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# Do we need more women in power? Gender, public policy, and development in Bolivia *

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**Abstract**

This paper evaluates the impacts of increasing female representation in Bolivian municipal councils on public policy choices and welfare outcomes. By combining detailed administrative panel data on municipal expenditures and revenues together with electoral data, an innovative regression discontinuity design (RDD) is applied. As opposed to previous studies, the RDD approach proposed is unique since it is implemented to systems of proportional representation. Findings indicate that municipalities with women councillors devote more resources to social investments. In particular, women politicians prioritize education, health, and environmental protection expenditures giving less attention to infrastructure investments. The impacts of higher female representation appear only some years after the elections, highlighting the importance of training and experience. Despite changes in public policy choices there is weak evidence on the links with final welfare outcomes.

**Keywords:** Gender, Politics, Public Policy, Development.

**JEL Classification:** O12, J16, P16

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†Inter-American Development Bank. The opinions expressed in this working paper are those of the author and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent. For comments please contact: patriciaya@iadb.org.

# 1 Introduction

In the past decades, many countries have amended their political systems to set aside positions to groups that are considered to be disadvantaged (Duflo 2005). Among these groups, women have received special attention, but their increased involvement in politics has catalyzed an active debate. Although almost everyone would agree about the importance of giving equal opportunities to both men and women in their access to power positions, there persists a discussion about whether increasing female representation actually affects policy determination and welfare outcomes. This paper evaluates the impact of increasing female representation in Bolivian municipal councils on public expenditure decisions. In addition, it evaluates whether changes in public policy choices translate into better/worst welfare outcomes.

Theoretically, there is no clear answer as to whether having more women in political positions will have an effect on policy choices. It is possible that electoral incentives encourage elected candidates to act accordingly to the interests of voters rather than follow their own interests. In these cases, public policy choices should just follow the median voter equilibrium (Downs 1957). However, in settings with weak electoral incentives, it is possible that the politicians' preferences and identity affect policy decisions (Besley & Coate 1997). Several studies have shown that men and women have different preferences. At the household level, there is evidence of differences in the effects of income in the hands of men and women, particularly women seem to be more concerned about the health and nutrition of girls in the house (Duflo 2000). At the policy level, women seem to be more concerned about social policy issues, they seem to support more child-related expenditures, and favor redistribution (Clots-Figueras 2011).

Earlier studies, using cross-sectional comparisons, conclude that women politicians do impact policy design. Thomas (1990) shows that U.S. states with higher female representation introduce and pass more bills responding to issues related to women, children, and families. Besley & Case (2000) find that the fractions of women in state houses are highly correlated with a state's workers' compensation policies. Since female representation may just be a reflection of the political preferences of the electorate, which may also drive policy determination, more recent papers have been more concerned about causality. Chattopadhyay & Duflo (2004) exploit the random assignment of a women's reservation policy in India. They show that reserving one-third of the seats for women in village councils of West Bengal and Rajasthan leads to more investment in infrastructure that is related to women. Svaleryd

(2009) exploits fixed effects models and uses changes in the number of seats devoted for women in Swedish municipalities and shows that the greater share of women in these local-level positions increases expenditure on childcare. Rehavi (2007) and Clots-Figueras (2011) take advantage of close elections results between men and women to show that having more women in state legislatures increases public welfare expenditure in the United States and India, respectively. More recently, Brollo & Troiano (2014), using also close election results, show that municipalities ruled by female mayors in Brazil have better health outcomes, receive more federal discretionary transfers, and have lower corruption[1]

This study contributes to the literature in three different ways. First, it expands our understanding of the impacts of political representation policies in low income countries, which are still characterized by strong differences in gender roles that could affect women's political involvement. So far, the literature in this topic using data from a developing country has been very limited (see Chattopadhyay & Duflo (2004) and Clots-Figueras (2011) for the case of India and Brollo & Troiano (2014) for Brazil). Second, no connections have been made yet in the gender literature between changes in expenditure choices and actual welfare outcomes. This analysis helps to respond to broader questions about public policy effectiveness and the relationship between gender equality and development. Finally, as opposed to previous studies that have used quasi-experimental designs and evaluate situations where two parties or two candidates are competing in an electoral race (Rehavi 2007, Clots-Figueras 2011), this paper proposes an innovative regression discontinuity design (RDD) that is useful to evaluate the impacts of gender quotas in political settings with multiple parties and proportional systems of representation.

Municipal governments in Bolivia are interesting units of analysis since they enjoy a significant independence from the national government and are the sole providers of important services, such as health, education, and basic infrastructure, among others. In 1999, a gender quota law was passed in the country that established that a certain proportion of the list of candidates for municipal councils, submitted by each political party prior to elections, needed to be women. Furthermore, the law proposed a specific order for men and women in these lists. Between 1998 and 2005 the number of women holding a seat in municipal councils more

[1]There is also a literature on gender quotas emerging from the political science field. This literature has been mostly focused on understading the impacts of quotas on female representation and the institutional and political system characteristics that help to increase women's political representation (e.g. Caul (2001), Tripp & Kang (2008)). In addition, there is a literature in economics looking at the impacts on gender quotas in enterprises. Adams & Ferreira (2009) show that female directors have a significant impact of board inputs and firm outcomes. Overall, they show that gender-diverse boards increase monitoring, but that mandating gender quotas in boards could harm well-governed firms in which additional monitoring is counterproductive.

than tripled, although there is still heterogeneity in female representation across municipal councils. Since 2005 Bolivian municipalities have also experienced an important increase in their revenues given the nationalization of the hydrocarbon sector, which resulted in the redistribution of hydrocarbon taxes to municipalities. The evidence seems to suggest that women politicians have prioritized social investments when using these additional resources.

To conduct the empirical analysis, I compiled a comprehensive panel data on municipal expenditure allocations, revenues, and development indicators at the municipal level from 2000 to 2010. I combine this data with electoral information about the list of candidates and the distribution of votes observed during the elections of 2004. The RDD exploits the fact that women have been, in most cases, located in the third position in the list of candidates, therefore when a political party shifts from winning 2 seats to gaining 3 seats in the council at least one woman will be participating in the council. Given small margins of difference in the distribution of votes, which can be considered random, the identification strategy comes from comparing changes in public policy choices and development outcomes over time between municipalities that are are just above relevant thresholds for a shift in the seat allocation and municipalities that are just below these thresholds. This notion of finding thresholds where a seat change happens is inspired by recent work from (Folke 2014), who looks at the impacts of party representation on public policy choices.

Results indicate that women politicians prioritize social expenditures. More specifically, I find that social per capita expenditure is four times higher than the baseline level of expenditure observed before elections in municipal councils where at least one woman holds a seat. When looking at the composition of social expenditure, I observe that women politicians prioritize education, health, and environmental protection expenditures and give less attention to investments in public infrastructure. I estimate both the average impacts of female representation during the period of 2005 to 2008[2] and also test for differential time trends. Results show that the impacts of female representation appear only some years after elections. There is weak empirical evidence of links between changes in public policy choices emerging from higher female representation and the evolution of health and education indicators over time. This could be a result of outcomes lagging expenditure changes or of limited information on the actual use of public funds and more specific indicators.

The paper is structured as follows. In the next section, I provide some country background information about the role on municipal councils, the system of proportional representation

[2]As it will be explained in Section 3, public expenditure data only spans the period from 2000 to 2008

that characterizes seat assignment in councils, and the gender quota law. In section 3, I explain the multiple data sources and discuss some suggestive evidence. In section 4, I explain the identification strategy and, in section 5, I present results and robustness checks. In section 6, the main conclusions and policy implications are discussed.

# 2 Country background

Bolivia is one of the poorest countries in South America, and also one of the most ethnically diverse. In 2011, 45% of the population was living below the poverty line (UDAPE 2012). In 2009, 52% of the population identified themselves as part of one of the 36 indigenous groups recognized by the constitution (INE 2009). This section provides information about the most important features of the Bolivian political system, it discusses the role of municipalities and municipal councils, how local elections operate, and provides details of the gender quota system.

## 2.1 Political system and the role of municipal councils

Bolivia's political system operates at 3 different geographical levels: the central government, the regional government, with 9 regions, and the municipal government, with 327 municipalities. After a decentralization law was passed in the country in 1994, municipalities became very important actors in local development. They became responsible for managing, preserving, and renewing health, education, basic services, and roads infrastructure. They also support social assistance programs, various human development and cultural projects, and environmental programs. Most municipal income comes from the national government (aprox. 85%). More specifically, national tax revenues and oil taxes are redistributed to municipalities based on their population.[3] In addition, they receive funds from the national level coming from the Highly Indebted Poor Country (HIPC) initiative. Municipalities may also raise their own resources through the collection of local taxes, and they can get loans, transfers, and credits from international sources (Zambrana 2008).

