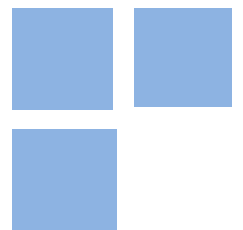# Local public finances in Brazil: are mayoral characteristics important?

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Abstract:

The purpose of this paper is to evaluate the importance of mayor's characteristics (education, experience, and gender) on Brazilian municipalities' fiscal outcomes. In order to estimate the causal effects we use a regression discontinuity methodology based on close elections. We find no evidence that the fiscal performance of a municipality is affected by mayor's gender. Regarding the qualification of the mayor, we find robust evidence that education and experience matter only for the composition of spending. Experienced and educated mayors choose to devote a smaller fraction of the budget to current expenditures and as a consequence seem to be more concerned with the quality of public finances.

Local public finances in Brazil: are mayoral characteristics important?

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Resumo: O objetivo deste artigo é avaliar a importância das características dos prefeitos (educação, experiência e gênero) sobre os resultados fiscais dos municípios brasileiros. Os efeitos causais são identificados através da metodologia de regressões com descontinuidade baseada em eleições apertadas. Não são encontradas evidências de que o desempenho fiscal dos municípios é afetado pelo gênero do prefeito. No que diz respeito ao nível de qualificação dos prefeitos, encontramos evidência robusta de que educação e experiência só são importantes para a composição do gasto. Prefeitos educados e experientes escolhem destinar uma menor parcela do orçamento para os gastos correntes e desta forma parecem mais preocupados com a qualidade das finanças públicas.

Classificação JEL: H83, C52

Palavras-chave: educação, experiência, gênero, prefeitos, regressão com descontinuidade.

Abstract: The purpose of this paper is to evaluate the importance of mayor's characteristics (education, experience, and gender) on Brazilian municipalities' fiscal outcomes. In order to estimate the causal effects we use a regression discontinuity methodology based on close elections. We find no evidence that the fiscal performance of a municipality is affected by mayor's gender. Regarding the qualification of the mayor, we find robust evidence that education and experience matter only for the composition of spending. Experienced and educated mayors choose to devote a smaller fraction of the budget to current expenditures and as a consequence seem to be more concerned with the quality of public finances.

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Key words: education, experience, gender, mayors, regression discontinuity.

1. **Introduction**

Brazil, like other countries around the world, adopted administrative and fiscal decentralization in the hopes that increased information on citizen needs improved government efficiency, effectiveness, responsiveness and accountability.

The shift of responsibility from central to local governments came, however, with a heterogeneous response in that some municipalities exceed others in terms of fiscal and policy performance.

In order to understand the variance in local fiscal municipal response, this paper proposes to evaluate the determinants of municipal fiscal performance given mayors´ characteristics. More precisely, we seek to explain the relevance of mayors' previous public sector experience and educational achievement on fiscal outcomes.

Literature points to a series of factors that affect governmental behavior. Among the usual economic variables (growth rates, productivity), budgetary institutions appear to be particularly important. Alesina et al. (1999) are the first to formally evaluate the impact of the quality of budget institutions, measured by an index that captures different stages of the budgetary process, on fiscal performance. The evidence for 20 Latin American and Caribbean countries indicates that hierarchical (top-down) procedures that impose a hard budget constraint and budgetary transparency are positively related to fiscal discipline. Dabla-Norris et al. (2010) build multi-dimensional indices of the quality of budget institutions for low-income countries, and conclude that better fiscal institutions help improve fiscal balances and the adoption of countercyclical policies.

Governmental performance can also be explained by the electoral competitiveness hypothesis, according to which, more competition is associated with higher performance (Holbrook and Van Dunk (1993)); by leader's political support (O'Toole and Meier (2004)); by party's alternation since change creates instability and overspending (Calcagno and Escaleras (2007)).

As pointed by Avellaneda (2008) political and economic factors are external to public organizations, and it is important to take into account the influence of internal organization factors as well, such as manager characteristics. The management quality hypothesis points out that qualified management contributes to increased performance (Meier and O'Toole (2002); Boyne and Walker (2005)). [1] Besides, public policies, although the product of collective action, are shaped by the actions of a single-actor, the mayor, when the setting involves local decision making. The mayor in fact is the most important decision maker for municipal performance, since he performs political and administrative functions. Managers' education and experience should then contribute to performance not only in the private, but in the public sector as well. She suggests as measure of managerial quality the mayor's human capital that is, his educational background and job-related experience. Both variables still have the advantage of being quantifiable and observable homogeneously across different contexts.

There are not many studies assessing the influence of manager's education and experience on performance. Gibson and Lehoucq's (2003) find that more educated mayors (completed years of education) hire more staff to monitor forest conditions in Guatemala. Fernández (2005) do not find evidence of the impact of superintendent total years of experience on the performance of school districts in Texas. Congleton and Zhang (2009) and Besley et al. (2011) associate more educated political leaders to

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[1] Empirical support to the management quality hypothesis can be found, for example, in Fernández (2005) and Andrews et al. (2006).

higher economic growth. Dreher et al. (2009) find evidence that the professional background of the head of government influences the adoption of market-liberalizing reforms. Golhmann and Vaubel (2007) show that, besides mayoral qualifications (education and profession background), the gender of monetary policy makers is important for inflation. Avellaneda (2008) tests the mayoral qualifications thesis against the political and economic explanations. In order to do so she evaluates 40 municipalities in the Colombian Department of Norte of Santander, and finds evidence that mayoral qualifications positively influence municipal performance with respect to education coverage (school enrollment). However, these positive effect decreases under external constraints, such as the presence of illegal armed groups.

