IN PURSUIT FOR HAPPINESS: MUNICIPAL PARLIAMENTARY RENEWAL (2004-2016)

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Abstract: What is the parliamentary renewal in Brazilian municipalities? The objective of this article is to analyze the distribution of the renewal of city councilors in Brazil for the 2004, 2008, 2012 and 2016 Elections. Methodologically we analyze three measures of parliamentary renewal: (1) compulsory, (20 gross and (3) net. The results indicate that: (1) The average annual net renewal is below (9%), (2) in general, the incumbents have (3) rates of gross and compulsory renewals have an average of 60%, (4) the Northeast has the lowest average renewal rate (gross = 57%, compulsory = 55.43% and liquid = 3.8%).

Keywords: Brazil; Parliamentary renewal; Municipal elections; Councilmen.

1 Introduction

The Brazilian political system is that the municipal assemblies of councilors open a limited number of nine per cent and five seats[6], in addition to proportionally distributing the number of voters of the municipalities. Brazilian electoral rules guarantee indefinite reelection for all parliamentarians, regardless of the sphere, that is, councilors, state or federal deputies and senators can run for reelection as many times as they wish[7]. An example of this is the case of councilor Luiz Gonzaga de Souza, from the municipality of Dom Peixoto Lopes, in the interior of the state of Piauí, which achieved the fulfillment of five consecutive terms; elected for the first time in 1996 has been reelected since then (2016). But the case of Luiz Gonzaga is not isolated. Other parliamentarians in Brazil have been able to repeat this feat. However, the literature on electoral disputes for the position of city councilor is rather scarce.

Our work has a descriptive and comparative focus over time. That is, we analyze the renewal in all municipalities of the Federation as of the 2004 elections8. This represents an important starting point for future work aiming at the evaluation of causal relations about parliamentary renewal. Focusing on this research agenda, this article analyzes the distribution of

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[6] In May 2008, the Chamber of Deputies approved a Proposal of Constitutional Emendation n. 333/2004, fixing to very small municipalities for about 9 Seats with Up to 15.000 inhabitants from a maximum number of 55 Seats for Municipality WITH MORE THAN 8 Million inhabitants.
[7] Except in cases where the candidate does not prove regularity before the Electoral Court.

parliamentary renewal in the Brazilian municipalities for the 2004 to 2016 Elections, to answer the following research question: *what is the rate of parliamentary renewal in Brazilian municipalities?* Methodologically, we analyzed three measures of parliamentary renewal: (1) compulsory, (2) gross and (3) net. We used descriptive statistics to treat a systematized database based on information from the Superior Electoral Court (SEC).

To comply with this research design, the next section reviews the literature on incumbency and parliamentary renewal; then we describe our methodological strategies to ensure the replication of results; the third section presents results and their respective analyses; finally, we summarize our main considerations.

2 Literature review

Part of the US literature has considered parliamentary renewal as a dependent variable (HYNEMAN, 1938; ROSENTHAL, 1974; SMITH & MILLER, 1977). In more intuitive terms, what explains the behavior of parliamentarians in the exercise of their functions is the maximization of the chances of remaining in the position. More specifically, Rosenthal (1974) indicates nine institutional independent variables to explain the renewal rate in the US states, which directly relates the rate of renewal to institutional design. This logic points to the level of professionalization as an explanatory factor of reelection, that is, the more professional the parliamentarian, the greater the chances of reelection. According to Friedman and Holden (2009), the likelihood of a reelected member of parliament in the United States has increased over the last century, reaching the 95 percent mark.

In Brazil, when we talk about parliamentary renewal in the Chamber of Deputies, there is a literature in formation that deals with the subject (SANTOS, 1997; 2000; LEONI, PEREIRA and RENNÓ, 2003; MIGUEL, 2003; SAMUELS, 2003; PEREIRA & RENNÓ, 2007; DI MARTINO, 2009; BARRETO, 2012; COSTA and CODATO, 2016). According to Miguel (2003), the renewal rate in the Chamber of Deputies would be quite high, around 50%. The justification given by the author is that there is a high degree of entry of actors who are not of the political field, or, in the expression of Santos (1997), are beginners. Moreover, the author draws attention to the fact that this parliamentary renewal does not only mean substitution in political frameworks, but rather the mere passing of legislative seats to actors outside the political field, that is, individuals without political experience. In this way, perverse effects can arise in this renovation, linked to a low level of professionalism. In this sense, high waves of renewal are associated with low levels of professionalism. Although this is not the object of investigation of this article, this logic can reproduce itself in the sub-national scenario, more precisely in the city councils.

According to Silva Júnior and Figueiredo Filho (2012), the literature that works with parliamentary renewal argues that the higher degree of professionalization would be

advantageous electorally for incumbent candidates. Comparatively, outsider candidates would be at a disadvantage. What Samuels (2001) calls "incumbency advantage" in the Brazilian elections. In other words, the higher degree of professionalization, which would be correlated with a higher degree of institutionalization, would reduce the rate of parliamentary renewal. But it is worth mentioning that these analyses concern, once again, the National Congress.

In another study that examines the Chamber of Deputies, Peixoto (2010) argues that the legislative renewal rate in Brazil is relatively high. Ames (2000) states that in Brazil, around 50% of the deputies are newcomers, which implies a high rate of renewal, mainly in the South and Southeast regions. Cervi (2009) affirms that high rates of renewal point to the existence of risks for the analysis of cases in Brazil, considering the hypothesis that reelection is the first objective of the elected politician. One of the externalities of high renewal rates is the expectation of a short political career. For Magalhães and Hirvonen (2015), incumbency has effects on a political career that goes beyond the probability of reelection.

The discussion on parliamentary renewal is organized around its causes and consequences. Polsby (1968) is one of the first to establish this relationship, for him "As an organization institutionalizes, it stabilizes its membership, entry is more difficult, and turnover is less frequent. Its leadership professionalizes and persists" (POLSBY, 1968, p. 145/146). Within the specialized literature, much effort has been made to identify which are the factors that explain the levels of renewal.