There are three main actors at the municipal level: the mayor, which is the executive authority, the municipal council, which is the legislative body at the local level, and civil society organizations, which are in charge of social control[4]. Over the years, municipal

[3]For more details about national tax revenue redistribution, please refer Law 1551, Article 20. For more details about oil tax redistribution, please read Decreto Supremo No 28421, Article 2.

[4]These are better known as "Organizaciones Territoriales de Base" (OTB) and they are composed by different neighborhood associations. OTBs are represented in the municipal government by the "Comite de

councils have proven to be very important for policy determination. They are the ones in charge of revising and accepting all projects proposed by the mayor to be implemented at the local level. Moreover, they monitor the use of local resources and have the power to remove a mayor from office if needed. [5]

## 2.2 Municipal elections and local politics

Since 1999, municipal councillors are elected for a period of five years and they can be re-elected once (OEP-PNUD 2012). 90 days before the election day, parties are required to submit their list of candidates for municipal councillors. Once votes are cast, council seats are assigned to each party following a system of proportional representation based on the d'Hondt method. This means that the total votes cast for each party are divided, first by 1, then by 2, then 3, right up to the total number of seats to be allocated for the municipality. The resulting quotients are ranked and seats are allocated in a consecutive order to parties whose quotients are on the top of the rank. Table 2 presents a numeric example where party A wins 3 seats, party B wins 1 seat, and party C wins 1 seat. The total number of seats in a municipal council is proportional to the population. All municipalities with less than 50.000 inhabitants have 5 seats. For each additional 50.000 people, municipalities gain 2 extra seats in the council up to a total of 11 seats.[6]

List of candidates for municipal councillors are closed. This means that once the list is submitted it cannot be changed but only under some special circumstances, such as when the candidate dies, resigns, or is disqualified.[7] Lists are published once in local newspapers; however, during the election day the ballot only shows the names of political parties and not the names of candidates. Therefore, people can only vote for a political party but not for a specific candidate.

Multiple political parties participate in municipal elections. In 2004, citizen and indigenous groups were allowed to run in the elections. Until this year only traditional parties were allowed to participate. Besides the 16 traditional political parties that were present in the 1999 elections, 347 citizen groups and 52 indigenous groups participated in the 2004 elections (OEP-PNUD 2012). On average, the number of political parties per municipality

Vigilancia", which is in charge of monitoring how municipal resources are invested.

[5] For more details on the role of municipal councils, please read Law 2028, Article 12.

[6] All municipalities that are capitals of a department or region have 11 seats regardless of their population.

[7] All changes need to be made prior to elections. Candidates can be disqualified if they don't satisfy certain conditions, such as: minimum age, citizenship, home address in the municipality, etc. For more details, please read Law 1984, Article 113.

in the 2004 elections was 8, the maximum was 22 and the minimum was 1.

Once the municipal council has been elected, members need to meet regularly every week and their sessions are open to the public. Municipal councils make decisions based on a voting system, where every member has the same weight, and decisions are accepted with 2/3 of the votes.

## 2.3 Gender quotas

In 1999, Bolivia passed an electoral law that introduced a gender quota system.[8] More specifically, the law committed political parties to put in their list of candidates for municipal councillors at least 30% of women. The law also established certain ordering for the first three positions in the list, which required some alternating (not perfect) between men and women. According to the law, configurations such as: 1)Man 2) Man 3) Woman or 1)Woman 2) Woman 3) Man were acceptable. As it can be seen in Figure 1, most of the party lists in 1999 placed women in the third place (70%). The law also established that for every principal candidate in the list there should be a substitute. Besides the requested ordering for the first three positions in the list, the 30% quota was applied to either substitute or principal candidates, which resulted in most women being located in substitute positions (ACOBOL 2009).

In 2004, citizen and indigenous groups were allowed to run in the elections. For these incoming groups a 50% gender quota and perfect alternating order was required in their lists.[9] As Figure 1 shows, although there was an important increase in the number of lists that had women in the second position (32%), still the majority of parties in 2004 placed women in the third position (57%). Overall, gender quotas seem to have been effective at increasing female representation in municipal councils over time. In 1999 the total number of women in municipal councils was 229, more than twice the number observed in 1995. In 2004 the number of women councillors increased to 343. Despite the absolute increase in the number of women in power positions, female representation is still low and was just below 20% of total councillors in 2004. As Figure 2 shows, there is also significant heterogeneity in female representation across space. This is a result not only of how parties construct their lists but, as it will be explained in the next section, of how votes are distributed and the number of seats parties gain after an election.

[8]For more details, please read Law 1984, Article No. 112, Part 2

[9]More details can be found in Law 2771, Article No. 9.

In this study, I focus on women's political participation as a results of the elections of 2004. This decision is driven mostly by the fact that public expenditure data is missing before 2000 for many of the municipalities in the sample. By focusing on 2004, I am able to evaluate both post and pre-election trends. Data from the elections of 1999 is used to conduct some robustness checks.

# 3 Data and suggestive evidence

This study combines electoral, administrative, demographic, and development data for a sample of 327 municipalities. Data has been collected from multiple sources and spans the period from 2000 to 2010. Data from candidates, elected officials, and the distribution of votes across parties, from elections in 1999 and 2004, comes from the National Electoral Court. Yearly administrative data about municipal public expenditures and revenues comes from the Ministry of Finance and the Unit of Economic and Social Policy Analysis (UDAPE). Expenditure data spans the period from 2000 to 2008 and the revenue data goes from 2000 to 2010. Population data comes from the 2001 census and projected population data, from 2002 to 2010, comes from the National Statistics Institute (INE). Annual development indicators, both for health and education, come from UDAPE and are available for the period of 2000 to 2010. Other municipal-level data about geographic characteristics and access to basic services comes from INE and the Federation of Municipal Associations of Bolivia (FAM).

Table 1 reports some baseline descriptive statistics. Municipalities differ widely, but most of them are small, rural, and poor. Columns (1) to (5) report statistics for the full sample of municipalities. The average population size is approximately 26000 people, but the range goes from 236 to more than 1 million. On average, 19% of the population in these municipalities lived in urban areas, and 64% lived below the extreme poverty line in 2001. The comparison of municipalities with and without women councillors based on the 2004 election results, shows significant differences. Municipalities with women are more urbanized, have significantly higher levels of education, lower levels of poverty, are located in less mountainous regions, and have less indigenous population, among the most important differences. It is also evident that the number of seats won by the party with the most votes is higher in municipalities with women versus those that do not. Columns (6) to (8) report statistics for the subsample of municipalities that have only 5 seats in the council, which accounts for 83% of all municipalities in the country. As it will be explained in the next section, I focus on this subsample of municipalities for the empirical analysis. This not only facilitates the identification strategy but, as it can be seen in Table 1, municipalities within these subsam-

ple seem to be also more homogeneous across multiple dimensions. For example, differences in the size of the population, urbanization rates, and the percentage of indigenous people between municipalities that have women councillors and those that do not are no longer significant in municipalities that have 5 seats.

Figure 4 shows the evolution of per capita public expenditure in municipalities with and without women, based on the results of the 2004 elections. The evidence shows that trends in per capita public expenditure prior to the 2004 elections was similar between municipalities with and without women councillors. There is also evidence that a few years after the elections municipalities with women councillors experience a higher increase in per capita social expenditure. There is no evidence of differential trends in non-social per capita expenditure after the election year.

There could be two possible confounding effects affecting the trends in Figure 4. First, it is possible that differential trends in population changes over time could be driving results. The panel on the left in Figure 5 helps to rule out this concern. Second, there could be differential trends in changes in municipal income. This second point is particularly important given that Bolivia went through an important hydrocarbons nationalization process that brought new sources of income to municipalities since 2005. As it can be seen in the panel on the right Figure 5, municipalities with more women seem to have gained more from hydrocarbon taxes. This piece of information is important and will be taken into account in the empirical analysis.

# 4 Identification strategy

Estimating the causal impacts of having women in municipal councils on public expenditure decisions raises an important identification challenge. To illustrate this, assume that the baseline empirical specification tested is:

$$y_i = \beta_0 + \beta_1 W_i + \beta_2 X_i + \epsilon_i \tag{1}$$

Where $y_i$ is the social or non-social per capita public expenditure in municipality $i$, $W_i$ is an indicator variable that takes the value of one if at least one seat in the council is held by a woman, $X_i$ are some observable characteristics of municipality $i$ that might affect public expenditure decisions. If I were to estimate equation (1) as it is, the coefficient $\beta_1$ would

be biased as a result of unobservable municipality characteristics that might affect simultaneously female representation and government expenditure. For example, municipalities that have more women councillors may be more progressive and this might also directly affect the priority that is given to certain types of expenditures. The possible simultaneous effect of voter preferences on expenditure outcomes and female representation seems to be less problematic in this setting, given that people vote for a party and not for a specific candidate. Nonetheless, it could still be the case that voters prefer parties that have more women in their lists.