Regarding specifically fiscal outcomes, Persson and Zhuravskaya (2011) show that leaders that began their career in a given province and stayed their (inside provincial leaders) have a higher probability of making more infrastructure investments than leaders that come from a different province (outside provincial leaders). Jochimen and Thomasius (2012) find evidence that prior professional experience in the financial sector makes finance ministers less prone to deficits.

In order to verify the impact of individual characteristics of political decision makers on policy outcomes we use a regression discontinuity design (RDD) based on close elections. If the election between two candidates is sufficiently close, whether the municipality elects an educated (experienced) mayor or not is the outcome of a random event. Freier and Thomasius (2012) apply the same procedure to evaluate the effects of politician's qualification (education and experience) on local public debt, local expenditures and local taxes, using a sample of German municipalities. They, however, use a fuzzy regression discontinuity design to evaluate the effect of mayor's education since the education level of the winner of an election reflects the average university graduates for the occupation category of the candidate. Since we have information on the level of education of each candidate in each election we can create an indicator variable of whether the new mayor is educated or not and use a sharp design.

There is also a growing literature which discuss if women's representation shapes actual policy choices. Alesina (1998) and Besley and Coate (1997) develop a model to account for divergence between male and female candidates regarding their policy proposals. Female mayors in fact would choose actions that are closer to their preferences, regarding both the size of government and the allocation of resources. Chattopadhyay and Duflo (2004) use the fact that the heads of village councils in India are responsible for the provision of several public goods in rural areas, and that for 1/3 of the councils only women could be elected to the position of head, to account for the divergence hypothesis. They find evidence that in India in fact women are more concerned and invest more in public goods related to their interests, like drinking water. Svaleryd (2009) assess the effects of women's representation in Swedish local councils on public expenditure, and also concludes that women, relative to men, consider spending on childcare and education more important than spending on elderly care. Ferreira and Gyourko (2011), on the other hand, are unable to find evidence on the effects of gender on the size of government, composition of spending, employment or crime rates for U.S. mayors.

Given that we have information on mayors' gender, we also investigate if female representation affects public finances.

The paper is organized in four sections besides this introduction. In the second section we present Brazilian municipalities spending and taxing responsibilities as well as the context in which they operate. In the third section we present the data and show some statistical evidence. In the fourth section we describe the empirical strategy, in the

fifty section we discuss the main results, and in the sixth section we present evidence on the validity of the research design. Finally, in the seventh section we summarize the main conclusions.

2. **Institutional background** [2]

During the 70's and 80's, despite the fact that Brazil was under a military regime, the political power of municipalities were preserved. As observed by Samuels (2000, 2004) in a large number of municipalities direct elections continued to be run and the states' role as intermediaries between the national and local governments were abolished. The result was an increase in municipalities' political autonomy and in the political capital of mayors since they became the politicians directly responsible for the local projects and thus the ones able to claim the credits.

The controlled electoral opening allowed the enlargement of the capacity of local governments to expand their discretion over expenditures and as consequence their demands for new sources of revenue.

Gradually the military became dependent on municipalities for support and legitimacy. After the first democratic election for governors and mayors in 1982 the government increased the pace of decentralization.

Congress passed the Passos Porto Amendment in December 1983 increasing the amount of constitutionally mandated revenue sharing from federally collected taxes, income tax and industrial production tax, to states and municipal governments.

The end of military rule and the transition to democracy in the mid-1980s further boosted decentralization.

"The electoral cycle, of municipal then governor then national over a period of several years, meant that the nationally elected leaders were riding the coattails of local elections. The military era law of requiring parties to hold national, state, and municipal conventions, with each delegation chosen by the one below it further shifted power and responsibility downward (Willis, Garman, and Haggard, 1999). The sub-national governments thus have bargaining-power and leverage over the national government".

The 1988 Constitution delegated a higher degree of fiscal autonomy to sub-national governments. It formally established Brazil as a federal republic with three levels of government: a federal government, twenty-six states and a federal district (Brasília) and more than 5,000 municipalities. The New Constitution, therefore, established the legal status of municipalities as federal entities.

It also established the municipalities' responsibilities regarding the provision of goods and services. They include the provision of basic education and health services, the protection of historical and cultural patrimony, the offer of systems of public transportation.

Brazilian municipalities have also huge taxation autonomy. They rely mainly on two types of taxes: an annual tax on urban land and buildings (*Imposto Predial e Territorial Urbano)* e a tax applied paid by services providers (companies or professionals) to a third party (*Imposto sobre Serviços*). Mayors are free to choose tax rates on both types of taxes and in fact the rates vary substantially according to the municipality.

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[2] Decentralization can be defined as the transfer of authority, responsibility and resources to lower levels of government. There are in general two processes of decentralization. The political involves the adoption of elected, autonomous sub-national governments that can make binding policy decisions. The functional decentralization implies the transfer of policy responsibilities, expenditure capacity and revenue-raising power to the sub-national governments. As such it also involves what some call administrative decentralization and fiscal decentralization.

