Legislatures as social arenas: co-authorship in the City Council of Rio de Janeiro
Francisco Moraes da Costa Marques

Abstract

In this paper I look at legislatures as social arenas in which numerous interactions take place. These interactions affect the policy making process, as legislators develop notions of reciprocity, forge alliances, friendships and, also, enmities among themselves. Likewise to what has been done in studies of different legislatures in the United States, I see instances of co-authorship as an indicator of interlegislator cooperative relationship. More specifically, I aim at explaining the cooperative relationship among the members of the City Council of Rio de Janeiro during the fourteen-year period between 1997 and 2010.

My focus, then, is on the interactions among the legislators, instead of on individual legislators themselves. Here legislators constitute the nodes and their dyadic interactions, the ties connecting them. Social network analysis offers me the quantitative tools to test and weigh the impact of a set of proxies of homophily and social interaction – such as constituency similarity and shared committee membership – on the strength of the cooperative relationship that councillors establish among themselves through co-authorship.

1. Introduction

In this paper I analyse the strength of the cooperative relationship that councillors members of the Rio de Janeiro City Council establish among themselves. As I further detail, I see councillors’ co-authorship ties as a proxy of their cooperative relationship. The concept is simple: if two or more councillors decide to co-sign a certain proposal, it is fairly reasonable to consider them as having developed a cooperative relationship among themselves. As I explain, too, in the following pages, the measurement of how strong these ties are takes into account, for every dyad of councillors, the frequency of co-authorship and the relative weight of each co-authorship as a function of the number of co-authors signing the proposal. The analysis covers the fourteen-year period between 1997 and 2010.
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It is Rice (1927) who first uses pairs of legislators as the unit of analysis, measuring the dyadic similarity/dissimilarity regarding roll call votes between members of the New Jersey Senate. Rice (1927) also envisions, but does not test, the effects of what is nowadays known in the literature as homophily. Accordingly, similar values and background and common individual attributes would bring legislators closer to one another.

Looking at the Wisconsin Assembly in the late 1950s, Patterson (1959) pioneered the testing of the effects of social ties on legislative affairs. The relationships between legislators, its existence and strength, were measured as the presence/absence and the intensity of self-reported friendship ties, collected in interviews and questionnaires. Accordingly, the legislature is seen as a network in which legislators constitute the nodes and their dyadic interactions, the ties connecting them. The focus, then, shifts from legislators to the interactions among them and their effects on the behaviour of individuals and groups (Knoke, 1990; Scott, 2000).

Until recently, though, this research avenue had not been taken with enthusiasm as scholars opted for models in which social interactions were assumed away. It is only a few years now since political scientists have been adopting it more frequently, resorting to the tools and concepts of social network analysis (SNA).

Rice (1927), then, leads the way in showing the importance of homophily while Patterson (1959) introduces the effect of social interaction on legislators’ behaviour. In this paper I look at both, which, I contend, significantly impact councillors’ cooperative relationship. My measurements of homophily express similarities/dissimilarities in terms of the legislature’s activities per se – as shared committee membership – and legislators’ attributes not directly associated with the Council processes – as constituencies’ characteristics. Besides focusing on the effects of social interactions, I am particularly keen in analysing the role of the electoral connection, to use Mayhew’s

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1 Analyses of interlegislator interactions were rare and usually restricted to ethnographic studies (Bezerra, 1999; Kuschnir, 2000a; Crewe, 2010). Among the few exceptions, Caldeira and Patterson (1987) and Caldeira et. al. (1993) measured respectively friendship and political respect among legislators in Iowa state legislature.
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(1974) now classic expression. In addition, I test the influence of party ideology, which, in contrast, I expect to be insignificant.

Still at its beginnings, the contribution of SNA to legislative studies lacks the controversies seen in established, more mature fields. Yet, scholars have been addressing a number of important long debated questions.

For instance, Ringe et. al. (2009) and Ringe (2009) analyse, respectively, information exchange networks and roll call votes in the European Parliament. Arnold et al. (2000) and Peoples (2008) work with data from the Ohio state legislature and measure the effect of social ties on legislators’ position on roll call votes. Kirkland (2010) looks at how weak ties, as understood by Granovetter (1973), translate into legislative influence in the agenda setting process at the U.S. House of Representative and eight lower state legislatures. Victor and Ringe (2010), contradicting the findings of previous research, see the informal network of caucuses replicating and reinforcing the formal structure of power and influence inside the U.S. House of Representatives. Fowler (2006a) uses the legislative co-sponsorship network in both chambers of the U.S. Congress to identify the most influential members in the legislature, applying an original measure of closeness centrality.


Rather than conducting interviews or running questionnaires, most frequently researchers today use several proxies for legislators’ social interaction, such as seat proximity, tenure similarity (Peoples, 2008), office location (Gross, 2008), shared committee membership (Bratton and Rouse, 2009) and constituency proximity (Fowler, 2006b).