To solve this endogeneity issue, I exploit a regression discontinuity design (RDD), similar in motivation to the close-elections approach (Clots-Figueras 2011), but that is relevant for systems of proportional representation. More specifically, I exploit the fact that, given that the majority of parties have constructed their lists placing women in the third position, the probability of having at least one woman in the council increases when a party gains three seats in an election. The causal effects of women's representation are then estimated by comparing outcomes across municipalities where a party barely received or did not receive a third seat. The main identification assumption is that the third seat is randomly allocated when we are sufficiently close to thresholds where this third seat change happens. This RDD strategy is inspired in recent work by Folke (2014), who looks at the impacts of party representation on public policy choices. In contrast to Folke (2014), who focuses on all possible thresholds where a seat change could happen for a given party, here I focus on a very specific change - when the party with the highest number of votes jumps from having two to having three seats in the council.

To implement this empirical approach, I focus on municipalities that have a total of 5 seats in the council, which constitute 83 % of all municipalities in the country. I then follow three steps. First, I simulate all possible configurations for the distribution of votes across parties and identify situations (i.e. "critical ties" or "thresholds") where due to a very small margin of difference in votes the party with the most votes could jump from having two to having three seats. Second, using information on the number of votes, I calculate the distance to these thresholds and determine which municipalities are above or below them. Finally, I define what being close to a threshold means.

Given that I focus on municipalities with 5 seats total, only the first 5 parties with the most votes in a municipality will be relevant for the analysis [10]. Parties are indexed by

[10] On average, municipalities have 7 parties, and the range goes from 3 to 22

$p = \{1, 2, 3, 4, 5\}$ and the number of votes for party $p$ is denoted by $v_p$. I further assume that the number of votes for each party within a given municipality can be perfectly ranked and that $v_1 > v_2 > v_3 > v_4 > v_5$[11]. Given that the number of seats that a party can gain is affected by the distribution of votes among all parties, the identification of relevant thresholds requires considering all possible vote share configurations that could lead to the party with the highest number of votes ($p = 1$) to gain three seats in the council. It is important to mention that party 1 could gain three seats by winning not only the third position, but also by winning the fourth or the fifth positions.

Based on the d' Hondt method, I identify all possible "critical ties" that could emerge when allocating the third, fourth, and fifth position in the council, respectively (please refer to the Appendix for more details). As mentioned before, I focus on situations where the party with most votes could jump from having two to having three seats. For example, Table A1 in the Appendix shows that once the first two seats have been allocated to party 1, this party could be (closely) competing with party 2 for the third position. Table A2 shows that two critical ties could arise in the competition for the fourth seat. In option A, party 1 is competing with party 2 for the fourth seat. In option B, party 1 is competing with party 3. A similar logic follows for the fifth position. Table 3 summarizes all possible critical ties for each position and shows the conditions that need to hold in every case.[12]

Having identified all multiple ties or thresholds, the distance to these thresholds is defined as:

$$\lambda_j = v_1/3 - Q_j \tag{2}$$

Where $Q_j$ is the relevant quotient against which the third quotient of party 1 is being compared to. When $\lambda_j$ is positive, this means that party 1 won the tie and obtained three seats. When $\lambda_j$ is negative, party 1 lost the tie and did not get the three seats. Table 3 summarizes all possible values of $\lambda_j$. Given that party 1 could lose a tie for the third position but still have chances to win the fourth or fifth positions, the maximum value of $\lambda_j$

[11] When looking at the data, in none of the municipalities there was a tie between two or more parties in the number of votes

[12] This notion of finding critical ties could be also represented graphically with a multi-party map. For more details on the construction of these maps please visit http://www.geometricvoting.org.uk/htablec1.htm. Figure A1 in the Appendix shows an example, extracted from Folke (2014), for the distribution of three seats between three parties as a function of their votes shares. The shaded areas inside the triangle are those that are slightly above and below a critical tie. As mentioned before, Folke (2014) is interested in all possible seat changes, in my case however the shaded area of interest will be only the one that is closest to the right vertex of the triangle (where party 1 jumps from having two seats to having three seats).

will indicate whether the party finally won a third seat or not.

To determine how far or close from the threshold the first party is, I take into account the total number of votes received by the five parties with the most votes in the municipality:

$$Z_i = \frac{Max(\lambda_1, \lambda_2, ..., \lambda_7)}{\sum_{i=1}^{5} v_i} \tag{3}$$

Therefore, $Z_i$ is the running variable of interest and summarizes the distance to any of the relevant thresholds. By construction, the cut-off point is zero. In municipalities with positive values of $Z_i$ the party with the most votes gains at least three seats. In those with negative values no party holds more than 2 seats in the council. As it can be seen in the panel of the left of Figure 6, it is true that for positive values of $Z_i$ the probability of having a party with three seats in the council jumps sharply from zero to one. Given the position of women in the list of candidates, it is also true that the probability of observing at least one woman in the council increases above the threshold (panel on the right).

An important assumption for this RDD design to hold is that political parties should not be able to manipulate the final vote share to be above the thresholds. As Lee (2008) argues in the context of close election results, although parties may manipulate the overall vote share prior to elections with their campaigns, any small difference on the day of the election cannot be manipulated and can be considered as good as random. The way the vote count is done in Bolivian municipal elections reduces the concerns of having electoral fraud. Vote count is done manually at every electoral table. Citizens are selected randomly to be electoral judges during the election day and help with the vote count. Furthermore, the vote counting process is open to the public, so in most cases and, particularly in situations where parties could be in a close race, multiple observers are present to make sure that votes are counted correctly (CNE 2004). One final concern could be that municipalities where parties win only 2 seats could have different list of candidates than municipalities with 3 seats. As it is shown in Figure 3 there are no differences in list construction between these two types of municipalities.

As opposed to a sharp RDD, where the probability of treatment jumps from zero to one in the cutoff, here we have a fuzzy RDD given that the probability of having women in the council does not jump perfectly but is increasing above the cut-off. The presence of cross-overs (observations below the threshold that are treated) is explained by the fact that some parties, particularly citizen and indigenous groups, have placed women in the second

position in their lists. Given this fuzzy design, the estimation of treatment effects is done with a two-stage least square IV approach:

$$W_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + f(Z_i) + \varepsilon_i \tag{4}$$

$$Y_i = \gamma_0 + \gamma_1 W_i + \gamma_2 X_i + g(Z_i) + \mu_i \tag{5}$$

Where $W_i$ is a binary variable that takes the value of one when at least one woman holds a seat in municipality $i$'s council. $Y_i$ is the per capita social or non-social public expenditure. $T_i$, the treatment variable, is used as an instrumental variable in this setting and takes the value of one when the running variable $Z_i$ is above the cut-off (i.e.is positive) and zero otherwise. $X_i$ is a vector of municipality characteristics that may affect the presence of women in the council and also public expenditure decisions. $f(.)$ and $g(.)$ are polynomial functions of the running variable that help to reduce residual variation. To estimate the effects on government expenditures of female representation I use panel data from 260 municipalities during the period 2000-2008.

As Lee & Lemieux (2010) indicate, including fixed effects is unnecessary for identification in a RDD and introduces further restrictions in the context of panel data. As the authors suggest, I estimate the system of equations (4) and (5)with a pool sample. More specifically, given that I focus on the 2004 elections, I pool the sample for all years after the election (2005 to 2008) and cluster standard errors at the municipality level to take into account within-municipality correlation of the errors over time. To exploit the structure of the panel data, I introduce lagged values of the dependent variables as baseline covariates. Moreover, I introduce time specific dummies to capture differential effects over time. Finally, I control for whether the party with the majority of votes is left-wing to rule-out the concern that having a party winning three seats not only implies having women in power but also having party majority in the council which could affect public expenditure allocation decisions.

# 5 Results

## 5.1 Social versus non-social expenditure

Table 4 presents the average impacts of having women in municipal councils on social and non-social per capita expenditure during the period of 2005 to 2008. Social expenditure considers categories such as: health, education, social protection, and basic infrastructure (water and sanitation), among the most important. Non-social expenditure considers categories such as: road infrastructure, productive investments, security, and services.

Columns (1) and (4) present OLS estimates and show that in municipalities with women councillors social per capita expenditure more than doubles during the period of 2005 to 2008 while there are no significant impacts on non-social per capita expenditure. Columns (2) and (5) report the instrumental variables estimations, where the treatment variable $T$, which takes the value of one when the running variable is above the cut-off and zero otherwise, is used as an instrument for whether the council has a woman or not. The IV results show no significant impacts of women councillors on social or non-social per capita expenditure. As it can be seen in columns (3) and (6), the variable $T$ is a very good predictor of the presence of women in municipal councils.

Based on the evidence presented in Figure 4, it seems plausible that the effects of women councillors on public expenditure decisions could take some time to appear. Table 5 presents the OLS and IV estimations for models that introduce differential time effects. Results indicate that two years after the 2004 elections statistically significant differences in social per capita expenditure exist between municipalities with women councillors and those without them. Results are robust across both OLS and IV regressions and show sizeable impacts. As column (2) shows, social per capita expenditure in 2007 and 2008 is more than 4 times the baseline per capita expenditure in municipalities with female representation. Column (5) reports no significant differences in time trends for non-social per capita expenditure, although for 2005 municipalities with women seem to invest also more in this category.

