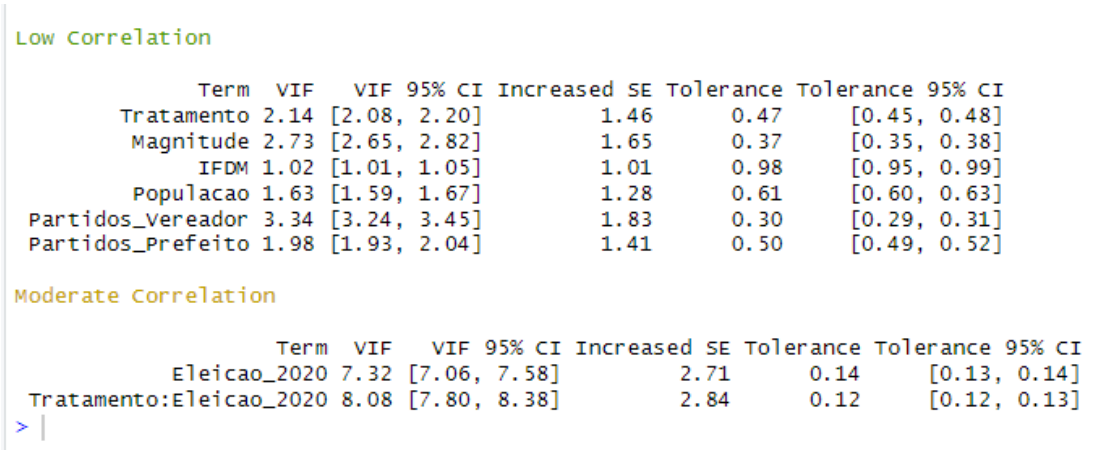
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### Author contributions

**Bruno Marques Schaefer**: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review and editing, Investigation, Methodology, Funding acquisition, Resources, Software, Supervision, Validation, Visualization; **Wagner Pralon Mancuso**: Project administration, Conceptualization, Data curation, Writing – original draft, Writing – review and editing, Investigation, Methodology, Funding acquisition, Resources, Supervision, Validation, Visualization; **Silvana Krause**: Project administration, Conceptualization, Data curation, Writing – original draft, Writing – review and editing, Investigation, Methodology, Funding acquisition, Resources, Supervision, Validation, Visualization.

## A Appendix

Figure 5 – Multicollinearity test - Model 2



Source: Own elaboration

Figure 6 – Robust standard errors - Models 1 and 2

	Model 1	Model 2
(Intercept)	5.25 *** (0.10)	0.32 * (0.13)
Tratamento1	0.44 *** (0.10)	0.37 *** (0.06)
Eleicao_20201	-0.49 *** (0.14)	0.47 *** (0.07)
Tratamento1:Eleicao_20201	-1.24 *** (0.14)	-0.50 *** (0.08)
Magnitude		0.12 *** (0.01)
IFDM		0.72 *** (0.13)
Populacao		-0.00 *** (0.00)
Partidos_Vereador		0.24 *** (0.00)
Partidos_Prefeito		-0.01 (0.01)
*** p < 0.001; ** p < 0.01; * p < 0.05		
>		

Source: Own elaboration