2. My Research Question

The question I aim at answering is:
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Do instances of social interaction as well as the different incentives stemming from the electoral arena explain the cooperative relationship that councillors establish among themselves through proposals co-authorship ties?

3. Hypotheses

I exam the effect of twelve independent variables: shared committee/directorate membership, served together, same area, vote distribution, dominance, living standards, same region, schooling, common committee/directorate membership, number of votes, provision of social services and party ideology. The first two variables should lie at the heart of the explanation. They measure instances of social interaction among councillors whereas vote distribution, dominance, living standards and same region capture the effect of the electoral connection. The last five variables are control variables.

Served Together and Shared Committee/Directorate Membership

Served together and shared committee/directorate membership are my main variables. The first refers to interlegislator contacts in the RJCC in general; the second, specifically in the committees. Consonant with current research, I expect that social interaction will strengthen cooperative relationship (Braton and Rouse, 2009; Burkett and Skvoretz, 2001; Gross, 2008). Thus, councillors who have previously served together and councillors who share or have shared a committee/directorate membership should bear stronger relationships between themselves.

From what has been specified, I derive the following hypotheses:

H1 Councillors who have previously served together establish stronger cooperative relationship between each other than councillor who have not.

H2 Councillors who share or have previously shared a committee/directorate membership establish stronger cooperative relationship between each other than councillors who have never shared a committee.

Same Area

The concept of area is crucial for councillors who concentrate particularly large shares of votes in a few neighbourhoods. These neighbourhoods, the top ones and their vicinities, comprise the areas. Not formally established, the areas somehow find their
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limits based on the borders of the official Administrative Regions (ARs), usually encompassing two or three of them.²

The importance of the ARs in making up the areas derives from the executive’s strategy to help its allies. In order to improve the electoral prospective of its legislative coalition, the mayor hands in the command of the ARs to key partners. The control over the ARs is a powerful tool to build up ones’ personal reputation. Functioning as decentralised units of the municipal government, they help citizens dealing with red tape and channel the grievances and demands regarding the provision of local public services.

As Figure 1 shows, there are twelve areas in total: Centro; Tijuca & Adjacencies; South Zone; Central’s Suburbs I; Central’s Suburbs II; Central’s Suburbs III; Leopoldina’s Suburbs; Ilha do Governador; Barra da Tijuca & Jacarepaguá; West Zone I; West Zone II and West Zone III.³

Figure 1 - Rio de Janeiro – Areas

² There are three different territorial levels in Rio de Janeiro. The Planning Areas (PAs) are the broadest administrative level. The ARs come next. They make up an intermediary level between the PAs and the neighbourhoods, which are the smallest units of the municipal territory. In total, there are 10 APs, 34 ARs and 140 neighbourhoods.

³ The corresponding ARs of each area are as follows: Centro covers ARs I, II and III; Tijuca & Adjacencies covers ARs XVIII and IX; South Zone covers ARs IV, V, VI and the favela of Rocinha; Ilha do Governador covers AR XX; Leopoldina’s Suburbs covers ARs X, XI and the groups of favelas Complexo do Alemão and Complexo da Maré; Central’s Suburbs I covers ARs XIV and XV; Central’s Suburbs II covers ARs XXII and XXV; Central’s Suburbs III covers ARs XII and XIII; Barra da Tijuca & Jacarepaguá covers ARs XVI, XXIV and XXXIV; West Zone I covers ARs XVII and XXXIII; West Zone II covers AR XVIII; and West Zone III covers ARs XIX and XXVI.
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Not surprisingly, many candidates anchor their campaigns in a couple of ARs or, to use their own word, a certain area (Diniz, 1982; Kuschnir, 2000a; 2000b; Costa Marques, 2007; Lameirão, 2007). Understandably, councillors who share the same area see one another as main rivals, which should lead them to establish only weak or no cooperative relationship among themselves.

From what has been specified, I derive the following hypothesis:

**H3 Councillors who share an area establish weaker cooperative relationship between each other than councillor who do not share an area.**

**Vote Distribution, Dominance, Living Standards and Same Region**

Vote distribution, dominance, living standards and same region all measure the effect of the electoral connection on the strength of the cooperative relationship that councillors establish among themselves.

Vote distribution, dominance and living standards refer to constituencies’ characteristics. Building on the work of Ames (2005) we may point them out as the main defining elements of councillors’ constituencies: (1) the relative dispersion/concentration of votes; (2) competition from fellow members of the legislature; and (3) living standards. Increasing similarity in constituencies’ characteristics should lead to stronger interlegislator cooperative relationship. Same region, though, does demands some qualification
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If the sharing of an area pushes councillors apart, the sharing of a region should have the opposite effect. As seen in Figure 1, with the exception of Ilha do Governador and Barra/Jacarepaguá, regions form broader territories. Given its size, a region could allow the strong electoral presence of more than one councillor inside it without turning them into one another’s main contenders. These councillors would not necessarily compete for the same votes, their constituencies, yet, would be fairly similar. The sharing of a region, then, should strengthen interlegislator relationship.