What we perceive is that both the Brazilian and US literature associate renewal, low professionalism, and reduced ability to influence policy making. Although not in most works, this argument needs to be weighed by the distribution of power within the legislative house (SHEPSLE, 1978; KREHBIEL, 1991). The importance of commissions and of some key actors in the Legislative Branch is largely addressed by US literature. Some arenas and actors play a fundamental role and end up having more weight in the internal workings of the Legislative (GILLIGAN and KREIBIEL, 1989; HALL, 1989; COX and McCUBBINS, 1993).

The rationale is that the more inexperienced the occupants of these positions, the less the influence of the legislature in policy making. The national literature also points to this differentiation. Figueiredo and Limongi (2001) place the leader as one of the great articulators of Brazilian governability. For them, the Executive's life is greatly facilitated by the prerogatives retained by the leaders. Likewise, some papers point out the relevance of the presidents and rapporteurs of some committees of the Chamber (SANTOS and ACIR, 2005; MULLER, 2005). It is therefore possible to support the argument that the effect of renewal must be weighed by its scope within the legislative house. That is to say, it is plausible to say that the influence of the legislature on policy making tends to be compatible with the experience of the commanders of the house in question, especially considering the centralized pattern of parliamentary work.

Regarding works that respond to research on parliamentary renewal at the sub-national level, looking closely at municipal electoral disputes for the positions of councilman is still rare in Brazil. Barreto (2009) attempts to identify the trends and standards in the dispute for the City Council from 1976 to 2004, in the city of Pelotas-RS. The author verified that there are a diversity of factors that interact for possible reelections, confirming what the literature on the subject states the political system, according to the author, would have a high dose of unpredictability. Silva (2011) is even more specific when analyzing exclusively the standard of reelection of evangelical councilors in Belém-PA, in the elections from 1992 to 2008. While Cervi (2011) proposes a content analysis model from the HGPE (electoral propaganda). Unlike these authors, except for a better search, we did not find literature / studies that deal with municipal legislation and elections/reelections.

In turn, Kerbauy (2005, 350) states that municipal legislative research up to the 1990s indicated "for a clientelist institution par excellence and homologating the mayor's decisions, in which transfers of individual resources guarantee the reelection of councilors ". Future works can analyze the political-partisan compositions of the municipal legislative houses to measure the support of the mayor as an explanatory variable for the reelection of the parliamentarians.

3 Methodology - The data and the measurement of the concepts

This section describes methodological procedures. To ensure replication of results (KING, 1995), the table below summarizes our research design and publicly makes available our database. Summarizing, our unit of analysis is the Brazilian city councils, more precisely, we are dealing with a parliamentary renewal rate for the 2004, 2008, 2012 and 2016 elections.

to answer our research question, we consider three types of parliamentary renewal:: (a) *compulsory*, which refers to the percentage of new legislators, who will replace those who did not apply for reelection; (b) *gross*, percentage referring to the total of new representatives considering the vacancies of the dropouts and the vacancies of the losers; and (c) *net*, refers to the proportion of losers over the total number of incumbents who ran for the election (SANTOS, 2002). As in the period the number of legislative seats in dispute changed, we used as a weighting factor for the difference of seats between the pair of elections, as recommended by Santos (2002). Here are the formulas below:

(a) *Gross* $\left|\left(\frac{Des+Dif}{Tot.vacancies}\right)100\right|$

(b) *Compulsory* $\left|\left(\frac{Des+Der+Dif}{Tot.vacancies}\right)100\right|$

(c) $Net\left|\left(\frac{Der}{Ree+Der+Dif}\right)100\right|$

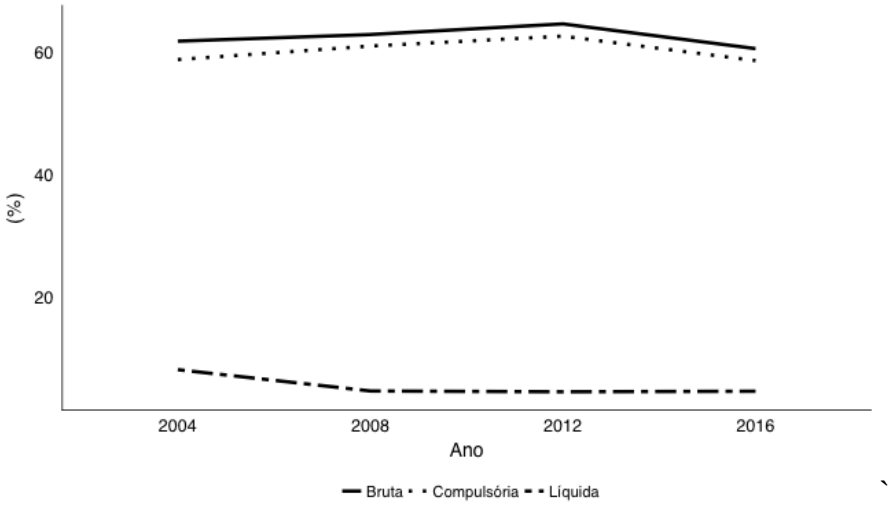
The data used were collected from the Superior Electoral Court (SEC) using the *electionsBR* package for statistical software *R* (MEIRELES, SILVA and COSTA, 2016). Data were collected from the 2000 elections, since it was necessary to have the information of those elected to build the renewal rates for 2004. Due to the inaccuracies in the reporting of the SEC base, we chose to combine the bases of candidatures with the bases of voting. In the process of data cleaning, we exclude all additional elections because we believe that the analysis is more substantive when the dispute occurs within the procedural "normality", since the usual procedure was changed an analysis would be necessary apart from these cases where a new electoral race occurred.

Finally we built a base with 567,906 candidates between elected, non-elected and other conditions, allowing us to compare if the municipal parliamentarian gave up the candidacy (those who could not be re-appointed for any reason also fell into the category of withdrawal) or disputed reelection, and, in such cases, whether the candidate was victorious or defeated. After making these comparisons it was possible to base the renewal rates for 21,906 municipal legislative elections between 2004 and 2016.

4 Results and Discussions

In this section we present the results and the respective analyses. The chart below summarizes the average rates of gross, compulsory and net parliamentary renewal for the 2004 to 2016 elections.

Chart 01. Average rates of renewal in the Municipal Legislative Elections in Brazil (2004-2016)



Gross Compulsory Net

Chart 1 shows that there was a *gross* renewal with an average of 60% of the cases, that is, more than half of the municipal legislators, on average, are "new faces" in the city councils.