## 5.2 Categories of social expenditure

Following UDAPE's classification, I estimate separate regressions for multiple categories of social expenditure, namely: education, health, social protection, environment, infrastructure, and recreation. The social protection category considers all expenditures devoted to protect vulnerable populations, such as elderly people, children, and women. Some examples, are

payment for the functioning of shelters for orphans or shelters for women that are victims of violence. The environmental category considers expenditures devoted to waste treatment and garbage disposal, environmental education programs, protected areas and reforestation programs, among others. The infrastructure category considers investments in water and sanitation. Finally, the recreation category considers investments in activities that promote culture and protect heritage, such as museums, libraries, etc.

Tables 6 and 7 present the OLS and IV results looking at different categories of social expenditure. The evidence suggests that women councillors mostly prioritize investments in education, health, and environmental protection, as there are sustained increases over multiple years in these categories. For education, the per capita expenditure is approximately 4 and 5 times higher than the baseline expenditure for the years 2007 and 2008, respectively. For health, the per capita expenditure is 6 and 5 times higher than the baseline for 2007 and 2008, respectively. For environment, the magnitudes are 2.5 and 4 times the baseline expenditure for 2007 and 2008. There are also increases in some years in social protection and recreational expenditure, and no impacts are observed in infrastructure expenditure.

## 5.3 Robustness checks

Multiple robustness checks are conducted. First, I introduce polynomial functions of the running variable in the regression to take into account the possibility of a non-linear relationship between the outcome and the running variable. As reported in Table 8, results are robust to including quadratic and cubic polynomials of the running variable. The point estimates and their statistical significance remains almost unchanged when including these polynomials. The only exception is the recreation expenditure, which is no longer statistically significant. Second, I estimate regressions with the subsample of observations that is closest to the cut-off point. More specifically, I restrict the sample to observations where the difference in votes between the two parties competing in any critical tie is no more than 5% of the total number of votes received by the five parties with the most votes. As it is shown in Table 9, statistically significant increases in total social, education, health, and social protection per capita expenditures are still observed for the year 2008 using this subsample of observations, but point estimates are larger. For the environmental per capita expenditure, results are robust and still observed for both 2006 and 2007.

One concern about the identification strategy could be that, even when the margin of difference in votes is small, by comparing municipalities where the party with the most

votes won three seats versus those where it only obtained two seats, the effect of female representation could be confounded with the effect of having a party that holds majority in the council. Given that the outcome of interest is the allocation of public expenditure and not an outcome related to efficiency, a priori there are no reasons to believe that majority in a council will translate into different patterns of expenditure allocation. As a robustness check, I regress public expenditure decisions before the 2004 elections and look at the impacts of a party having three seats versus only holding two. As reported in Table 10, majority in the council did not affect expenditure decisions between 2000 and 2003.

## 5.4 Impacts on outcomes

One key question that emerges from the differential trends in public expenditure decisions observed over time between municipalities with and without women councillors is whether these differences have translated into better/worst welfare outcomes. Based on the results discussed in the previous section and also based on the availability of data, I analyze the evolution of education and health indicators from 2005 to 2010. Although there is also robust evidence of impacts on environmental expenditure, unfortunately there is not data about outcomes in this dimension. Columns (1) to (3) of Table 11 report results for education indicators, namely the primary enrollment rate, primary completion rate, and gender differences in the primary completion rate[13]. Columns (4) and (5) of Table 11 report results for health indicators, more specifically I focus on the coverage of the pentavalent vaccine[14] and the percentage of women that delivered their babies in a formal medical institution[15].

Overall, there are very few significant impacts of female representation on outcomes over time. There are some increases in the primary enrollment rate in the year 2007 and some reductions in the gender gap of the primary completion rate in 2006, which indicates that girls' completion rates get closer to those of boys. Despite the increase observed in education and health per capita expenditures in municipalities with higher female representation, there could be two explanations for the almost null impacts of these policy changes on outcomes. First, it could be that these are long terms outcomes and therefore we don't expect to see a big change in them in the short run. Second, it could be the case that the higher per capita

[13]Gender gaps are measured as the difference between the male average completion rate minus female completion rate.

[14]The pentavalent vaccine is a combination of five vaccines in one: diphtheria, thetanus, whooping cough, hepatitis B, and Haemophilus influenza type b (the bacteria that causes meningitis, otitis, and pneumonia). This vaccine has been promoted in developing countries for children under the age of 1 in order to reduce infant mortality.

[15]Formal institutions include not only hospital and clinics, but also small medical centers in rural areas. Delivery in a formal institution helps to reduce maternal and child mortality.

expenditure observed both in health and education categories is going towards very specific initiatives that are not captured by these outcomes.

# 6 Conclusions

This paper shows that female politicians influence public expenditure decisions and prioritize social investments. More specifically, by exploring the case of municipal councils in Bolivia, which have recently experienced an important increase in their revenues as a result of the nationalization of the hydrocarbon sector, I find that the presence of women in municipal councils leads to a significant and sizeable increase in social per capita expenditure. The analysis of the composition of social expenditure indicates that women councillors prioritize health, education, and environmental programs, and give less attention to investments in infrastructure. When I test for differential time trends, I observe that the impacts of female representation do not appear immediately after elections, but take some time to be seen. Given that for most women this is their first time holding power positions, these results could indicate that training and familiarity with administrative procedures is an important step to influence public policy choices.

Other authors have shown that the gender of the politician affects public policy choices; however, evidence from a developing country setting has been restricted to the case of India. By focusing on the case of Bolivia, one of the poorest countries in South America, this paper contributes to the understanding of the impacts of political representation policies in low income countries. Most importantly, as opposed to previous studies that evaluate situations where two parties or two candidates are competing in an electoral race, this paper proposes an innovative regression discontinuity design that is useful to evaluate the impacts of quotas in political settings with multiple parties and proportional systems of representation. In addition, none of the previous studies exploring the impacts of women on public expenditure choices have evaluated the effectiveness of public policy. In this paper, I show that despite the impacts of female representation on education and health expenditures, there is still no evidence of positive impacts on related outcomes. This could be a result of outcomes lagging expenditure changes or limited information on the actual use of public funds and more specific indicators.

Given the increased divergence in social investments observed across Bolivian municipalities in the last years, which could exacerbate inequality in the long run, the results from this study shed some light about some of the factors that might explain these differences.

Although women's participation in local politics in Bolivia has increased in the past years, female representation is still low. More policies and initiatives need to be in place to make sure that women have equal access to local councils across space. Possible avenues for future research include understanding under what conditions can women be more effective in their participation and involvement in municipal councils. For example, the use of geographical data, about soil quality and agricultural practices, as it historically relates to social norms about gender (Alesina et al. 2013) could help to understand whether there is heterogeneity in the impacts of women across space based on the role women have in society. It will be also interesting to analyze whether certain characteristics of the politician or their party of affiliation facilitate their involvement or create differential impacts. A preliminary analysis suggest that belonging to the ruling party does not have any differential impact on expenditure, but that women belonging to an indigenous municipality are more concerned about environmental protection programs.

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Table 1: Baseline municipality characteristics

| | Full sample | | Full sample | | | Restricted sample (5 seats) | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | sd | No women | With women | Diff. | No women | With women | Diff. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Elevation | 2436.930 | 1508.330 | 2717.603 | 2321.502 | 396.101* | 2666.614 | 2337.549 | 329.066 |
| Slope | 39.530 | 32.881 | 48.248 | 35.944 | 12.304** | 47.830 | 35.221 | 12.609** |
| Agricultural potential | 0.301 | 0.459 | 0.263 | 0.316 | -0.053 | 0.274 | 0.267 | 0.007 |
| Total population 2001 | 26453.635 | 93811.212 | 12843.137 | 32051.026 | -19207.889 | 10357.036 | 9216.364 | 1140.672 |
| Land area | 3255.590 | 6588.986 | 2905.900 | 3399.402 | -493.502 | 3061.677 | 3402.091 | -340.414 |
| Years of education 2001 | 5.115 | 1.669 | 4.520 | 5.360 | -0.840*** | 4.544 | 5.097 | -0.553** |
| % Indigenous population 2001 | 70.444 | 30.611 | 76.892 | 67.792 | 9.099* | 76.307 | 68.586 | 7.721 |
| % Female population 2001 | 0.485 | 0.029 | 0.488 | 0.483 | 0.005 | 0.487 | 0.479 | 0.008* |
| Life expectancy 2001 | 60.626 | 4.925 | 59.717 | 61.000 | -1.283* | 59.757 | 60.649 | -0.892 |
| Extreme poverty 2001 | 64.038 | 20.827 | 69.966 | 61.600 | 8.366*** | 69.980 | 64.962 | 5.018* |
| Urbanization rate 2001 | 0.190 | 0.282 | 0.110 | 0.223 | -0.113*** | 0.103 | 0.143 | -0.041 |
| Prop. women councillors 2004 | 0.184 | 0.152 | 0.000 | 0.260 | -0.260*** | 0.000 | 0.267 | -0.267*** |
| Highest no. seats won 2004 | 2.709 | 1.274 | 1.853 | 3.061 | -1.208*** | 1.798 | 2.670 | -0.873*** |
| Observations | 326 | 326 | 95 | 231 | 326 | 84 | 176 | 260 |

Note: * p<0.10 ** p<0.05 *** p<0.01. Differences tested with t-test statistics.