From what has been specified regarding vote distribution, dominance, living standards and same region, I derive the following hypotheses:

H4 The more similar the shares of votes two councillors have in their top neighbourhoods, the stronger their cooperative relationship.

H5 The more similar the dominance degree of two councillors over their top neighbourhoods, the stronger their cooperative relationship.

H6 The more similar the living standards of the top neighbourhoods of two councillors, the stronger their cooperative relationship.

H7 Councillors who share a region establish stronger cooperative relationship between each other than councillor who do not share a region.

Control Variables: Schooling, Common Committee/Directorate Membership and Party Ideology

Schooling, common committee/directorate membership, and party ideology are measurements of homophily. It is reasonable to conceive similar councillors in regard to individual attributes and experiences inside the legislature as sharing common interests. Accordingly, similar schooling and common committee/directorate membership would lead councillors to develop stronger cooperative relationships. By its turn, party ideology is not expected to significantly affect councillors’ behaviour.

Control Variables: Number of Votes and Provision of Social Services

Increasing similarity between councillors regarding their number of votes should lead to stronger cooperative relationship between them. As far as the provision of social services is concerned, councillors who run social centres should engage in weaker cooperative relationship with each other, given their half-hearted enthusiasm for legislative initiatives in general.
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Methods

I adopt a quantitative approach based on regression analysis to answer my main and subsidiary research questions. My analysis covers four legislative sessions – 1997-2000, 2001-2004, 2005-2008 and the first two years of the 2009-2012. In the legislative sessions of 1997-2000 and 2001-2004, there were forty-two seats in RJCC. This number went up to fifty in the following legislative session of 2005-2008 and finally to fifty-one in the legislative session of 2009-2012. However, the total number of councillors serving in each legislative session has been greater than the number of seats in the council. In Brazil, for every elected legislator a substitute legislator is also elected. Some substitutes are actually sworn in to replace main office holders who take a leave of absence or do not finish their terms. Hence, the total number of councillors serving in each of the four legislative sessions is respectively 53, 52, 66 and 56.

I look at each of the four legislative sessions separately, using a linear regression model. I am also working with a different type of data, typical of SNA. My variables, then, do not measure the attributes of individual legislators but the dyadic relation between them. Therefore, my unit of analysis is the dyadic distances in terms of similarity/dissimilarity between councillors instead of individual councillors themselves. My relational data describes an undirected network. Each of my variables forms a councillor by councillor square, symmetric matrix. In symmetric matrices the top half and the bottom half are identical, as the example shows.

Figure 2 - Square, Symmetric Matrix

<table>
<thead>
<tr>
<th>Councillor</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>5</td>
<td>.</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>7</td>
<td>3</td>
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</tr>
<tr>
<td>E</td>
<td>0</td>
<td>8</td>
<td>3</td>
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</tbody>
</table>

Author’s elaboration.
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Rather than considering all councillors, I am analysing here only those who serve their entire four-year terms in office. The reason for this is simple: main office holders who interrupt their terms and their substitutes never serve together, so they never have the chance to co-author any legislative proposal. For each legislative session, all councillors are paired with each other.

Autocorrelation is a well known feature of social network data. Instead of being independent from each other, observations in social network data are conceived of having at least some (unknown) degree of interdependence. In relational dyadic data, this is clearly the case of observations located in the same row or column, which tend to be positively correlated as they all share a common actor. Such particularity makes an OLS model an inappropriate tool for my analysis, given its reliance on the assumption that observations are independent. Most typically, because the error terms are correlated across the observations, an OLS model would underestimate the standard errors, providing me overestimated significance for my regression coefficients (Martin, 1999; Simpson, 2001).

Some scholars working on the field of legislative studies have employed multilevel models with random effects as a solution (Gross, 2008; Koger and Victor, 2009; Victor and Koger, 2010). This alternative, though, requires modelling and estimating the covariance matrix (Rabe-Hesketh and Skrondal, 2008), a task – it has been argued – for which in the case of dyadic data there is no theory to guide us through (Krackhardt, 1988).

As a solution, while using a linear regression model, I resort to a quadratic assignment procedure (QAP) in order to assess the significance of the relationship between my variables, accounting for the autocorrelation in my data (Krackhardt, 1987; 1988; Dekker et. al., 2007). This approach has been applied in research dealing with questions similar to the ones I interested in (Peoples, 2008; Bratton and Rouse, 2009).

Through a QAP the standard errors are estimated using permutations of the dataset. Firstly, the dependent variable matrix is regressed onto the independent variables matrices. Once the regression is run, the resulting coefficients are stored. In the following step, the observations in the dependent matrix are rearranged by permutation. Rows and columns are both simultaneously permuted, in order to keep the
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interdependencies in the data. The structural features of the network are kept intact, but observations change places, as seen below.