Presenting the same pattern of behavior, *compulsory* renewal registered almost 60% of the renewal, that is, the vacancies were filled by a legislator who did not reapply. The *net* renewal that refers to the list of elected and non-elected representatives has an average well below the others, which suggests that whoever re-candidates is reelected to the position. Silveira (2009) calls attention to the fact that reelection in municipalities can benefit from the fact that politicians usually exercise control over municipal secretariats and other public agencies, guaranteeing the preservation and expansion of their particular (political) interests. It is noteworthy that we are talking about an average for the more than five thousand municipalities.

Other statistical techniques should be considered for a more specific analysis of these results. Table 1 summarizes the descriptive statistics of municipal parliamentarians for the four elections analyzed.

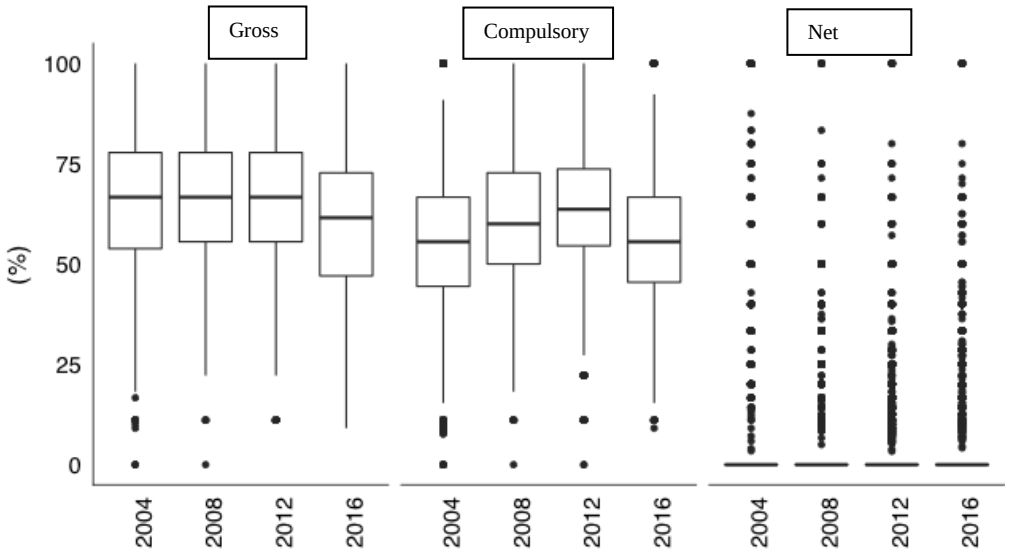
Table 1. Descriptive statistics of municipal parliamentary renewals in Brazil (2004-2016)

Year	Renewal Type	Avg.	Stand. Deviation	Medium	Min.	Max.	CV
2004	Gross	61,79	17,11	66,67	0,00	100,00	0,28
	Compulsory	58,78	18,50	55,56	0,00	100,00	0,31
	Net	8,01	22,60	0,00	0,00	100,00	2,82
2008	Gross	62,88	16,24	66,67	0,00	100,00	0,26
	Compulsory	60,99	16,35	60,00	0,00	100,00	0,27
	Net	4,52	13,48	0,00	0,00	100,00	2,98
2012	Gross	64,62	15,60	66,67	11,11	100,00	0,24
	Compulsory	62,61	15,77	63,64	0,00	100,00	0,25
	Net	4,39	12,12	0,00	0,00	100,00	2,76
2016	Gross	60,57	15,92	61,54	9,09	100,00	0,26
	Compulsory	58,61	16,09	55,56	9,09	100,00	0,27
	Net	4,48	12,11	0,00	0,00	100,00	2,70

Source: elaboration of the authors from the SEC data.

For the three rates in the four electoral disputes, there are municipalities where the minimums are zero and the maximums are 100% renewal. The net renewal rate is the one that draws the most attention because it presents lower values. When we look only at the standard deviations, we may find that it is apparently equal to the other rates. To make the comparison of the values more coherent, we must consider the coefficient of variation (CV). In this case we chose to report the results with box-plot charts.

Chart 2. Box-plot of the renewal rates of municipal legislative elections in Brazil (2004-2016)



Source: elaboration of the authors from the SEC data.

Chart 2 shows the distribution of rates in more than 5,000 municipalities, recording that the concentration is between 50% and 75% of *gross* and c*ompulsory* renewal, respectively. While *net* renewal is concentrated at zero, with many cases out of the confidence interval, which explains such high coefficients of variation. The results indicate that the incumbents present an advantage in the dispute, corroborating with the specialized literature (GELMAN and KING, 1990; GERBER, 1998, 2004; SAMUELS, 2001; LEE, 2008; MENDES, ROCHA and AMORIM, 2004; BRAMBOR and CENEVIVA, 2012). Table 2 analyzes these data in a more specific way, presenting results of the municipal parliamentary renewal by regions and later by the number of voters. The objective is to describe these distributions better, since we expect that in Brazil the distribution is not random and that regional particularities matter.

Table2. Descriptive statistics of municipal parliamentary renewals by region (2004-2016)