As in other decentralized systems, the policy responsibilities of local governments are not fully financed by their own tax revenues. Therefore, municipalities benefit from a complex revenue-sharing arrangement and fiscal transfers both from the central and state governments.

Regarding the political process of decentralization, the mayor is in charge of local legislative matters, while the municipal legislature (Câmara dos Vereadores) is in charge of local legislative matters. Individuals (men and women) who are more than 18 years old and less than 70 years old are obliged to vote. Individuals who are at least 16 years old and more than 70 are free to vote, if they want to.

Since 1996, both the mayor and the municipal legislature are elected in general elections every four years.[3] The last election happened in 2012. Mayors are chosen through the majoritarian system. For municipalities with less than 200,000 inhabitants the election for mayor is decided by simple majority rule (more than 50%, excluding blank and null votes). For municipalities above 200,000 inhabitants if neither candidate gets 50% of the votes there is a runoff between the two candidates with more votes.

The increased strength of Brazilian local governments had an important impact in the career goals of politicians. High municipal autonomy made municipalities an attractive choice for politicians as shown by the career path of politicians which show that municipal-level positions are highly demanded by them after they serve in Congress (Samuels 1999, 2000).

Therefore, Brazil is very similar to Colombia and other Latin American countries where mayoral leadership is very important. As well pointed by Avellaneda (2008) "in municipal settings, where the figure of city manager is absent, the single actor, the elected official, the identifiable individual, as well as the manager, is the mayor. There, the mayor performs not only political but also administrative functions. This makes the mayor the key decision maker for municipal performance (p. 3)".

3. **Data and descriptive statistics**

Our analysis is based on a large data set of 5561 (out of 5570) Brazilian municipalities, for which information was collected on the outcomes of three mayoral elections (years of 2000, 2004 and 2008). For the three elections, there is complete information for both incumbent and runner-up on educational level, professional background (including rather the candidate had previous public sector managerial experience), gender, and vote share.

The election data come from the Superior Electoral Court (*Tribunal Superior Eleitoral* - TSE), the most important entity of the electoral justice in Brazil .TSE acts jointly with the regional electoral courts (*Tribunal Regional Eleitoral* -TRE), which are directly responsible for the administration of the electoral process in the states and municipalities.

It is not an easy task to measure performance, especially in the public sector. In the United States, government spending is the usual indicator of managerial efficiency. Although it constitutes an objective measure, expenditures by themselves do not tell much about performance since they are not linked to quality, as pointed out by Boyne (2002).

We could use the growth literature to find some argument in favor of government expenditure as a good indicator of performance.

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[3]Federal and of the state government politicians are chosen in the same election. Therefore, every four years, Brazilians vote for a President of the Republic, federal and state parliament members, senators and also a state governor. The last election occurred in 2014. Politicians are renewed every four years, but every other year there is one election in the country.

From the theoretical point of view, public spending plays an important role in promoting economic growth. The empirical evidence, however, or do not find a clear evidence of the relationship between government spending and growth (for example, Agell et al. (1997)) or find a negative relationship (Barro and Sala-i-Martin (1995)). Since higher levels of spending imply that more revenues are necessary to balance the budget, the final result is certainly a negative impact on growth given that taxes are distortionary. High levels of government expenditure can harm economic growth given the economic costs of raising taxation to finance spending. There is consensual evidence that taxes do not promote growth because they have negative effects on incentives to work, save and invest.

The theoretical and empirical literature also cares for the mix of expenditure.

Empirical works that use an economic classification show inconclusive results for public investment. According to the intuitive belief, Avila and Strauch (2003) find evidence that public investment affects positively growth in the EU. On the other hand, Afonso and Furceri (2008) find that public investment is not a statistically significant determinant of growth in the EU and OECD. The results regarding current expenditures are, however, unanimous. As pointed out by Barrios and Schaechter (2008) transfers and consumption impact negatively economic growth.

Therefore, in order to follow the literature our measure of performance is given by total expenditures per capita and tax revenues per capita, as measures of the size of government. In order to take into account another objective measure we also use as a performance indicator the current expenditures/total expenditures ratio. It represents a measure of fiscal priority, indicating the quality of spending. As discussed before, the composition of public expenditure is known to be an important determinant of growth, and if governments have as one of their main goals to promote growth, priority should be given to the more productive items of the budget.[4]

Given that all mayors start their mandates at the same time (January 1), the beginning of the mayoral administration and the beginning of the calendar year are the same and therefore municipalities' fiscal indicators can be associated with a specific mayoral administration.

Table 1 presents the main descriptive statistics for the fiscal outcomes. It calls particular attention the high standard deviation of expenditure per capita and tax revenue per capita, while there is no such heterogeneity for the expenditure composition.

Table 1 – Fiscal outcomes: descriptive statistics

	Obs	Average	Std. Dev.
Expenditure per capita	21,270	1762,22	1617,26
Tax revenue per capita	19,754	255.94	430.22
Expenditure composition	21,266	0.86	0.08

Table 2 shows some election information. First, we observe that 9,850 are close elections with a margin of victory of no more than 10% for the winner and out of those 5,310 with no more than 5%. Second, we can see that in 21,162 out of 21,286 elections one candidate received a clear majority of votes. In 124 elections there was a run-off election.

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[4] Avellaneda (2008) uses as a measure of local educational performance the percentage of eligible children who actually enrolled in school.