**Figure 3 - Original Matrix and Permuted Matrix**

<table>
<thead>
<tr>
<th>Councillor</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>A</td>
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<td>a14</td>
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<td>B</td>
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<td>a32</td>
<td>a33</td>
<td>a34</td>
<td>a35</td>
</tr>
<tr>
<td>D</td>
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<td>a42</td>
<td>a43</td>
<td>a44</td>
<td>a45</td>
</tr>
<tr>
<td>E</td>
<td>a51</td>
<td>a52</td>
<td>a53</td>
<td>a54</td>
<td>a55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Councillor</th>
<th>A</th>
<th>B</th>
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<tr>
<td>A</td>
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<td>a32</td>
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<td>a31</td>
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<td>a52</td>
<td>a54</td>
<td>a51</td>
<td>a55</td>
</tr>
</tbody>
</table>

Hence, comparing the permuted with the original matrix, we see that column A contains data originally in column C, column B remained with its original data, column C contains data originally in column D, column D contains data originally in column A and column E contains data originally in column D.

Notice that all the entries in each row share the first subscript, all the entries in each column share the second subscript and all the diagonal elements remain as diagonal elements, though in new positions. Through this process, the dyadic relationship between councillors as well any dependence between the observations located in the same row or column are preserved whereas the dependence between the independent and dependent variables is eliminated.

After the observations have been rearranged via permutation, a regression is performed again and the resulting coefficients are stored. This process is repeated many times – 2000 times, in this study –, generating an empirical sampling distribution of created coefficients for each independent variable, which corresponds to the null hypothesis of no association between independent and dependent variables.

Lastly, the regression coefficients from the first regression are compared with the empirical sampling distribution of created coefficients to determine significance. Thus, assuming the process of permutation has been repeated a hundred times, if the
coefficient from the first regression is greater than 95 of the 100 created coefficients, it is significant at the 0.05 level.

Because I apply a linear regression model, the characteristic skewness of the distribution of my dependent variables demands an additional observation. Legendre (2000) assesses the performance of four permutation techniques through numerous simulations. The simulations involve testing the different methods with skewed (exponential) and highly skewed (cubed exponential) data. As Legendre shows, the performance of the method I am using – permutation of raw data – is not affected when the data analysed is skewed or highly skewed.

**Measuring the Variables**

**Dependent Variable**

*Strength of Interlegislator Cooperative Relationship*

The dependent variable *strength of interlegislator cooperative relationship* is a seven-point ordinal variable. For every dyad, I measure it as the strength of the co-authorship ties between two councillors. These ties are undirected or, in other words, the decision to co-author a legislative proposal is a decision of mutual support. There are no such figures as the principal author and the co-sponsors, as we see in the U.S. Congress. Every councillor who signs a legislative proposal is an author.

Suppose $lp$ is a legislative proposal on which councillors $i$ and $j$ appear as co-authors. Looking at this particular legislative proposal, $lp$, alone, the strength of the connection between councillors $i$ and $j$ is measured as $1/clp$, where $clp$ is the total number of co-authors of the legislative proposal $lp$. Hence, the strength of the connection between councillors $i$ and $j$ is weighted by the total number of councillors who have signed this same legislative proposal as co-authors. As such, the drafting of a proposal with few authors is assumed to involve a stronger relationship among the co-signers compared with a proposal that carries the names of many councillors.

To assess the strength of the connection between two councillors, $i$ and $j$, I sum the total number of legislative proposals they have both co-authored and divide it by the total number of co-authors (Newman, 2001; Fowler, 2006a).
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\[
SIC_{ij} = \sum_{lp} \frac{lp_{ij}}{(clp - 1)},
\]

where \(lp\) is the number of legislative proposals on which councillors \(i\) and \(j\) appear as co-authors and \(clp\) is the total number of councillor who have signed these same legislative proposals. Thus, for instance, if councillors \(i\) and \(j\) have co-authored four legislative proposals, with the first of these legislative proposals having been co-authored by 8 councillors, the second by 5 and the third and fourth by the only two councillors \(i\) and \(j\), then the strength of their connection will be:

\[
SIC_{ij} = \frac{1}{(8-1)} + \frac{1}{(5-1)} + \frac{1}{(2-1)} + \frac{1}{(2-1)} = 2.4
\]

An inspection of the distribution of the values shows the presence of outliers, which would prevent my regression analysis from rendering accurate results (Legendre, 2000). In order to address this issue, I transform the variable, turning it into a seven-point ordinal variable. The values seen in the four-year periods of legislative sessions 1997-2000, 2001-2004 and 2005-2008 all fit in the same ranges. I apply a different set of ranges for the values of the 2009-2010 period, though, as here we are dealing with two instead of four years. Since the years of 2009-2010 make up half of a legislative session, I define the values of the ranges as half of those established for the full legislative sessions. The corresponding values of the original and new variables are shown below.