Table 2: Seat assigment example using d'Hondt method

| | Party A | Party B | Party C | Party D | Party E |
|---|---|---|---|---|---|
| # votes | 45 | 23 | 12 | 14 | 6 |
| # votes/2 | 22.5 | 11.5 | 6 | 7 | 3 |
| # votes/3 | 15 | 7.7 | 4 | 4.7 | 2 |
| # votes/4 | 11.25 | 5.75 | 3 | 3.5 | 1.5 |
| # votes/5 | 5 | 4.6 | 2.4 | 2.8 | 1.2 |
| Party A | Position 1 | Position 3 | Position 4 | | |
| Party B | Position 2 | | | | |
| Party C | Position 5 | | | | |

Table 3: Critical ties to win 3 seats

| Position contested | Citical tie | Conditions required | $\alpha$ |
|---|---|---|---|
| Position 3 | $v_1/3 = v_2$ | $v_1/2 > v_2$ | $\alpha_1 = v_1/3 - v_2$ |
| Position 4-A | $v_1/3 = v_2/2$ | $v_1/3 < v_2, v_2/2 > v_3, v_1/3 > v_3$ | $\alpha_2 = v_1/3 - v_2/2$ |
| Position 4-B | $v_1/3 = v_3$ | $v_2/2 < v_3, v_1/2 > v_3, v_1/3 < v_2$ | $\alpha_3 = v_1/3 - v_3$ |
| Position 5-A | $v_1/3 = v_3$ | $v_2/2 > v_3, v_2/3 < v_3, v_1/3 < v_2/2$ | $\alpha_4 = v_1/3 - v_3$ |
| Position 5-B | $v_1/3 = v_4$ | $v_2/2 < v_4, v_1/2 > v_4, v_1/3 < v_3$ | $\alpha_5 = v_1/3 - v_4$ |
| Position 5-C | $v_1/3 = v_2/2$ | $v_2/2 < v_3, v_2/2 > v_4, v_1/3 < v_3, v_1/3 > v_4$ | $\alpha_6 = v_1/3 - v_2/2$ |
| Position 5-D | $v_1/3 = v_2/3$ | $v_1/3 > v_3, v_2/3 > v_3$ | $\alpha_7 = v_1/3 - v_2/3$ |

Table 4: Social and Non-social per capita expenditure 2005-2008

| | Social expenditure | | | Non-social expenditure | | |
|---|---|---|---|---|---|---|
| | OLS | IV | First-stage | OLS | IV | First-stage |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Women | 99.12*** | 199.03 | | 12.24 | 97.66 | |
| | (34.63) | (144.79) | | (22.27) | (60.99) | |
| Z | -114.90 | -345.43 | 0.06 | -143.03 | -339.55** | 0.06 |
| | (275.53) | (409.26) | (0.42) | (128.11) | ( (144.99) | (0.42) |
| Above threshold (T) | | | 0.50*** | | | 0.49*** |
| | | | (0.07) | | | (0.07) |
| Baseline expenditure | 2.19*** | 2.17*** | 0.00 | 1.01*** | 0.98*** | 0.00 |
| | (0.43) | (0.42) | (0.00) | (0.14) | (0.14) | (0.00) |
| IDH revenue | 0.58*** | 0.58*** | 0.00 | 0.45*** | 0.44*** | 0.00 |
| | (0.07) | (0.07) | (0.00) | (0.07) | (0.07) | (0.00) |
| Copart revenue | 1.26** | 1.28*** | -0.00 | 0.95*** | 0.97*** | -0.00 |
| | (0.51) | (0.52) | (0.00) | (0.30) | (0.29) | (0.00) |
| N | 984 | 984 | 984 | 984 | 984 | 984 |
| Baseline mean | 84.56 | 84.56 | | 110.78 | 110.78 | |
| Baseline std. dev. | 87.82 | 87.82 | | 116.29 | 116. 29 | |
| Cragg-Donald F | | | 152.71 | | | 151.47 |
| Kleibergen-Paap F | | | 55.84 | | | 55.18 |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Revenue and expenditure variables are per capita. Other controls include a dummy variable for left-wing party with majority of votes. T takes the value of 1 when the running variable Z is above the cut-off (i.e. is positive).

Table 5: Social and Non-social per capita expenditure 2005-2008 (Time effects)

| | Social expenditure | | | Non-social expenditure | | |
|---|---|---|---|---|---|---|
| | OLS | IV | First-stage | OLS | IV | First-stage |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Women | -7.31 | 4.26 | | 2.18 | 129.78** | |
| | (23.82) | (107.80) | | (16.50) | (56.11) | |
| Year 2006*Women | 44.39 | 70.09 | | 22.33 | -32.52 | |
| | (40.71) | (89.73) | | (24.17) | (58.51) | |
| Year 2007*Women | 217.76*** | 360.08** | | 52.73* | 34.15 | |
| | (56.20) | (142.52) | | (30.46) | (67.96) | |
| Year 2008*Women | 163.99*** | 366.24** | | -26.74 | -75.53 | |
| | (53.64) | (160.26) | | (42.27) | (99.75) | |
| Year 2006 | -18.69 | -35.71 | -0.01 | -25.40 | 11.43 | -0.00 |
| | (40.94) | (48.41) | (0.01) | (23.41) | (37.02) | (0.01) |
| Year 2007 | -22.32 | -119.88* | -0.01 | -35.28 | -24.30 | -0.00 |
| | (74.99) | (69.79) | (0.02) | (41.09) | (43.09) | (0.02) |
| Year 2008 | -156.17 | -294.69* | -0.02 | -121.93* | -91.65 | -0.00 |
| | (139.68) | (156.38) | (0.04) | (71.72) | (73.79) | (0.04) |
| Above threshold (T) | | | 0.50*** | | | 0.50*** |
| | | | (0.07) | | | (0.07) |
| Year 2006*T | | | -0.00 | | | -0.00 |
| | | | (0.00) | | | (0.00) |
| Year 2007*T | | | -0.00 | | | -0.00 |
| | | | (0.00) | | | (0.00) |
| Year 2008*T | | | -0.01 | | | -0.01 |
| | | | (0.01) | | | (0.02) |
| Z | -115.14 | -354.47 | 0.06 | -151.40 | -374.85** | 0.06 |
| | (275.95) | (410.38) | (0.43) | (128.03) | (153.53) | (0.42) |
| N | 984 | 984 | 984 | 984 | 984 | 984 |
| Baseline mean | 84.56 | 84.56 | | 110.78 | 110.78 | |
| Baseline std. dev. | 87.82 | 87.82 | | 116.29 | 116. 29 | |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Cragg-Donald F | | | 36.73 | | | 36.16 |
| Kleibergen-Paap F | | | 13.41 | | | 13.12 |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include baseline per capita expenditure (social and non-social, respectively), municipal per capita revenues, and dummy variable for left-wing party with majority of votes. Expenditure variables are per capita. T takes the value of 1 when z is positive. z is the running variable.

Table 6: Categories of social per capita expenditure 2005-2008 (OLS regressions)

| | Edu | Health | Soc.Prot. | Envi | Infra | Recre |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Women | 3.03 | -8.85 | 1.88 | -2.85 | 15.28* | -5.00 |
| | (9.22) | (6.54) | (4.37) | (2.58) | (9.14) | (6.51) |
| Year 2006*Women | 12.83 | 13.00 | 9.22 | 6.59** | -11.08 | 14.48 |
| | (17.24) | (11.76) | (9.79) | (2.78) | (16.73) | (9.40) |
| Year 2007*Women | 78.11*** | 40.16** | 23.00 | 6.78* | 21.87* | 48.97*** |
| | (27.95) | (17.14) | (15.18) | (3.47) | (12.62) | (12.57) |
| Year 2008*Women | 55.12** | 23.80 | 23.26* | 4.32 | 0.22 | 58.88*** |
| | (24.45) | (16.86) | (11.82) | (3.77) | (13.61) | (17.53) |
| Year 2006 | -23.02 | 4.43 | -10.84* | -6.70*** | 9.90 | -1.29 |
| | (20.46) | (6.93) | (5.64) | (2.21) | (15.34) | (5.16) |
| Year 2007 | -29.97 | 19.22* | -13.99 | -4.95** | -25.40 | 14.11 |
| | (39.77) | (9.97) | (10.64) | (2.16) | (15.53) | (9.12) |
| Year 2008 | -126.54* | 14.52 | -35.23* | -2.32 | -49.34* | 7.97 |
| | (71.66) | (14.85) | (19.23) | (3.16) | (27.19) | (16.02) |
| N | 984 | 984 | 984 | 984 | 984 | 984 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include Z (running variable), the baseline per capita expenditure for each category, municipal per capita revenues, and dummy variable for left-wing party with majority of votes. Expenditure variables are per capita.