Table 2 – Number of elections and candidates by election outcome

	All	10% window	5% window
Clear election results	21,162	9,790	5,278
Run-off elections	124	60	32
Same votes	10	10	10
Total	**21,286**	**9,850**	**5,310**

Table 3 presents some mayor characteristics by election. It calls attention how women are underrepresented in politics, although they have increased their representation over time.

Given that the level of education in Brazil is quite low, we decided to use two thresholds to separate educated and non-educated mayors. The first one is high school completion. In the 2000 election, 45.63% of the elected mayors had at least a high school degree. In the 2004 election the percentage of educated mayors increased to 48.11%, reaching 43.57% in the 2008 election. When we use a more strict definition, a university degree, the percentages do not change much and maintain the increasing trend, indicating that mayors are surprisingly educated if we compare to the level of education of the average population that is quite low.

Finally, although the percentage of experienced mayors increased over time, only 30% of the mayors had previous public sector experience in the 2008 election. If we compare education and experience it is possible then to conclude that Brazilian mayors' main characteristic is education, not experience.

Table 3 – Incumbent characteristics by election

	2000	2004	2008	2012
Gender	318	408	491	646
(% of total)	5.72%	7.34%	8.84%	11.63%
Mayor with at least a high school degree	2515	2652	2786	3028
(% of total)	45.63%	48.11%	50.54%	54.93%
Mayor with a university degree	2130	2268	2421	2695
(% of total)	38.33%	40.81%	43.57%	48.50%
Mayor with previous public sector experience	753	928	1645	1505
(% of total)	13.55%	16.70%	29.60%	27.08%
Total	**5555**	**5521**	**5415**	**5484**

Given the huge heterogeneity among Brazilian municipalities we also present mayors characteristics by regions.

Table 4 shows the percentage of educated mayors (with at least a high school degree) while Table 5 presents the percentage of educated mayors (with a university degree) in each region. It is interesting to observe that when education involves only high school, the percentage of educated mayors increases in all regions and is not very different among regions.

Table 4 – Proportion of educated mayors (with at least a high school) in each region of total number of highly educated mayors in Brazil, per year

Year	North	Northeast	Central	Southeast	South
2000	21.41%	23.07%	20.75%	23.54%	22.84%
2004	25.57%	24.27%	25.73%	24.12%	23.05%
2008	25.14%	25.08%	25.12%	25.56%	25.79%
2012	27.87%	27.58%	28.40%	26.77%	28.32%
Total	**6.35%**	**32.82%**	**7.52%**	**31.66%**	**21.65%**

However, when education involves a university degree, the differences among regions is quite impressive. It calls attention that the Northeast region (one of poorest) and the Southeast (the richest) have similar percentages of educated mayors, and that both show a small decrease in the percentage of educated mayors over time.

Table 5 - Proportion of educated mayors (with a university degree) in each region of total number of highly educated mayors in Brazil, per year

Year	North	Northeast	Central	Southeast	South
2000	5.27%	33.36%	7.11%	34.12%	20.14%
2004	6.18%	32.32%	7.86%	33.51%	20.13%
2008	5.54%	31.74%	7.48%	33.31%	21.94%
2012	6.55%	31.68%	7.85%	31.46%	22.46%
Total	**5.92%**	**32.22%**	**7.59%**	**33.01%**	**21.25%**

Regarding experience, the Northeast and the Southeast have the most experienced mayors. This is not surprising, given that the Northeast always had a strong political influence that is passed through generations.

Table 6 – Proportion of experienced mayors (previous public sector experience) in each region of total number of experienced mayors in Brazil, per year

Year	North	Northeast	Central	Southeast	South
2000	9.04%	27.93%	6.52%	33.24%	23.27%
2004	8.86%	31.97%	8.53%	29.05%	21.60%
2008	7.80%	29.07%	8.04%	32.78%	22.30%
2012	8.92%	32.02%	7.32%	28.70%	23.04%
Total	**8.55%**	**30.37%**	**7.67%**	**30.86%**	**22.55%**

4. **Empirical strategy**

As already stated, the present study seeks to evaluate the impact of mayor educational level and previous public sector experience, as well as gender, on municipal fiscal outcomes. Two steps are taken to assess this effect: (i) we estimate a fixed effects

(FE) model to account for possible omitted variables; and (ii) we use a regression discontinuity design (RDD) to account for other potential endogeneity problems.

It is quite possible that unobservable local characteristics and local economic shocks affect the outcome of mayoral elections and other local decisions at the same time, resulting in an endogeneity bias of the fixed effects estimator. Therefore, in order to obtain a consistent estimator of the mayoral characteristics effect, we use a RDD based on close elections. Given that elections in Brazil are compulsory to all citizens between 18 and 70 years of age, possible external factors that could affect turnout (such as weather conditions) are not considered to be a significant issue for the Brazilian case.

Our analysis of the effect of mayor education, experience or gender on fiscal outcome variables is close to the one followed by Freier and Thomasius (2012), except that they use a fuzzy RDD to evaluate the effects of education on fiscal outcomes while we use a sharp RDD. Our data set contains precise information on incumbent and runner up educational achievement, as well as previous professional experience. Therefore, we are able to clearly discriminate mayors with a university degree or with previous public sector experience from the others.

The underlying hypothesis to the identification strategy for the RDD is that victory between a candidate with a specific characteristic (such as higher education, previous experience or male) and one without this characteristic is randomly decided if the election was a very close race.