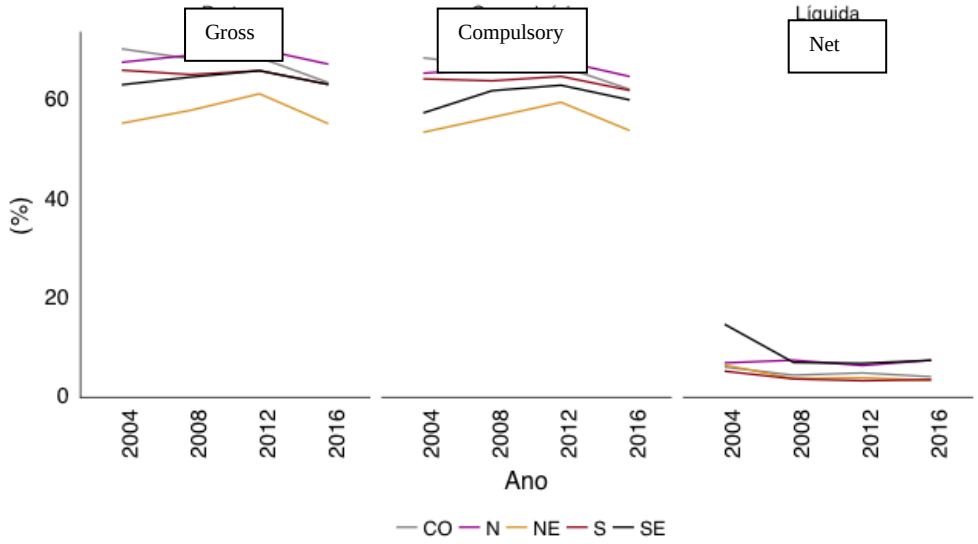
Region	Renewal	Avg.	Stand. Deviation	CV
CO	Gross	67,31	15,16	0,23
	Compulsory	65,74	15,54	0,24
	Net	4,30	13,93	3,24
N	Gross	68,18	14,84	0,22
	Compulsory	65,74	15,24	0,23
	Net	6,51	16,73	2,57
NE	Gross	57,02	16,22	0,28
	Compulsory	55,43	16,30	0,29
	Net	3,80	12,92	3,40
S	Gross	64,68	16,17	0,25
	Compulsory	63,34	16,65	0,26
	Net	3,37	12,36	3,67
SE	Gross	63,82	15,52	0,24
	Compulsory	60,18	16,73	0,28
	Net	8,25	19,46	2,36

Source: elaboration of the authors from the SEC data.

Compulsory and *gross* renewal rates are lowest in the Northeast (NE), 55.43% and 57.02%, respectively. In general terms, these rates point to a mandatory number of new legislators in legislative houses, that is, considering the elections analyzed, this region of the country is the one that least renews its city councils.

In other regions these rates are approximately 10% higher than in the Northeast. As for the *net* renewal rate, it should be noted that it is higher in the Southeast (SE) (8.25%), that is, in the Southeast the incumbent municipal legislature is less successful than its competitors. At least, in descriptive terms. Future hypothesis testing and other analyzes at the municipal level and perhaps at other levels should be considered to explain this phenomenon. Our methodological concern here is not to justify the need for municipal parliamentary renewal as an explanatory variable for better social and economic indicators, nor the opposite. Chart 3 summarizes the means of electoral renewal by Region and electoral year.

Chart 3. Average renewal rates of municipal legislative elections by Region (2004-2016)



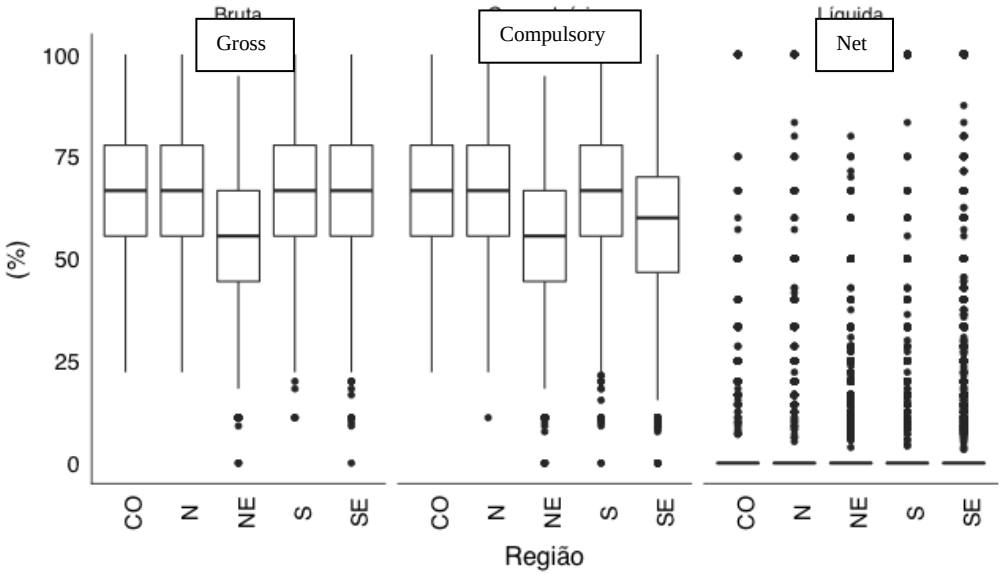
Source: elaboration of the authors from the SEC data

The average rates of gross and compulsory renewal up to the 2012 Elections show a growth trajectory B[8]. And perhaps it was really a growth trajectory, but to say that, it would be necessary to have data prior to the 2000 Elections, which, although available in the SEC databases, lack indexers to ensure that candidate A really is candidate A and not. This problem is even greater because it is a database with more than five thousand municipalities per election, which makes individual conference of cases unfeasible.

The average rates of *net* renewal are stable, that sis, with no upward or downward trend. It is worth mentioning that the rate in the Southeast Region is not in line with the pattern of the other regions (8.25%) in the 2004 elections. In chart 4, we present a boxplot illustration, which clarifies the understanding of the distribution of these renewal rates for the series analyzed.

[8] Future works may make use of statistical techniques of time-series to analyze the trend behavior of parliamentary renewal in Brazilian municipalities. For more information on time-series, see Enders (2008), Morettin and Toloi (2006), Chatfield (1996), Box, Jenkins and Reinsel (1994) and Brockwell and Davis (1991).

Chart 4. Box-plot of renewal rates of municipal legislative elections by Region (2004-2016)