**Table 1 - Strength of Interlegislator Cooperative Relationship - Original and New Values**
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Independent Variables

Vote Distribution

Describing how vote distribution, dominance and living standards are built demands some additional explanation.

The independent variable vote distribution is a continuous variable. I measure it as the absolute value of the difference between two councillors’ vote distribution. Thus, for a pair in which one councillor has a vote distribution score of 60 and the other has a vote distribution score of 50, the value of vote distribution is 10.

A councillor’s vote distribution score measures the extent to which her votes are more or less evenly scattered throughout the city. It is the percentage of votes that a councillor concentrates in the five neighbourhoods which contributes the greatest to her total vote citywide.

Domiance

The independent variable dominance is a continuous variable. I measure it as the absolute value of the difference between two councillors’ dominance scores. Thus, for a pair in which one councillor has a dominance score of 0.80 and the other has a dominance score of 0.50, the value of dominance is 0.30.

A councillor’s dominance score measures the extent to which a councillor dominates her top 5 neighbourhoods. The way I operationalise it is slightly adapted from Ames (2005). The five neighbourhoods used to calculate councillors’ vote distribution scores are also the reference for assessing councillors’ dominance.4

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4 I proceed in two steps to build the dominance score. First, for every councillor in each of her top 5 neighbourhoods, I measure $D_{ij}$, councillor $i$’s dominance score in neighbourhood $j$. In order to do so, I
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Living Standards

The independent variable living standards of the top 5 neighbourhoods is a continuous variable. I measure it as the absolute value of the difference between two councillors’ top 5 neighbourhoods HDI. Thus, for a pair in which one councillor’s top 5 neighbourhoods have a HDI score of 0.90 and the other councillor’s top 5 neighbourhoods have a HDI score of 0.80, the value of living standards is 0.10.

Party Ideology

I measure party ideology as the absolute value of the difference between two councillors’ ideology position. Thus, pairs of councillors whose members share the same ideology are coded as 0. For instance, for a pair of leftist councillors – both being assigned ideology number 1 – the value of party ideology is 0. This value changes as pairs are made up by councillors located in different points of the ideological continuum. Hence, a pair of leftist and rightist councillors is coded as 3.

Switching parties is reasonably common among Brazilian politicians and RJCC members are no different. A fair amount of councillors have changed parties while serving their terms in office. For some of them, changing parties also meant changing party ideology, for instance going from centre-right to right. However, I am not identify all councillors who have neighbourhood j ranked among their top 5 neighbourhoods. I then calculate Dij as councillor i’s share of the total vote cast in neighbourhood j for all councillors who have neighbourhood j ranked among their top five neighbourhoods. As I argue, these are the councillors more likely to treat neighbourhood j as part of their informal constituency. In contrast, councillors with no significant share of their votes concentrated in neighbourhood j tend to attach no particular interest to it. As dominance is about electoral competition, it is reasonable to measure it considering only those councillors whose interests are at stake.

In the second step, I calculate the dominance score for each councillor across her top 5 neighbourhoods. I sum the five Dij scores, weighted by the share each neighbourhood contributes to councillor i’s total vote in her top 5 neighbourhoods, which can be formally represented as:

\[ D_i = \sum_{n=1}^{5} \left( \frac{V_{ij}}{V_i} \right) \left( \frac{V_{ij}}{V_{i\text{top5}}} \right) \]

where Vij is the number of votes councillor i received in neighbourhood j, Vi is the total vote cast in neighbourhood j for all councillors who have neighbourhood j ranked among their top 5 neighbourhoods and Vi_top5 is the total vote for councillor i in her top 5 neighbourhoods. The scores vary from 0 to 1. A councillor with a dominance score of 1 would have no one else garnering significant amount of votes in her top 5 neighbourhoods. Hence, the higher a councillor’s dominance score, the more he dominates her five best neighbourhoods, instead of sharing them with fellow legislators.
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considering these changes when building party ideology. Ideally, it might be argued, I should take councillors’ party-switching into account. This is not possible, though, because doing so would necessarily lead me to have certain councillors with more than one entry in the dataset.\(^5\) So, instead, I am working with councillors’ party affiliation at the time of their election.\(^6\) Therefore, what I intend to measure and test is the consistency of the ideological position with which councillors presented themselves when running their campaigns.

The matrix below shows the ideological distances.

**Figure 4 - Ideological Distances: Left vs Centre-Left vs Centre-Right vs Right**

<table>
<thead>
<tr>
<th>Ideology</th>
<th>Left</th>
<th>Centre-Left</th>
<th>Centre-Right</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
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<td>2</td>
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<td>1</td>
</tr>
<tr>
<td>Right</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Author’s elaboration*

**Same Region**

The independent variable *same region* is a dummy variable. I code 1 pairs in which both councillors get 50% or more of their votes in the same region and 0 if otherwise.

**Provision of Social Service**

The independent variable provision of social service is a dummy variable. I code 1 pairs in which both councillors run their own social service machines and 0 if otherwise.