The educational level of the election winner is denoted by edu_w and of the best opponent by edu_o. These variables can take only two values: 0 for less than a university degree and 1 for a university degree. Analogously, previous experience of the election winner in the public sector is denoted by exp_w, and of the best opponent with exp_o. These variables also can take only two values: 0 for no previous public sector experience and 1 for public sector experience. Finally, the gender of the election winner is denoted by gen_w, and of the best opponent with gen_o, where 1 is used to identify males.

For the regression discontinuity design to be viable, we must consider only the observations in which the winner and the best opponent have different levels of education ($edu_w \neq edu_o$) or experience ($exp_w \neq exp_o$), or different gender ($gen_w \neq gen_o$).

The vote share of the more highly educated is denoted by v_h, and v_l for the lower educated. Then we define the margin of votes of the higher educated candidate, m, as the difference between v_h and v_l. That is, $m = v_h - v_l$, and therefore m determines whether the candidate with higher education is elected, with the cutoff at m=0. Thus we have a sharp discontinuity in the treatment variable (d_i, described below) at m=0. The same idea applies to experience and gender.

It is noteworthy that we assess the three mayor characteristics separately, and, as a result, three running variables exist. In other words, m_c can be defined in terms of education, experience or gender (m_{educ} or m_{exp} or m_{gen}), and the above procedure for its calculation is replicated for experience and gender. For simplicity we consider m_c as m, where c can be education (**educ**) or experience (**exp**) or gender (**gen**).

The treatment d_i (where i refers to the unit of observation, omitting a time index t) is an indicator variable of whether the new mayor is educated or has previous experience or is a male. That is, $d_i = edu_w$ in the case of the educational level, $d_i = exp_w$ in the case of experience, and $d_i = gen_w$ in the case of gender. The margin of victory (m) uniquely determines d: d = 1 [m>0].

We therefore have a sharp design, given that the relationship is deterministic, and we do not have to use instrumental variable estimation to deal with the discontinuity of the treatment variable.

We implement the following specification:

$$y_i = \beta_0 + \beta_1 d_i + X_i \gamma + f(m_{c_i}) + \varepsilon_i \qquad (1)$$

where the set of control variables X includes linear and squared terms of the local population number as well as year fixed effects, and the function *f(m)* is a polynomial in the margin of victory, **m**.

We introduce the flexible functional form f(m) in order to control for any correlation of treatment with omitted variables in the error term that could be related with the conditioned margin of votes (on education or experience or gender). This requires a clear criterion for polynomial degree selection. Lee and Lemieux (2010) present an extensive discussion on various approaches to defining the best polynomial specification. We use different non-parametric polynomial specifications with varying order degrees to verify whether the effects are sensitive to the choice of the functional form. The Akaike Criteria is proposed as a generalized cross-validation case to select the most adequate polynomial degree.

The main idea of the RDD is to focus on the observations just around the threshold, assuming that the margin of victory, **m**, cannot be precisely manipulated by the candidates. This is a fundamental underlying hypothesis for the identification strategy, which leads to comparable observations right and left of the cutoff. This way the differences in fiscal outcomes can be attributed to mayor characteristics. Observations just right and left of the decisive threshold (m=0) should have the same characteristics both observable and unobservable, except treatment, that will be different just right and left of the cutoff.

In other words, if an election was a very close race, an election between a highly educated (or experienced) candidate against a not as well educated (or experienced) opponent must have been decided by random chance. Then, the vote margin between the two candidates, randomly decided around the threshold, effectively determines treatment. That is, if the highly qualified candidate receives more votes than the opponent, the municipality will have a qualified mayor, otherwise it will not. The same idea applies to gender.

The chosen bandwidth around the threshold (*m=0*) derives from the optimal robust variance estimator proposed by Calonico, Cattaneo and Titiunik (2015a, 2015b). As confidence intervals may significantly change according to the interval chosen, leading to possible inference obstacles, the authors propose a robust confidence interval estimator for average treatment effect at cutoff, by balancing the trade-off between squared-bias and variance of the RDD estimator. This approach presents an additional robustness to estimates, as the optimal bandwidth is only valid when usual bandwidth conditions are valid, but add on additional bias-correction. The adopted kernel functions are triangular, as we seek to look at average treatment effect and, therefore, would like to favor middle value observations for treatment, excluding outliers.

Given the strong case for exogenous treatment attribution our results will be internally valid (as is further explored in section 6). However, external validity still remains a challenge. Observations in which a highly qualified or male candidate wins with a big vote margin might be very different from the observations that we consider, so the results should only be generalized with care.

5. **Results**

Initially we present evidence on the causal effects of mayor characteristics on fiscal outcomes from the fixed effects model (Table 7). The dependent variables are average *per capita* values of each fiscal outcome over the electoral mandate, and the logarithm of these averages. We can note that the mayor characteristics show statistically significant effects on the average expenditure composition and its

logarithm. The more qualified mayors, as well as female mayors, tend to spend a relatively smaller percentage of the budget on current expenditures (mostly wages) and more on investment.