Table 7: Categories of social per capita expenditure 2005-2008 (IV regressions)

| | Edu | Health | Soc.Prot. | Envi | Infra | Recre |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Women | 4.22 | 33.60 | 24.76 | -7.91 | 37.01 | -33.74 |
| | (38.09) | (31.48) | (20.77) | (5.05) | (28.99) | (29.60) |
| Year 2006*Women | -0.13 | 49.50 | 24.62 | 12.12** | -5.54 | -8.99 |
| | (34.40) | (36.11) | (33.05) | (5.41) | (30.57) | (19.68) |
| Year 2007*Women | 123.21* | 102.44* | 42.81 | 20.07** | 16.55 | 57.70* |
| | (64.25) | (52.35) | (45.39) | (9.29) | (29.06) | (35.05) |
| Year 2008*Women | 146.69* | 92.44* | 84.29* | 1.36 | -13.24 | 59.34 |
| | (79.94) | (51.46) | (43.85) | (6.92) | (30.39) | (53.39) |
| Year 2006 | -13.96 | -20.05 | -21.03 | -10.46** | 6.23 | 14.85 |
| | (19.82) | (19.54) | (14.81) | (4.21) | (21.44) | (15.18) |
| Year 2007 | -60.72* | -23.60 | -27.62 | -13.98** | -21.77 | 8.95 |
| | (34.83) | (28.11) | (21.03) | (5.91) | (23.10) | (20.37) |
| Year 2008 | -188.74** | -32.73 | -76.77** | -0.33 | -40.10 | 9.00 |
| | (81.83) | (30.08) | (32.52) | (5.67) | (25.30) | (38.17) |
| N | 984 | 984 | 984 | 984 | 984 | 984 |
| Baseline mean | 31.15 | 18.26 | 3.82 | 4.88 | 14.84 | 10.45 |
| Baseline std. dev. | 35.10 | 28.01 | 5.90 | 13.01 | 17.34 | 10.35 |
| Cragg-Donald F | 38.32 | 38.01 | 38.29 | 34.91 | 38.12 | 38.20 |
| Kleibergen-Paap F | 14.15 | 13.84 | 13.87 | 12.65 | 13.87 | 14.05 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include Z (running variable), the baseline per capita expenditure for each category, municipal per capita revenues, dummy variable for left-wing party with majority of votes. Expenditure variables are per capita.

Table 8: Categories of social per capita expenditure 2005-2008
(IV regressions with polynomials of Z)

| | Social | Non-social | Edu | Health | Soc.Prot. | Envi | Infra | Recre |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Women | 3.76 | 149.27** | 23.63 | 56.46 | 42.39 | -7.32 | 43.90 | -84.81* |
| | (161.89) | (71.81) | (57.78) | (50.84) | (38.89) | (7.11) | (38.30) | (49.35) |
| Year 2006*Women | 70.04 | -32.46 | -0.11 | 49.57 | 24.67 | 12.12** | -5.52 | -9.17 |
| | (40.75) | (45.96) | (34.44) | (36.15) | (33.10) | (5.41) | (30.57) | (19.69) |
| Year 2007*Women | 359.95** | 34.21 | 123.17* | 102.50* | 42.85 | 20.07** | 16.57 | 57.50 |
| | (142.56) | (67.99) | (64.27) | (52.40) | (45.45) | (9.28) | (29.05) | (35.00) |
| Year 2008*Women | 366.04** | -75.38 | 146.68* | 92.60* | 84.39* | 1.36 | -13.20 | 58.89 |
| | (160.30) | (99.71) | (79.89) | (51.54) | (43.82) | (6.92) | (30.39) | (53.44) |
| Year 2006 | -35.14 | 11.48 | -13.50 | -19.90 | -20.88 | -10.44** | 6.26 | 14.91 |
| | (48.53) | (37.05) | (19.85) | (19.49) | (14.76) | (4.20) | (21.49) | (14.86) |
| Year 2007 | -118.68* | -24.27 | -59.80* | -23.34 | -27.35 | -13.94** | -21.72 | 9.22 |
| | (69.77) | (42.88) | (34.67) | (28.11) | (21.14) | (5.91) | (23.02) | (20.41) |
| Year 2008 | -292.44* | -91.57 | -187.02** | -32.24 | -76.27** | -0.25 | -40.00 | 9.48 |
| | (155.61) | (73.24) | (80.56) | (29.69) | (32.08) | (5.66) | (25.08) | (39.58) |
| Z | -486.70 | -531.12 | -326.23 | -330.64 | -291.78 | -12.22 | -166.27 | 535.99* |
| | (965.44) | (351.00) | (359.16) | (278.26) | (249.37) | (35.01) | (165.98) | (273.74) |
| $Z^2$ | -3127.40 | -722.02 | -1967.15 | -1285.44 | -1019.01 | -167.07 | -90.93 | 1557.00 |
| | (3503.96) | (1338.86) | (1393.16) | (996.24) | (824.77) | (123.54) | (630.20) | (998.83) |
| $Z^3$ | 7044.88 | 4409.19 | 7353.73 | 6178.06 | 4845.50 | 452.86 | 1201.09 | -10786.06* |
| | (19618.26) | (7134.38) | (7094.25) | (5244.77) | (4730.94) | (670.70) | (3228.51) | (5538.30) |
| N | 984 | 984 | 984 | 984 | 984 | 984 | 984 | 984 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include baseline per capita expenditure for each category, respectively, and municipal per capita revenues. Expenditure variables are per capita.

Table 9: Categories of social per capita expenditure 2005-2008
(IV regressions sample close to threshold +/-0.05)

| | Social | Non-Social | Edu | Health | Soc.Prot. | Envi | Infra | Recre |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Women | 170.51 | 260.63** | 55.47 | 41.12 | 46.56 | -17.27 | 118.04* | 41.14 |
| | (178.97) | (119.02) | (76.24) | (63.14) | (50.73) | (11.86) | (62.72) | (39.10) |
| Year 2006*Women | 12.26 | -11.51 | -49.62 | 90.50 | 39.65 | 24.13** | -64.68 | -24.41 |
| | (190.52) | (108.64) | (68.67) | (61.35) | (56.01) | (9.91) | (58.88) | (44.28) |
| Year 2007*Women | 213.05 | 24.80 | 7.58 | 132.36 | 70.53 | 37.00** | -11.66 | -16.42 |
| | (257.78) | (106.75) | (117.11) | (81.82) | (83.20) | (16.39) | (48.53) | (42.16) |
| Year 2008*Women | 486.29** | -59.10 | 229.28* | 151.94* | 87.16* | 13.65 | 15.56 | 0.30 |
| | (234.52) | (126.18) | (117.85) | (82.74) | (46.91) | (12.27) | (41.04) | (68.10) |
| Year 2006 | 16.53 | 17.28 | 19.33 | -52.08 | -26.63 | -20.48** | 57.26 | 27.57 |
| | (161.74) | (86.51) | (57.90) | (39.08) | (30.99) | (8.82) | (51.16) | (43.81) |
| Year 2007 | -20.88 | -3.81 | 28.45 | -54.55 | -38.82 | -27.55** | -3.99 | 51.11 |
| | (196.26) | (72.59) | (90.68) | (52.52) | (55.68) | (11.89) | (36.96) | (37.51) |
| Year 2008 | -457.74*** | -107.96 | -282.33*** | -86.28 | -90.16*** | -9.28 | -74.18*** | 38.94 |
| | (156.68) | (77.30) | (86.76) | (55.83) | (33.00) | (11.06) | (27.63) | (58.68) |
| Z | -1780.14 | -1339.17 | -383.19 | -808.51 | -489.57 | 73.82 | -1277.37 | -10.56 |
| | (1326.83) | (956.01) | (1319.98) | (1084.90) | (1025.19) | (197.67) | (1025.23) | (703.42) |
| N | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 484 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include baseline per capita expenditure for each category, respectively, and municipal per capita revenues. Expenditure variables are per capita.