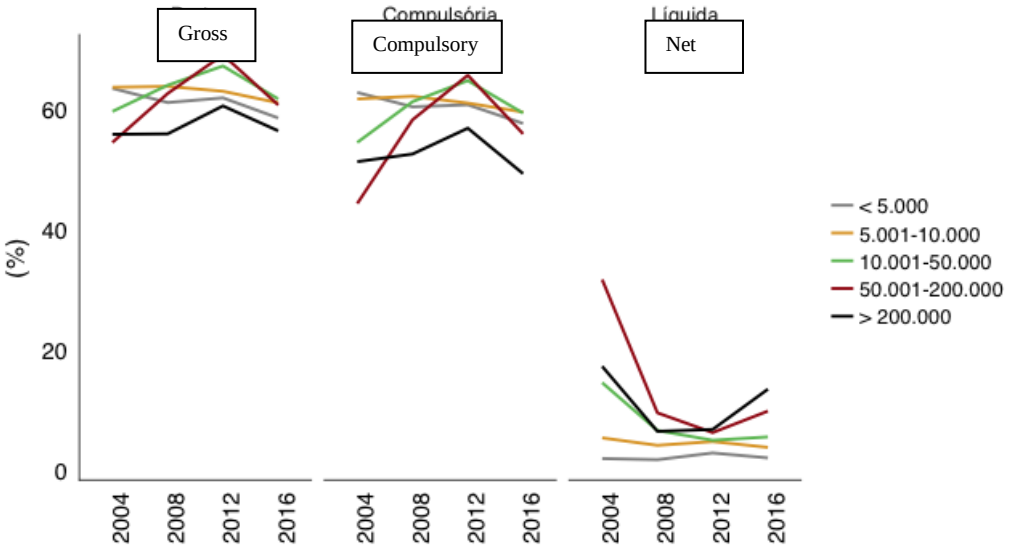


Source: elaboration of the authors from the SEC data

In terms of *gross* renewal, the concentration is in the range between 50% and 75%, except in the Northeast, which presents an interval slightly below as recorded in the previous table. *Compulsory* renewal follows a similar pattern of distribution, with the Northeast and Southeast regions at rates noticeably below the other regions. In more practical terms, gross and compulsory renewal rates have similar patterns of destruction, that is, city councilors are reelected in the 50-75% range. It is possible that studies involving the profile of city councilors that dispute and / or elect / reelect city councils may provide explanatory outputs for this phenomenon. We also believe that socioeconomic indicators can be used as control variables to clarify the reasons why the Northeast Region has lower rates of renewal.

In relation to the net renewal rate, the results do not present significant differentiation for the regions, since the concentration is close to zero. In practical terms, the results indicate that the proportion of defeated over the total incumbents is zero. Chart 5 summarizes the renewal rates by the number of voters of the municipalities analyzed.

Chart 5. Averages of the renewal rates of municipal legislative elections by number of voters (2004-2016)

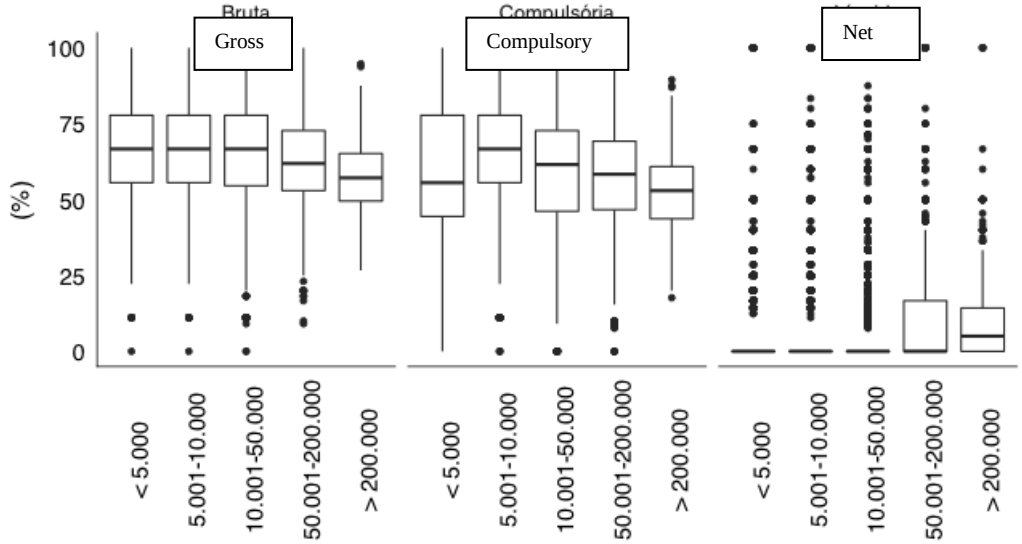


Source: elaboration of the authors from the SEC data

In chart 5, we can see that, for the period analyzed, only municipalities with more than 20 thousand voters had some trajectory of increase of *gross* and *compulsory* renewal rates. But in all voter ranges, in 2016 *gross* and *compulsory* rates were lower than in 2012. The net renewal rate in 2004 was higher than in all other years, with the exception of municipalities below 10,000 voters, where there was almost no change in the average rates of each year. It should be noted that, in municipalities with more than 50,000 voters, the net rate was higher in 2016 than in 2012. In this way, we can understand that, even though there was less withdrawal of re-candidates (*compulsory* renewal), there was a greater loss for the incumbents, that is, higher was the average renewal due to electoral defeats in those quantity ranges of voters.

In addition to the more technical analysis of these results, it is important to note that differences in renewal rates in municipalities with different numbers of voters are explained by the fact that political scenarios are influenced by this variable. That is, smaller municipalities tend to present electoral competition with logics of campaign and behavior of politicians distinct from that of larger municipalities. The reverse is true. Below, in chart 6, we describe information about the distribution of the analyzed rates, also considering the municipalities by number of voters.

Chart 6. Box-plot of renewal rates of municipal legislative elections by number of voters (2004-2016)