Table 7– Fixed effects results

Panel 1: Average of Fiscal Outcomes

	Expenditure per capita	Tax revenue per capita	Expenditure Composition
Education	5.55	2.49	-0.005***
	(8.65)	(6.99)	(0.001)
Experience	-8.19	4.84	-0.006***
	(27.69)	(6.04)	(0.001)
Gender	3.36	-3.53	0.002*
	(9.62)	(4.81)	(0.001)
Obs	14782.00	12968.00	14777.00

Panel 2: Log of Average of Fiscal Outcomes

	Expenditure per capita	Tax revenue per capita	Expenditure Composition
Education	0.00	0.018*	-0.006***
	(0.008)	(0.01)	(0.001)
Experience	0.00	0.01	-0.007***
	(0.009)	(0.01)	(0.001)
Gender	0.00	-0.01	0.002*
	(0.009)	(0.01)	(0.001)
Obs	14782 .00	12968.00	14777.00

Note: Significance levels: * p<0.10; ** p < 0.05; *** p <0.01. Standard **errors** in parenthesis are robust and clustered by micro region. For all FE estimates, income, squared income, population, squared population, affiliation with presidential party, and year dummies are included.

Graphical presentations of the outcome variables (expenditures per capita, tax revenues per capita and expenditure composition) and the value of the rating variable are shown in the appendix. They provide evidence of a discontinuity only for the expenditure composition.

The next three tables (8a-8c) show the results of the RDD analysis related to the three mayor characteristics investigated: education, experience and gender, respectively. For robustness, the tables include the results using three bandwidth choices, both for the average values of fiscal outcomes and its logarithms. Besides the optimal bandwidth - derived from the optimal robust variance estimator proposed by Calonico, Cattaneo and Titiunik (2015a, 2015b) as discussed in the previous section - estimators are also presented.

The main conclusion regarding the mayor´s education level and previous public sector experience, obtained from the fixed effects model, maintains in the RDD analysis, that is, more qualified mayors tend to spend a relatively smaller percentage of the budget on current expenditures. Mayors with a higher level of formal education tend to spend relatively more, but clearly promoting a better kind of expenditure. However, in the RDD analysis, the effects for gender are not statistically significant.

Table 8a – RDD: Education and public finance indicators
Panel 1: Education

	Order of Polynomial (AIC)	Average			Order of Polynomial (AIC)	Log of Average		
Expenditure per capita	1	231.31** (105.17) [6645]	148.63** (72.296) [6645]	4.64 (33.735) [6645]	1	0.10 (0.048) [6645]	0.06* (0.034) [6645]	0.04 (0.030) [6645]
Tax revenue per capita	1	38.22 (51.498) [5791]	29.01 (30.986) [5791]	-5.59 (11.644) [5791]	1	0.14 (0.110) [5791]	0.08 (0.074) [5791]	0.05 (0.060) [5791]
Expenditure Composition	1	-0.01* (0.006) [6644]	-0.01** (0.004) [6644]	-0.01*** (0.002) [6644]	1	-0.01* (0.007) [6644]	-0.01 (0.005) [6644]	-0.01* (0.004) [6644]
Bandwith		5%	10%	Optimal		5%	10%	Optimal

Note: Significance levels: * p<0.10; ** p < 0.05; *** p <0.01. Robust standard errors in parenthesis. The number of observations for each regression are in square brackets. Sample size was obtained directly from the optimization of bandwidth selection using the mean squared error (MSE) expansion of the RDD estimators, as proposed by Calonico, Cattaneo and Titiunik (2015a, 2015b). The functional polynomial form was obtained comparing AIC values between linear, quadratic and cubic specifications.

Table 8b – RDD: Experience and public finance indicators
Panel 2: Experience

	Order of Polynomial (AIC)	Average			Order of Polynomial (AIC)	Log of Average		
Expenditure per capita	1	154.020 (136.610) [3857]	7.5919 (95.897) [3857]	85.286* (46.354) [3857]	1	0.071 (0.066) [3857]	0.008 (0.047) [3857]	0.007 (0.037) [3857]
Tax revenue per capita	1	70.399 (62.634) [3356]	26.87 (41.080) [3356]	5.046 (18.708) [3356]	1	0.043 (0.150) [3356]	-0.032 (0.102) [3356]	-0.053 (0.078) [3356]
Expenditure	1	-0.004	-0.00629	-0.006**	1	-0.005	-0.008	-0.011**

	5%	10%	Optimal			5%	10%	Optimal
Composition	(0.008)	(0.005)	(0.003)			(0.009)	(0.006)	(0.005)
	[3856]	[3856]	[3856]			[3856]	[3856]	[3856]
Bandwith	5%	10%	Optimal			5%	10%	Optimal

Note: Significance levels: * p<0.10; ** p < 0.05; *** p <0.01. Robust standard errors in parenthesis. The number of observations for each regression are in square brackets. Sample size was obtained directly from the optimization of bandwidth selection using the mean squared error (MSE) expansion of the RDD estimators, as proposed by Calonico, Cattaneo and Titiunik (2015a, 2015b). The functional polynomial form was obtained comparing AIC values between linear, quadratic and cubic specifications.