Table 10: Number of seats and social per capita expenditure 2000-2003

| | Soc | Edu | Health | Soc.Prot. | Envi | Infra | Recre |
|---|---|---|---|---|---|---|---|
| 3 seats 1999 | -2.65 | -3.84 | -0.04 | 1.28 | -1.96 | -1.10 | 0.80 |
| | (8.99) | (4.17) | (2.85) | (1.13) | (2.09) | (3.69) | (1.80) |
| Year 2001 | -6.92 | 0.20 | -2.75 | 0.92 | -0.77 | -2.78 | -1.06 |
| | (7.15) | (3.40) | (1.75) | (0.91) | (2.15) | (2.71) | (1.45) |
| Year 2002 | -3.11 | 5.64 | -2.15 | -0.24 | -1.09 | -3.46 | -1.07 |
| | (8.00) | (4.43) | (1.79) | (0.64) | (2.11) | (2.54) | (1.88) |
| Year 2003 | 41.89*** | 12.96*** | 9.64*** | 3.17*** | 0.77 | 10.41*** | 5.58*** |
| | (7.95) | (4.11) | (1.72) | (0.80) | (2.36) | (3.76) | (1.68) |
| Year 2001*3seats | 3.40 | 2.55 | 0.31 | -2.54* | 2.05 | -0.14 | 0.66 |
| | (11.31) | (5.57) | (2.82) | (1.29) | (2.40) | (4.18) | (3.55) |
| Year 2002*3seats | 19.28 | 11.86 | 1.07 | 0.05 | 2.76 | 5.14 | -2.22 |
| | (17.21) | (10.94) | (3.95) | (1.80) | (2.50) | (5.17) | (2.51) |
| Year 2003*3seats | 15.54 | 10.56 | 4.14 | -0.56 | 3.66 | -2.34 | -0.56 |
| | (16.46) | (7.42) | (5.88) | (2.23) | (3.75) | (6.85) | (2.87) |
| Baseline expenditure | 0.46*** | 0.41*** | 0.47*** | 0.09 | 0.03 | 0.20*** | 0.15** |
| | (0.09) | (0.11) | (0.10) | (0.06) | (0.03) | (0.06) | (0.06) |
| Copart income | 0.03 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 |
| | (0.04) | (0.01) | (0.01) | (0.00) | (0.00) | (0.01) | (0.01) |
| N | 887 | 887 | 887 | 887 | 887 | 887 | 887 |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Income and expenditure variables are per capita.

Table 11: Women councillors, education, and health outcomes 2005-2010

| | Primary enrollment | Completion primary | Comple.prim. gender gap | Pentavalent Vaccine | Delivery in institution |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Women | 3.30 | 3.16 | 0.13 | 3.91 | 9.65 |
| | (7.22) | (6.69) | (5.64) | (8.72) | (7.30) |
| Year 2006*Women | 1.99 | 2.76 | -16.04** | -0.49 | -3.87 |
| | (1.67) | (3.26) | (6.64) | (4.05) | (4.71) |
| Year 2007*Women | 4.95* | 5.84 | -8.95 | -1.49 | -3.04 |
| | (2.69) | (3.55) | (5.48) | (4.54) | (5.12) |
| Year 2008*Women | 4.13 | 5.53 | -9.06 | -0.42 | 3.95 |
| | (3.03) | (4.23) | (6.64) | (5.30) | (6.03) |
| Year 2009*Women | 3.10 | 6.45 | -9.77 | 8.79 | 7.62 |
| | (3.39) | (4.47) | (6.70) | (7.56) | (6.44) |
| Year 2010*Women | 2.54 | 0.87 | -5.11 | -4.91 | 21.79 |
| | (3.78) | (4.28) | (6.16) | (7.17) | (19.66) |
| Year 2006 | -5.12*** | -3.81 | 9.08** | -3.58 | 3.62 |
| | (1.55) | (2.48) | (4.34) | (2.92) | (3.61) |
| Year 2007 | -10.50*** | -9.28*** | 3.25 | -5.50 | 3.70 |
| | (3.01) | (3.22) | (4.12) | (3.90) | (4.00) |
| Year 2008 | -16.38*** | -10.69** | 0.78 | -12.09** | -0.36 |
| | (4.81) | (4.69) | (4.40) | (5.99) | (4.86) |
| Year 2009 | -17.32*** | -8.72* | 1.66 | -18.58*** | -3.28 |
| | (4.95) | (4.68) | (4.70) | (6.44) | (4.71) |
| Year 2010 | -21.09*** | -8.76 | -4.59 | -15.01** | -6.28 |
| | (6.27) | (5.66) | (4.36) | (7.38) | (9.38) |
| N | 1476 | 1476 | 1476 | 1464 | 1464 |

Note: * p<0.10 ** p<0.05 *** p<0.01. Standard errors clustered at the municipality level. Other controls include Z (running variable), baseline indicators for each category, municipal per capita revenues. Expenditure variables are per capita.