**Schooling**

The Brazilian educational system is divided into three different levels: fundamental, intermediary and higher (Brazil, 1996). Candidates are required to inform

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\(^5\) The proportion of councillors changing their party ideology position while serving in office varies from legislative session to legislative session: 26.9% in 1997-2000, 33.3% in 2001-2004, 12.1% in 2005-2008 and 2% in 2009-2010.

\(^6\) Sugiyama (2007) faces and deals with this issue in the same manner in her research on policy diffusion in Brazilian municipalities.
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their schooling level using a seven-point coding scale provided by the Electoral Supreme Court: (1) read and write; (2) incomplete fundamental; (3) fundamental; (4) incomplete intermediary; (5) intermediary; (6) incomplete higher; and (7) higher. I use this information to build my schooling variable.¹⁷

The independent variable schooling is then a continuous variable. I measure it as the absolute value of the difference between two councillors’ level of schooling. Thus, for a pair in which one councillor has a schooling level of 7 and the other councillor has a schooling level of 5, the value of the variable schooling is 2.

Number of Votes

The independent variable number of votes is a continuous variable, measured as absolute value of the difference between the councillors’ number of votes. Thus, for a pair in which one councillor has received 20,000 the other councillor has received 15,000, the value of the variable number of votes is 5,000.

Common Committee/Directorate Membership

The independent variable common committee/directorate membership is a dummy variable. I code 1 pairs in which both councillors have sat, at some point in their careers and not necessarily together, on the same committee(s)/directorate and 0 if otherwise.

Shared Committee/Directorate Membership

The independent variable shared committee/directorate membership is a dummy variable. I code 1 pairs in which both councillors sit or have sat together, at some point in their careers, on the same committee(s)/directorate and 0 if otherwise.⁸

Served Together

The independent variable served together is a dummy variable. I code 1 pairs in which councillors have previously served together in the RJCC and 0 if otherwise.

¹⁷ People who cannot read and write are not allowed to run for public offices.
⁸ This variable is different from common committee/directorate membership, in which I code 1 pairs made up of councillors who have both sat, at some point in their careers and not necessarily together, on the same committee(s)/directorate.
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**Same Area**

The independent variable *same area* is a dummy variable. I code 1 pairs in which both councillors get 30% or more of their votes in the same area and 0 if otherwise.

**6. Inferential Analysis**

Councillors in Rio de Janeiro submit almost 600 proposals every year. Several of these proposals carry the signature of more than one legislator. On average 5.7% of the 8,385 proposals submitted between 1997 and 2010 have more than one author.

In this section I examine the results of my inferential analysis. I run a set of four regressions, one for each legislative session. Because of the Brazilian electoral rules and the institutional arrangements in place in the RJCC, *party ideology* should not have any significant explanatory power. Instead, I expect to see the electoral connection – mainly *vote distribution*, *dominance* and *living standards* – to have a relevant effect and, above all, social interaction measured in *served together* and *shared committee/directorate membership* to play a pivotal role. The results are shown in Table 2.9

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9 Because of how the continuous variables are built – the greater the similarity, the smaller the score – their relationship with *co-authorship* should carry a negative sign. Thus, for instance, the smaller the score in *vote distribution* – in other words, the more similar two councillors are – the greater I contend is their dyadic score in *co-authorship*. 
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Table 2 - Explaining the Strength of Coauthorship Ties – Qap Regression

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.8469</td>
<td>5.3884</td>
<td>3.5498</td>
<td>2.1737</td>
</tr>
<tr>
<td>Dominance</td>
<td>-0.0217</td>
<td>0.4990</td>
<td>-0.7552</td>
<td>-0.3241</td>
</tr>
<tr>
<td>Vote Distribution</td>
<td>0.0058</td>
<td>-0.0088</td>
<td>0.0047</td>
<td>0.0000</td>
</tr>
<tr>
<td>Living Standards</td>
<td>-6.5339*</td>
<td>0.0069</td>
<td>-0.5168</td>
<td>-1.8982**</td>
</tr>
<tr>
<td>Party Ideology</td>
<td>-0.0683</td>
<td>0.0678</td>
<td>-0.0159</td>
<td>-0.0948**</td>
</tr>
<tr>
<td>Same Region</td>
<td>-0.5733*</td>
<td>-0.2256</td>
<td>-0.4562*</td>
<td>-0.1835*</td>
</tr>
<tr>
<td>Provision of Social Service</td>
<td>-0.6783*</td>
<td>-0.7131*</td>
<td>0.1709</td>
<td>0.0997</td>
</tr>
<tr>
<td>Schooling</td>
<td>-0.0502</td>
<td>-0.1414</td>
<td>0.0598</td>
<td>0.0279</td>
</tr>
<tr>
<td>Number of Votes</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Common Membership</td>
<td>-0.315*</td>
<td>0.3738*</td>
<td>-0.0801</td>
<td>0.0255</td>
</tr>
<tr>
<td>Same Area</td>
<td>-0.1672</td>
<td>0.3148</td>
<td>1.4399***</td>
<td>0.2957*</td>
</tr>
<tr>
<td>Served Together</td>
<td>-0.4818*</td>
<td>-0.8733**</td>
<td>-0.6735**</td>
<td>0.2397**</td>
</tr>
<tr>
<td>Shared Membership</td>
<td>0.4493**</td>
<td>0.3559**</td>
<td>0.6226**</td>
<td>0.1709*</td>
</tr>
<tr>
<td>R Square</td>
<td>0.097</td>
<td>0.12</td>
<td>0.13</td>
<td>0.051</td>
</tr>
<tr>
<td>R Square Adjusted</td>
<td>0.087</td>
<td>0.11</td>
<td>0.12</td>
<td>0.046</td>
</tr>
<tr>
<td>Probability</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Number of Observations</td>
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<td>992</td>
<td>1332</td>
<td>1980</td>
</tr>
<tr>
<td>Random Seed</td>
<td>685</td>
<td>932</td>
<td>949</td>
<td>152</td>
</tr>
</tbody>
</table>