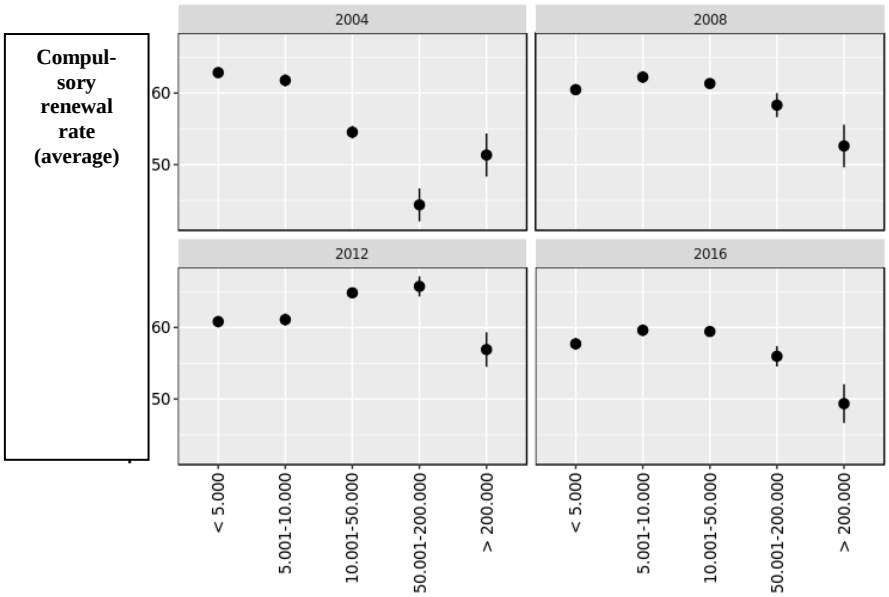


Source: elaboration of the authors from the SEC data

Again, *gross* renewal rates are similar across all ranges of quantities of voters, with a slight decrease as the voters' quantity increases, but overall, the range is between 50 and 75%. It should be noted that the range of over 200,000 voters has less dispersion in the *gross* renewal rate. In *compulsory* renewal, cities with up to 5,000 voters show the greatest dispersion in the rate of renewal among the groups analyzed. Generally, this category of renewal is concentrated between about 50% and 75%. It is only from chart 6 that we have some more visible differentiation of the *net* renewal rate, and, as we can see, are in the cities with more than 50 thousand voters where incumbents presented the lowest rates of electoral success, generating a concentration of rate of *net* renewal close to 25%. While, in the other ranges, the concentration is close to zero.

Finally, we present the analyses of the tests of differences of averages of renewal, to find statistically significant results. Chart 7 summarizes the results regarding the compulsory renewal rate.

Chart 7. Differences in *compulsory* renewal by election and number of voters

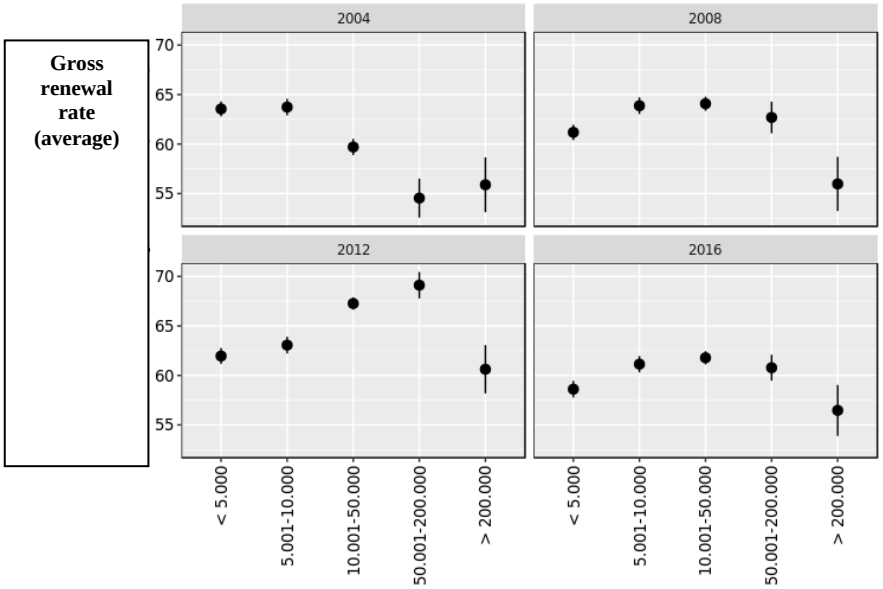


Source: elaboration of the authors from the SEC data.

With regard to compulsory renewal, we can observe that the data behave in a similar way throughout the four elections, highlighting as atypical those of 2012. The average pattern is high compulsory renewal in the smaller municipalities. For all electoral disputes, the difference in the rate between municipalities with less than 5,000 voters and those with more than 200,000 voters was significant. For the elections between 2008 and 2016, there were no statistical differences between municipalities with less than 5 thousand, between 5 and 10 thousand and 50 thousand voters. As the charts show, compulsory renewal is quite high in all municipalities. Only in municipalities between 50,000 and 200,000 in 2004, and above 200,000 in 2016, the compulsory renewal rate was less than 50%.

This kind of result in graph form brings at least two advantages to the analyses. The first is the intuitive gain the reader has when reading charts in relation to tables. The second is to analyze specific data, in our case, for each of the renewal rates, considering all the elections, the size of the municipalities according to the number of voters and, finally, all the elections that we propose to analyze. Next, in chart 8 we present the results for the same variables referring to the gross renewal rate.

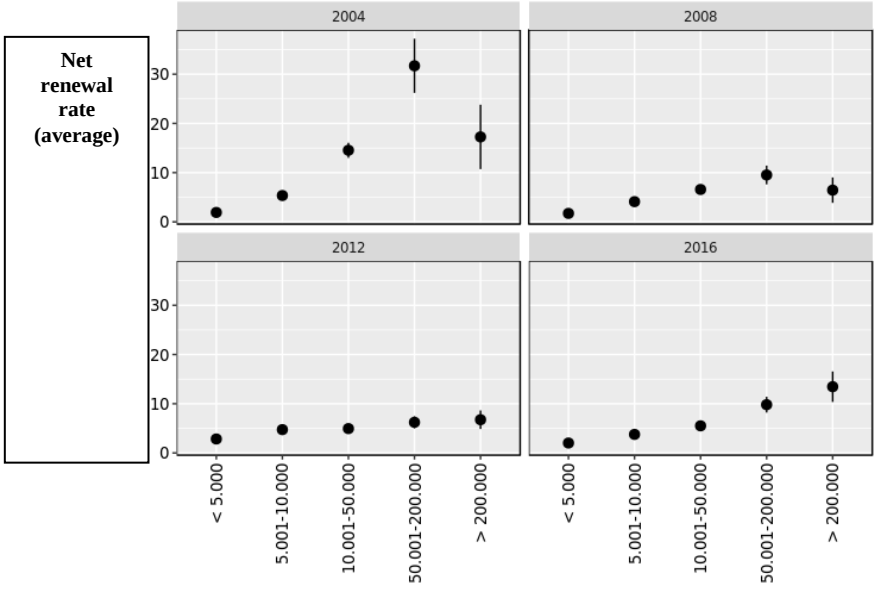
Chart 8. Differences in *gross* renewal by election and number of voters



Source: elaboration of the authors from the SEC data.