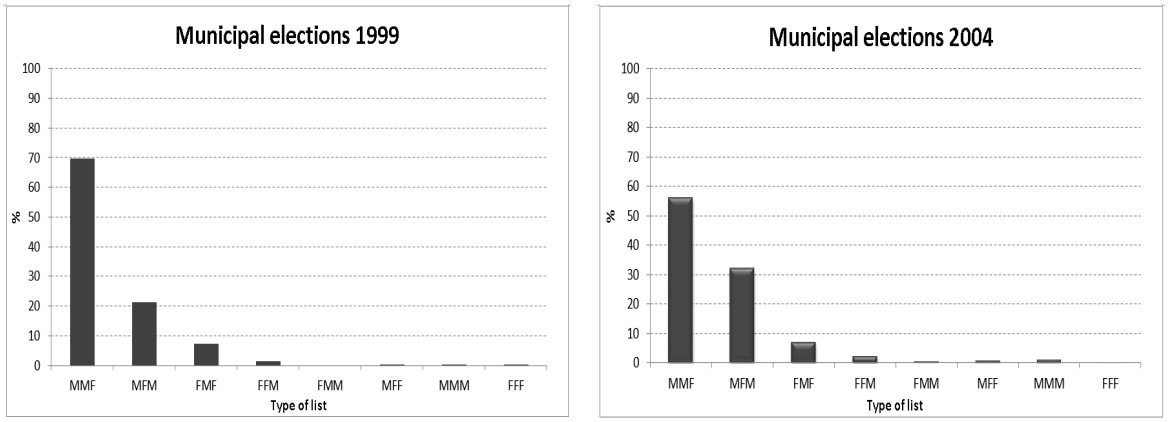


Figure 1: Types of list of candidates for municipal councillors

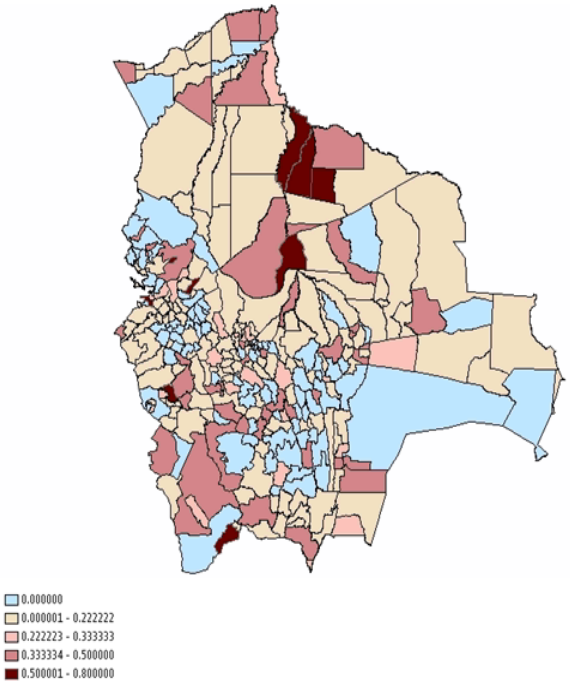


Figure 2: Proportion of women in municipal councils - 2004 elections

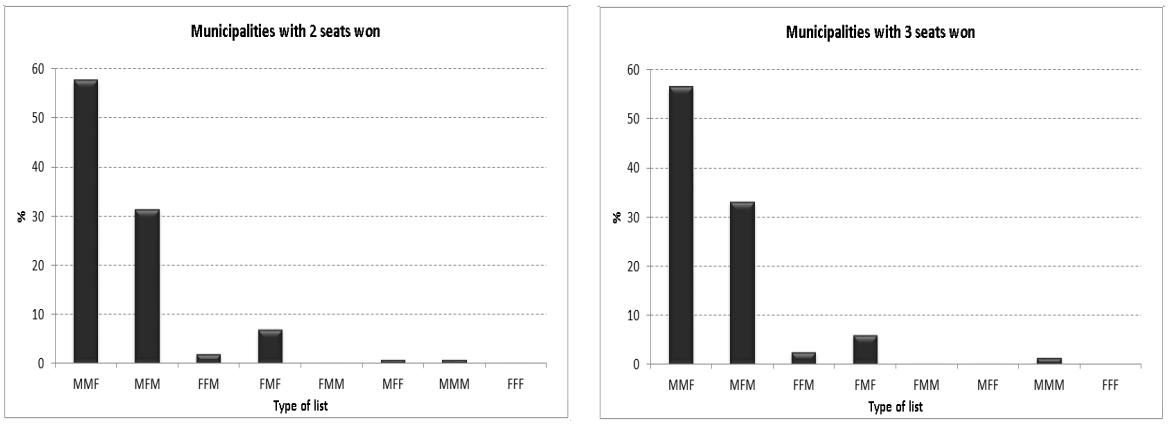


Figure 3: Types of list of candidates for municipal councillors

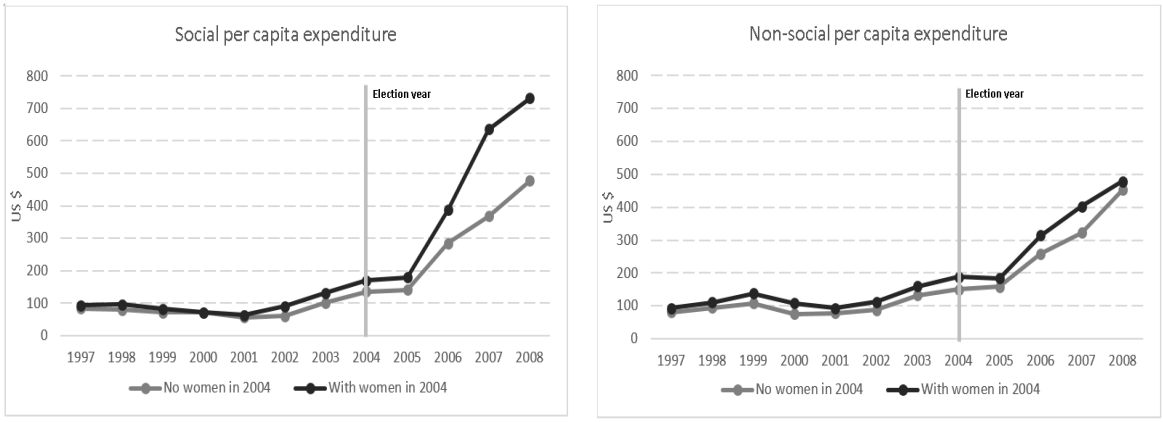


Figure 4: Evolution of per capita public expenditure in municipios with and without women councillors

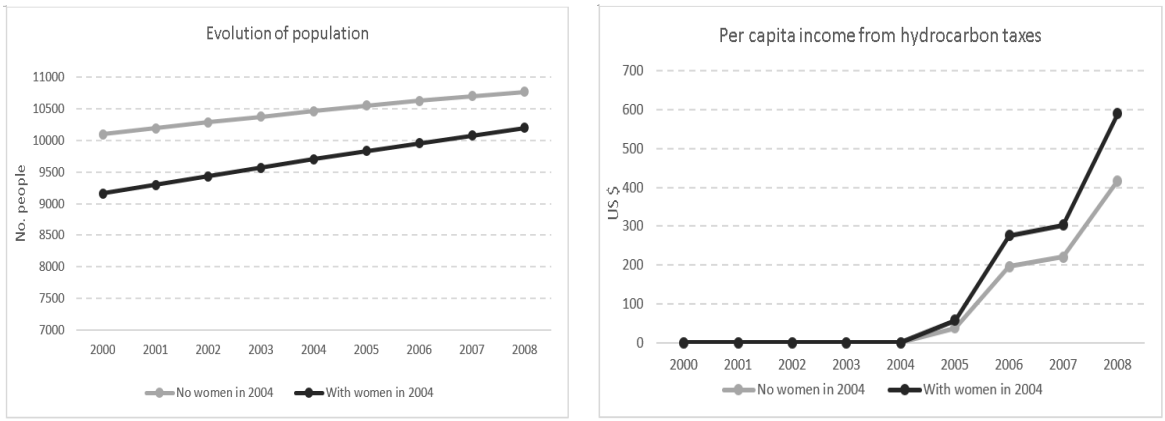


Figure 5: Evolution of potential confounders in municipios with and without women councillors

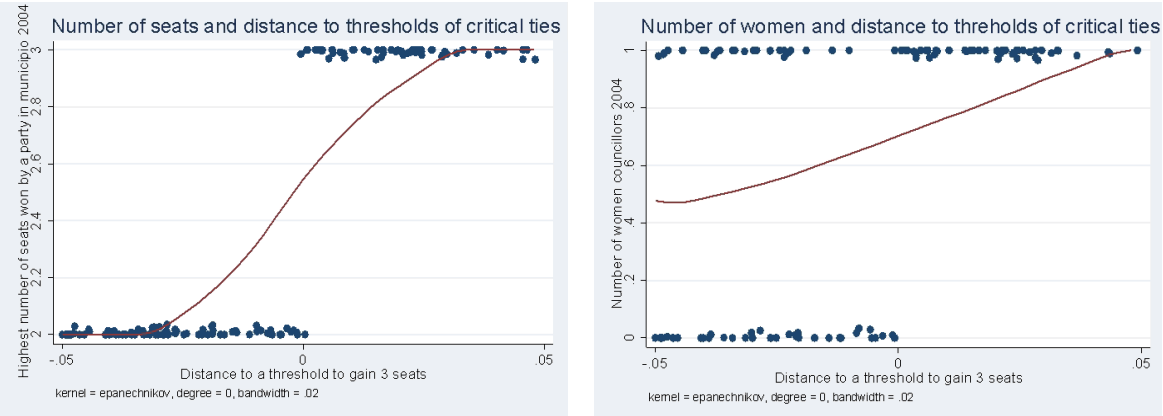


Figure 6: Evidence of discontinuity around the threshold

# Appendix

Table A1: Critical tie for third position

| | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$* | $v_3$ | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$ | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

Note: * are parties competing for the contested seat †are seats already allocated

Table A2: Critical ties for fourth position

| Option A | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$ | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$* | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

| Option B | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$* | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$ | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

Note: * are parties competing for the contested seat †are seats already allocated

Table A3: Critical ties for fifth position

| Option A | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$* | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$† | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

| Option B | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$† | $v_4$* | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$ | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

| Option C | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$† | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$* | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$ | $v_3/3$ | $v_4/3$ | $v_5/3$ |

| Option D | Party 1 | Party 2 | Party 3 | Party 4 | Party 5 |
|---|---|---|---|---|---|
| # votes | $v_1$† | $v_2$† | $v_3$ | $v_4$ | $v_5$ |
| # votes/2 | $v_1/2$† | $v_2/2$ † | $v_3/2$ | $v_4/2$ | $v_5/2$ |
| # votes/3 | $v_1/3$* | $v_2/3$* | $v_3/3$ | $v_4/3$ | $v_5/3$ |

Note: * are parties competing for the contested seat †are seats already allocated

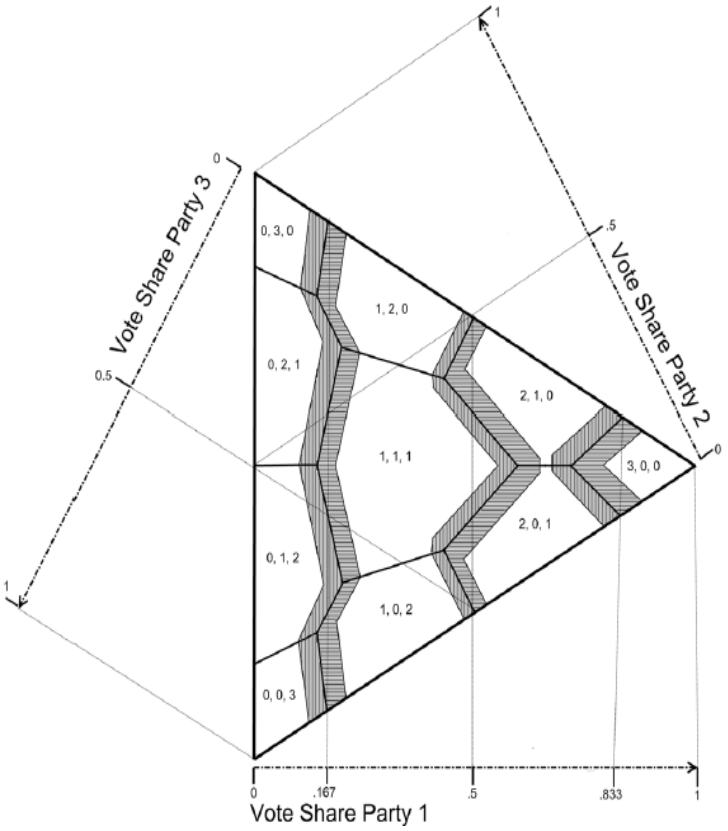


Figure A1: Party-map extracted from Folke (2014): Distribution of three seats between three parties as a function of their vote shares. The number of seats of each party is written within each contiguous "seat outcome" region in the order Party 1, Party 2 and Party 3. Regions defined as close to a threshold for Party 1 are marked in grey. The vertical lines indicate that Party 1 is close to gaining a seat, while the horizontal line indicates its being close to losing a seat. The seats are allocated using the Sainte-Lague method