Note: Qap regressions do not produce normal standards errors.

*** Significant at the 0.01 Level.
** Significant at the 0.05 Level.
* Significant at the 0.1 Level.

Keeping in mind the caveats in seeing R² as a useful goodness-of-fit measure, the explanatory power of the model varies over time, experiencing a moderate increase from the first to the second legislative session and a reasonably accentuated fall from the third to the fourth period. The best performance is seen in the years of 2001-2004 and 2005-2008, when 12% and 13% of the variance of co-authorship is explained whereas the weakest is found in the years of 2009-2010, when 5% of the variance is accounted for.

As expected, served together and shared membership significantly affect legislators’ behaviour. Both play a critical role across all four legislative sessions. Same
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region also distinguishes itself in three periods. Among these variables, though, shared membership is the only one to bear the hypothesised relationship with coauthorship.

Corroborating my argument, legislators who sit or have already sat together on a committee or on the directorate are more likely to develop a stronger cooperative relationship between each other (H2). The same does not apply to served together. On the contrary, members of the RJCC who have previously served together score lower in co-authorship in comparison with fellow councillors who have not served together before (H1). Surprisingly too, sharing a region as the main source of votes leads to weaker interlegislator cooperative relationships (H7).

As far as the other variables are concerned, they either significantly impact the behaviour of councillors in just one or two periods or they do not have a significant impact at all.

For illustrative purposes, the graph below presents the co-authorship network in the legislative session of 2005-2008. Shared membership and served together register respectively their strongest and second strongest effects during these years. The figure shows the ties in which dyadic co-authorship is equal or above four while the mean score for the period is 3.5. The network was drawn using the Iterative Metric Multidimensional Scaling (MDS) algorithm built in NetDraw 2.117 (Borgatti, 2002). Thus, the higher the co-authorship score, the closer the councillors are placed to each other.

The different colours represent the various committee/directorate shared memberships in 2007. I am working with a snapshot of a given year because the committee membership changes annually. Some councillors, then, might end their terms in office having had multiple memberships. However, the graphing of multiple memberships would hardly allow any clear meaningful interpretation. As far as served together is concerned, the distinct shapes of the nodes indicate the councillors who have and have not been together in some previous legislative session. Actually the circles and squares indicate respectively non freshers, who had been serving in the RJCC for one or more consecutive terms, and freshers, who entered the RJCC for the first time in the 2005-2008 legislative session. The only exception is councillor Jorge Felippe, who
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served in the 1989-1992 legislative session and was then returning to the RJCC. During the period of 1989-1992 Jorge Felippe served together with councillors Aloisio Freitas, Eliomar Coelho, Jorge Mauro, Jorge Pereira, Leila do Flamengo, Lucinha, Luiz Carlos Ramos, S. Ferraz and Sami Jorge. This relationship is signalled with a white start inside the corresponding nodes. In addition the graph also informs the region, if any, in which the legislators concentrate most of their votes. Accordingly, each region is assigned a specific identification number.

As mentioned in Methods, my co-authorship dataset only includes those councillors who have served their entire terms in office. Hence some committees appear with just one or two members, rather than three. For instance, as seen below, there is only one member sitting on each the Committee on the Rights of Persons With Disabilities and on the Committee on the Rights of the Elderly (the light and dark grey nodes, respectively). Finally, there are two councillors who had not got any slot (the white nodes).
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Figure 5 - Dyadic Co-authorship Ties, 2005-2008

Author’s elaboration.
Figures calculated using data collected from the ISCC website, the Brazilian Electoral Supreme Court website and the Institute Federal Pasaxes website, available at www.camara.gov.br, www.tse.jus.br and www.amazonas.dados.mun.br.
Made with NetDraw 2.17.
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As seen above, the graph shows that sitting on the same committee brings councillors closer to one another. This is particularly the case of the members of four committees: the Rules Committee (the yellow nodes), the Committee of Finance, Budget and Fiscal Oversight (the blue nodes), the Committee of Public Administration and Civil Service (the black nodes) and the Committee of Urban Affairs (the brown nodes). Although to a lesser extent, the position of the members of the Committee of Health and Social Welfare (the light pink nodes), the Committee of Industry, Commerce and Agriculture (the dark blue nodes), the Consumer Protection Committee (the light green nodes) and the Traffic and Transport Committee (the brownish green nodes) illustrates as well the effect of shared membership.