When we deal with *gross* renewal, patterns begin to disappear. In 2004, this type of renewal was significantly lower in the upper two strata of the electoral contingent. While, in the following election, only the large municipalities had a significantly smaller renovation, even so, establishing them at the 65% mark. These indicators have declined in the last elections. The highest average renewal rate occurred in municipalities between 10,000 and 50,000 voters, marking 61.79%. Municipalities with more than 200,000 voters achieved a significantly lower renewal.

Chart 9. Differences in *gross* renewal by election and number of voters



Source: elaboration of the authors from the SEC data

The results indicate that the scenario changes greatly when the size of the municipalities is increased. Whereas, in the previous measures, cities with more than 200 thousand voters obtained the lowest rates, as far as the net renovation is concerned, they present the highest rates. It seems that incumbents suffer more defeats in these large cities, which may indicate greater competition in electoral disputes. This was clear in 2004, where the differences were significant in all multiple comparisons (except between cities with 10,000 to 50,000 and those with more than 200,000). In the last elections, the pattern was the same. The incumbents suffer more the greater the city[9].

5 Final considerations

This work tries to advance in a research agenda still little explored in the Brazilian Political Science: renovation in the city councils. The first consideration of this work concerns the absence of studies on elections and municipal legislative behavior. On the one hand, there is a research agenda to be explored, with little literary reference and methodological models; on the other hand, there is a significant amount of data to be worked on. It is not known why researchers in Political Science in Brazil do not invest in this agenda. The large number of Brazilian municipalities (5,570) may be the major obstacle to the development of research. Moreover, as the information goes back in time, less reliable and less precise become - even in official repositories like the Superior Electoral Court (SEC). This fact is directly related to our choice by municipal elections as of 2004.

Our focus consisted in analyzing three types of renovation: *gross*, *liquid* and *compulsory*. In summary, the results indicate that, on average, there is a *gross* and *compulsory* renewal of around 60% of the seats. In turn, the *net* renewal is 9%. In general, net renewal is greater in municipalities with more than 50,000 voters, meaning that incumbents are more defeated in these constituencies. The Northeast has the lowest average renewal rate (gross = 57%, compulsory = 55.43% and net = 3.8%). This indicates a behavior of greater permanence of city councilors in power.

In summary, our findings on municipal parliamentary renewal point to a *gross* rate that is close to that of the Chamber of Deputies and State House of Representatives. These data make room for a research agenda, to explore whether legislative output, political ambition, electoral, institutional variables, geographic regions, expenditures and campaign financing among others, have explanatory power on the renewal of these parliamentarians. But, moreover, we are pointing to a methodological solution, with empirical results and providing an indicator of how the reelection rates in the municipalities behave for one of the objects of studies less analyzed by

[9] It is noteworthy that results in the form of tables containing more specific information in this study on rates of renewal, number of voters by municipalities, regions of the country and electoral years are present in the Appendix of this article.

Brazilian Political Science: the city councilmen.

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APPENDIX

Tabela 3. Renewal Rate by Region and Year (2004-2016)

Region	Year	Renewal Type	average	relative standard deviation	CV	Region	Year	Kind of renovatin	average	relative standard deviation	CV
CO	2004	Gross	69.97	14.70	0.21	NE	2012	Gross	60.88	15.89	0.26
CO	2004	compulsive	68.15	15.82	0.23	NE	2012	compulsive	59.16	16.01	0.27
CO	2004	net value	5.54	18.21	3.29	NE	2012	Líquida	3.36	9.58	2.85
CO	2008	Gross	67.97	15.37	0.23	NE	2016	Gross	54.80	15.63	0.29
CO	2008	compulsive	66.60	15.65	0.23	NE	2016	compulsive	53.42	15.66	0.29
CO	2008	net value	3.88	13.70	3.53	NE	2016	net value	2.85	8.68	3.05
CO	2012	Gross	68.19	15.10	0.22	S	2004	Gross	65.65	16.79	0.26
CO	2012	compulsive	66.49	15.24	0.23	S	2004	compulsive	63.90	18.07	0.28
CO	2012	net value	4.34	12.31	2.84	S	2004	net value	4.69	16.74	3.57
CO	2016	Gross	63.13	14.66	0.23	S	2008	Gross	64.77	16.15	0.25
CO	2016	compulsive	61.76	14.73	0.24	S	2008	compulsive	63.50	16.36	0.26
CO	2016	net value	3.57	10.90	3.05	S	2008	net value	3.13	10.84	3.46
N	2004	Gross	67.25	14.94	0.22	S	2012	Gross	65.54	15.55	0.24
N	2004	compulsive	65.04	15.89	0.24	S	2012	compulsive	64.40	15.75	0.24
N	2004	net value	6.37	18.60	2.92	S	2012	net value	2.76	10.64	3.86
N	2008	Gross	68.70	15.52	0.23	S	2016	Gross	62.77	16.02	0.26
N	2008	compulsive	66.01	16.09	0.24	S	2016	compulsive	61.55	16.19	0.26
N	2008	net value	6.92	16.71	2.41	S	2016	net value	2.98	10.35	3.47
N	2012	Gross	69.91	14.13	0.20	SE	2004	Gross	62.70	16.41	0.26
N	2012	compulsive	67.53	14.09	0.21	SE	2004	compulsive	56.99	19.20	0.34
N	2012	net value	5.84	14.91	2.55	SE	2004	net value	14.19	29.61	2.09
N	2016	Gross	66.87	14.58	0.22	SE	2008	Gross	64.26	15.45	0.24
N	2016	compulsive	64.37	14.67	0.23	SE	2008	compulsive	61.50	15.86	0.26
N	2016	net value	6.92	16.67	2.41	SE	2008	net value	6.46	16.01	2.48
NE	2004	Gross	54.90	16.64	0.30	SE	2012	Gross	65.55	14.95	0.23
NE	2004	compulsive	53.08	17.02	0.32	SE	2012	compulsive	62.61	15.29	0.24
NE	2004		5.94	19.73	3.32	SE	2012		6.28	14.19	2.26

		net value						net value			
NE	2008	Gross	57.53	15.94	0.28	SE	2016	Gross	62.77	15.07	0.24
NE	2008	compulsive	56.10	15.75	0.28	SE	2016	compulsive	59.63	15.72	0.26
NE	2008	net value	3.20	11.01	3.44	SE	2016	net value	6.90	14.58	2.11

Fonte: elaboration of the authors with data from the Superior Electoral Court.