Table 8c – RDD: Gender and public finance indicators

Panel 3: Gender

	Order of Polynomial (AIC)	Average			Order of Polynomial (AIC)	Log of Average		
Expenditure per capita	1	-199.850 (239.070) [2823]	-19.638 (147.400) [2823]	-14.518 (87.342) [2823]	1	-0.075 (0.086) [2823]	0.014 (0.060) [2823]	0.006 (0.044) [2823]
Tax revenue per capita	1	57.465 (77.271) [2394]	44.824 (46.954) [2394]	44.860 (33.946) [2394]	1	0.091 (0.188) [2394]	0.170 (0.132) [2394]	0.145 (0.101) [2394]
Expenditure Composition	1	0.001 (0.010) [2822]	0.00332 (0.007) [2822]	0.001 (0.005) [2822]	1	0.000 (0.011) [2822]	0.003 (0.008) [2822]	0.001 (0.006) [2822]
Bandwith		5%	10%	Optimal		5%	10%	Optimal

Note: Significance levels: * p<0.10; ** p < 0.05; *** p <0.01. Robust standard errors in parenthesis. The number of observations for each regression are in square brackets. Sample size was obtained directly from the optimization of bandwidth selection using the mean squared error (MSE) expansion of the RDD estimators, as proposed by Calonico, Cattaneo and Titiunik (2015a, 2015b). The functional polynomial form was obtained comparing AIC values between linear, quadratic and cubic specifications.

It seems that education and previous experience may affect positively expenditures per capita, but this result must be seen with caution, as more spending do not imply more quality.

Regarding the composition of spending the results are more robust. Educated mayors seem to choose a better mix of expenditures, whatever the specification. Experienced mayors also seem to focus on the more productive item of the budget (capital expenditures), although the estimate is statistically significant only for the optimal bandwidth. Therefore, we can conclude that mayors' qualification must be

taken into account because the composition of public spending is also an important issue and if the aim is to promote growth, more productive items of the budget must be stimulated.[5]

6. **Internal validity of the regression discontinuity design**

As a last step we test whether our RDD is internally valid, that is, whether treatment attribution is indeed exogenous around the cut-off point.

In order to do so, we first examine graphs plotting the probability of receiving treatment as a function of the rating variable. As can be seen in graphs I.a., I.b. and I.c., there is a "jump" at the cut-point in the probability of receiving treatment. Besides, the discontinuity is 1, implying that all observations to the right of the cut-off receive treatment (elected mayors are educated or experienced) while all the observations to the left of the cut-off do not. Therefore, the RDD is sharp.

Graph I.a. – Incumbent educational achievement on vote share difference, given difference in educational achievement between incumbent and runner-up
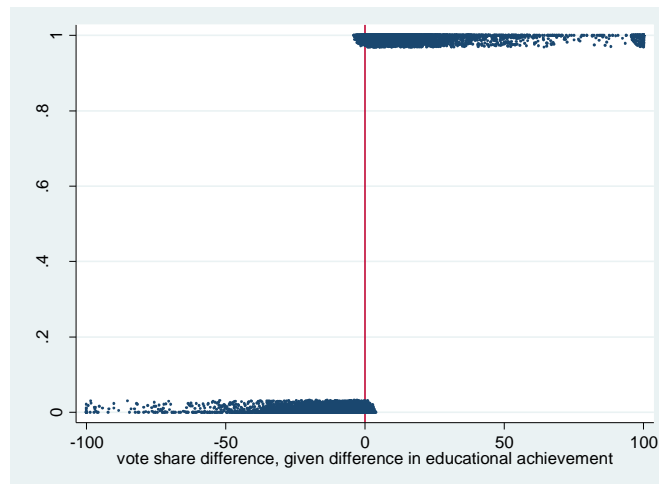
Graph I.b. – Incumbent previous public sector experience on vote share difference, given difference in previous public sector experience between incumbent and runner-up

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[5] We also tried a functional classification of expenditures. Spending on health and education seem not to be affected by mayors' characteristics, but new estimates are planned when we collect more reliable data.
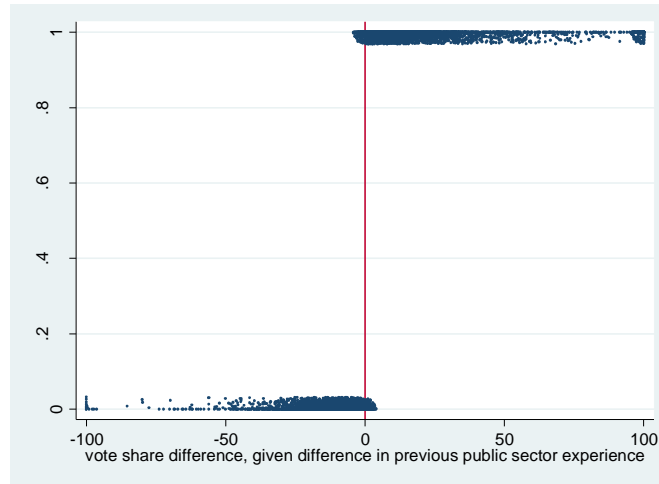
Graph I.c. – Incumbent gender on vote share difference, given difference in gender between incumbent and runner-up
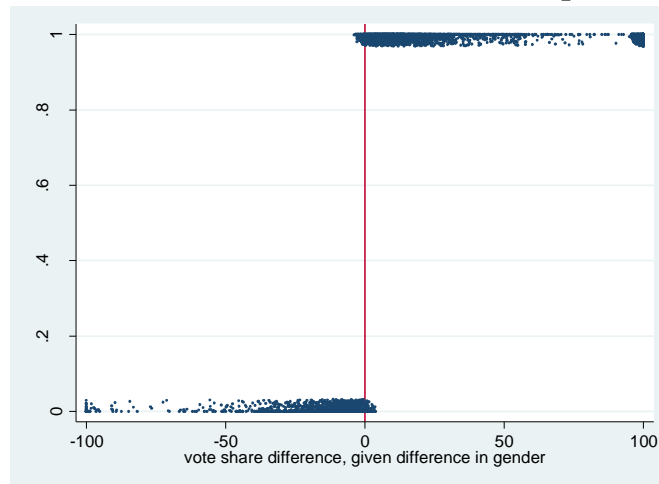
Then we run an RDD for non-outcome variables on rating variables. We expect that potential covariates (other explanatory variables used in the FE specification) are affected by the treatment. Indeed, for all three polynomial specifications, education, experience and gender do not impact the non-outcome variables.[6]