Figure 5 also provides us with a visualisation of the unexpected relationship between served together and co-authorship. Most of the circles, representing those councillors who have already served together, are in peripheral positions. In general they develop less and weaker cooperative relationships with one another. Meanwhile, the squares, symbolising those councillors who have no previous shared experience in the legislature, are mainly found at the centre, due to the more numerous and stronger cooperative relationships established among themselves.

This is a puzzling result at first. However, the atmosphere on the floor is indeed not rarely a tense one, as read in the press and in pages of the RJCC Official Gazette. There are three main reasons for conflicts to arise: the disputes between government and opposition, the alleged obscure legislative influence of lobbyists and the voting agenda regarding councillors’ proposals.

Thus, first of all, the discussions involving the mayor’s allies and adversaries frequently lead to bitter confrontations. The divergences usually emerge from procedural manoeuvres and the interpretation of the Internal Rules. The members of the ruling coalition most frequently prevail, often with the support of the president of the council. The oppositionists, who make up a small minority, struggle to delay the vote, hoping to open negotiations or to defeat the executive by tiring out the members of the government coalition (Câmara Municipal do Rio de Janeiro, 1997; 2000).
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Secondly, strife inside the council occasionally erupts from the supposed action of illegal lobbying. For instance, on December 26th 2002, several legislators strongly condemned as unconstitutional the voting process of the Legislative Proposal 2018/2000, which denied the right of free bus passes to post office workers (Câmara Municipal do Rio de Janeiro, 2002a). Six months earlier, on the 19th of June 2002, the accusation fell on councillors who, by passing the Legislative Proposal 285/2001, would be favouring lift companies in the business of residential and commercial elevation (Câmara Municipal do Rio de Janeiro, 2002b). Besides these two examples, from time to time the media publishes stories covering what is seen as illegitimate or outlaw lobbying, mostly benefiting bus companies and the civil construction and real estate industries (Jornal do Brasil, 1996; 2001a; 2001b; O Dia, 2004; O Globo, 2009; 2010; 2012).

Third and lastly, the setting of the voting agenda constitutes a common source of dissension. In many instances the number of legislators on the floor is just large enough to reach the quorum threshold. As settled by a non aggression agreement, councillors’ proposals pass on unanimous voice votes. Granted indiscriminately, the approvals often reward the absentees while the ones who bother to show up might not see the passage of their own initiatives before the session adjourns. Frustrated, those present express their disappointment at the podium and frequently remove the proposals of the truants from the voting agenda. It is fair to argue that the vehement speeches and the decision to change the voting agenda help to sour peer relationships (Câmara Municipal do Rio de Janeiro, 2003a).

Therefore, there are indeed quite a few interactive episodes in which incumbents are pushed farther apart instead of brought nearer one another in the course of their terms in office. The resulting animosity probably lays behind the negative effect of served together on coauthorship.

In addition, Figure 5 also presents the effect of same region. It is not as strong as shared membership’s and served together’s and therefore not as clearly shown. Yet, we do see councillors who share a region (nodes numbers 1 to 5) relatively dispersed across the network while half of those with no prevalent region (nodes number 6) are clustered on the right side of the graph. The exception are the councillors who concentrate most of
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their votes in Barra da Tijuca & Jacarepaguá (nodes number 4), all three in the centre, near one another.

Like the numbers for served together, this outcome is rather baffling too. For now I have no robust alternative explanation. We may though still conjecture about a possible plausible answer. For instance, it could be that regions are territories large and heterogenous enough to concentrate at once the votes of quite distinct councillors. Despite garnering most of their votes in the same region, these legislators would represent different constituencies, share no important interests and, hence, face no strong incentives to work with one another. Still, in comparison with their fellow members of the council, they are more likely to clash against one another in their search for voters, given the geographic proximity of their constituencies.

All in all, the analysis of my research question – do instances of social interaction as well as the different incentives stemming from the electoral arena explain the cooperative relationship that councillors establish among themselves through proposals co-authorship ties? – provides me only a partial positive answer, although fairly strong in regards to social interaction.

As we have seen, social interaction affects the behaviour of councillors, drawing them nearer one another or pushing them farther apart depending on the circumstances. The strong effect of shared membership and served together on interlegislator cooperative relationships adds to a still nascent body of evidence regarding the impact of social interaction on legislative affairs, an obvious and yet too often neglected point in political science analysis.

References


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