Tabela 4. Renewal Rate by voter range and year (2004-2016)

Year	**Voters banner**	**Renewal Type**	**Average**	**relative standard deviation**	**CV**	**Year**	**Voters banner**	**Renewal Type**	**Average**	**relative standard deviation**	**CV**
2004	< 5.000	Gross	63.55	16.84	0.26	2012	20.001-50.000	compulsive	65.88	13.29	0.20
2004	< 5.000	compulsive	62.86	17.06	0.27	2012	20.001-50.000	net value	4.80	11.66	2.43
2004	< 5.000	net value	1.91	10.02	5.25	2016	20.001-50.000	Gross	61.95	14.74	0.24
2008	< 5.000	Gross	61.18	16.91	0.28	2016	20.001-50.000	compulsive	59.36	14.86	0.25
2008	< 5.000	compulsive	60.47	16.95	0.28	2016	20.001-50.000	net value	5.90	13.72	2.33
2008	< 5.000	net value	1.72	8.15	4.74	2004	50.001-100.000	Gross	56.02	16.98	0.30
2012	< 5.000	Gross	61.96	16.41	0.26	2004	50.001-100.000	compulsive	44.98	19.84	0.44
2012	< 5.000	compulsive	60.81	16.55	0.27	2004	50.001-100.000	net value	30.03	38.15	1.27
2012	< 5.000	net value	2.84	10.56	3.72	2008	50.001-100.000	Gross	63.49	14.81	0.23
2016	< 5.000	Gross	58.61	16.89	0.29	2008	50.001-100.000	compulsive	59.31	15.55	0.26
2016	< 5.000	compulsive	57.70	17.01	0.29	2008	50.001-100.000	net value	9.36	18.36	1.96
2016	< 5.000	net value	2.02	7.90	3.91	2012	50.001-100.000	Gross	70.33	12.85	0.18
2004	5.001-10.000	Gross	63.73	16.37	0.26	2012	50.001-100.000	compulsive	66.99	13.61	0.20
2004	5.001-10.000	compulsive	61.78	16.86	0.27	2012	50.001-100.000	net value	6.20	11.59	1.87
2004	5.001-10.000	net value	5.35	17.13	3.20	2016	50.001-100.000	Gross	61.72	12.52	0.20
2008	5.001-10.000	Gross	63.87	16.19	0.25	2016	50.001-100.000	compulsive	57.57	13.74	0.24
2008	5.001-10.000	compulsive	62.23	16.26	0.26	2016	50.001-100.000	net value	8.42	13.60	1.62
2008	5.001-10.000	net value	4.11	13.43	3.27	2004	100.001-200.000	Gross	51.19	14.96	0.29
2012	5.001-10.000	Gross	63.06	16.47	0.26	2004	100.001-200.000	compulsive	43.00	18.26	0.42
2012	5.001-10.000	compulsive	61.09	16.80	0.28	2004	100.001-200.000	net value	34.72	39.27	1.13
2012	5.001-10.000	net value	4.74	13.00	2.74	2008	100.001-200.000	Gross	60.55	13.03	0.22
2016	5.001-10.000	Gross	61.14	16.16	0.26	2008	100.001-200.000	compulsive	55.64	13.70	0.25

2016	5.001-10.000	compulsive	59.60	16.18	0.27	2008	100.001-200.000	net value	9.95	13.37	1.34
2016	5.001-10.000	net value	3.77	11.97	3.18	2012	100.001-200.000	Gross	66.29	11.48	0.17
2004	10.001-20.000	Gross	60.69	17.54	0.29	2012	100.001-200.000	compulsive	62.80	11.90	0.19
2004	10.001-20.000	compulsive	56.67	18.97	0.33	2012	100.001-200.000	net value	6.28	11.10	1.77
2004	10.001-20.000	net value	11.77	27.36	2.32	2016	100.001-200.000	Gross	58.36	11.86	0.20
2008	10.001-20.000	Gross	63.58	15.96	0.25	2016	100.001-200.000	compulsive	51.85	12.25	0.24
2008	10.001-20.000	compulsive	61.23	16.16	0.26	2016	100.001-200.000	net value	13.35	18.46	1.38
2008	10.001-20.000	net value	5.57	14.69	2.64	2004	> 200.000	Gross	55.96	11.37	0.20
2012	10.001-20.000	Gross	66.49	15.07	0.23	2004	> 200.000	compulsive	51.42	12.42	0.24
2012	10.001-20.000	compulsive	64.19	15.15	0.24	2004	> 200.000	net value	17.28	26.79	1.55
2012	10.001-20.000	net value	5.04	13.33	2.64	2008	> 200.000	Gross	56.03	12.12	0.22
2016	10.001-20.000	Gross	61.68	15.97	0.26	2008	> 200.000	compulsive	52.67	13.21	0.25
2016	10.001-20.000	compulsive	59.47	16.07	0.27	2008	> 200.000	net value	6.44	11.36	1.76
2016	10.001-20.000	net value	5.27	13.23	2.51	2012	> 200.000	Gross	60.68	11.20	0.18
2004	20.001-50.000	Gross	58.03	17.79	0.31	2012	> 200.000	compulsive	56.96	11.12	0.20
2004	20.001-50.000	compulsive	50.94	19.14	0.38	2012	> 200.000	net value	6.76	8.64	1.28
2004	20.001-50.000	net value	19.72	34.41	1.74	2016	> 200.000	Gross	56.52	12.38	0.22
2008	20.001-50.000	Gross	64.93	15.63	0.24	2016	> 200.000	compulsive	49.40	13.04	0.26
2008	20.001-50.000	compulsive	61.54	15.70	0.26	2016	> 200.000	net value	13.46	14.95	1.11
2008	20.001-50.000	net value	8.26	18.20	2.20	2012	20.001-50.000	compulsive	65.88	13.29	0.20
2012	20.001-50.000	Gross	68.53	12.77	0.19	2012	20.001-50.000	net value	4.80	11.66	2.43

Fonte: elaboration of the authors with data from the Superior Electoral Court.

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