Table 9 – RDD with non-outcome variables

OTHER CO-VARIATES - RDD ESTIMATES

Variable Income per capita	Coef.	Std. Err.	z	P>z	Obs	Order of Polynomial
Education	0.00	0.00	0.08	0.93	9166.00	1
Experience	0.00	0.00	-0.17	0.86	5907.00	1
Gender	0.00	0.00	0.52	0.60	4219.00	1

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[6] The results for polynomials of order 2 and 3 can be obtained directly from the authors upon request.

Squared Income per capita

Education	2.60	73.22	-0.36	0.72	9166.00	1
Experience	129.50	112.35	0.61	0.54	5907.00	1
Gender	-0.39	50.98	-0.24	0.81	4219.00	1

Population

Education	-1341.40	2121.40	-1.45	0.15	9166.00	1
Experience	244.07	3950.20	0.23	0.82	5907.00	1
Gender	-1232.60	2537.90	-0.09	0.93	4219.00	1

Squared Populaiton

Education	-1.90E+09	2.20E+09	-1.13	0.26	9166.00	1
Experience	5.40E+08	9.70E+08	0.95	0.34	5907.00	1
Gender	-3.90E+08	3.50E+08	-0.57	0.57	4219.00	1

Political Alignment of Incumbent with Presidential Party

Education	1.92E-02	1.80E-02	1.13	0.26	9573.00	1
Experience	-2.83E-02	1.85E-02	-1.22	0.22	6156.00	1
Gender	-4.46E-02	4.02E-02	-1.04	0.30	4450.00	1

7. Conclusions

The purpose of this paper is to evaluate the importance of mayor's characteristics (education, experience, and gender) on fiscal outcomes. The hypothesis is that the main influence on local performance comes from inside the administrative structure and not from outside the administrative structure (political, socio-economic and institutional factors) as pointed out by Becerra (2007). Given that the mayors in Brazil perform political functions as well administrative functions, it is possible to say that public policies are the responsibility of the mayors, the single actors (managers). As there is evidence that gender may also be an important determinant of fiscal results we also explore the role of mayors' gender.

We use regression discontinuity and the outcomes of close elections to identify causal effects.

We find no evidence that the fiscal performance of a municipality is affected by gender. Regarding the qualification level of the mayor, we find robust evidence that it matters for the composition of spending. Experienced and educated mayors choose to devote a smaller fraction of the budget to current expenditures. There is strong evidence that current expenditures do not play a role in promoting economic growth and as such they can be considered an unproductive item of the budget. Therefore, given that growth is an important concern of governments, a municipality should be led by an educated and experienced mayor because he chooses a more suitable expenditure composition.

These results contradict the intuition behind the median voter theorem, at least in what regards qualification. Voters can control policy decisions since they can have important effects on fiscal outcomes through the right choice of the identity of the mayor.

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Appendix

Figures Ia, Ib and Ic illustrate the effect of having an educated, experienced and male mayor on total expenditure per capita. Figures IIa, IIb and IIc show the effects of the mayor characteristics on tax revenue per capita and figures IIIa, IIIb and IIIc on the expenditure composition.

Just right of the thresholds are elections in which the educated mayors, the experienced mayors and a male just won. The data have been grouped in bins in order to make the results clearer. The outcome variables on the horizontal axis are the log of the average of the variable over the mayor mandate.

Total expenditure per capita and expenditure composition show a break and/or trend change at the cutoff point for both education and experience.
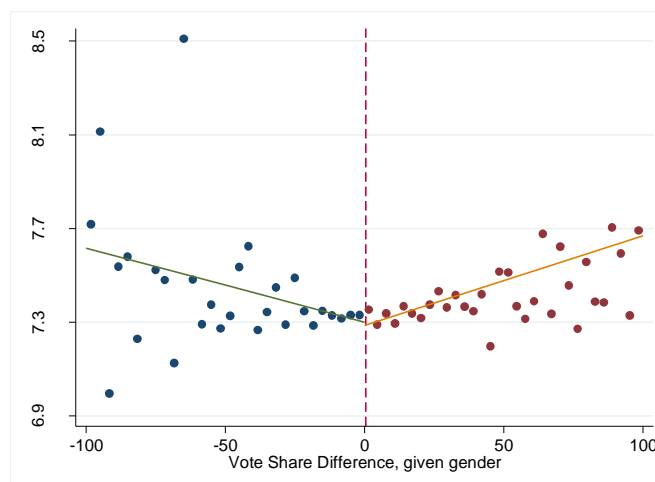
Graph I.a. – Total Expenditure per capita on vote share difference, given difference in educational achievement
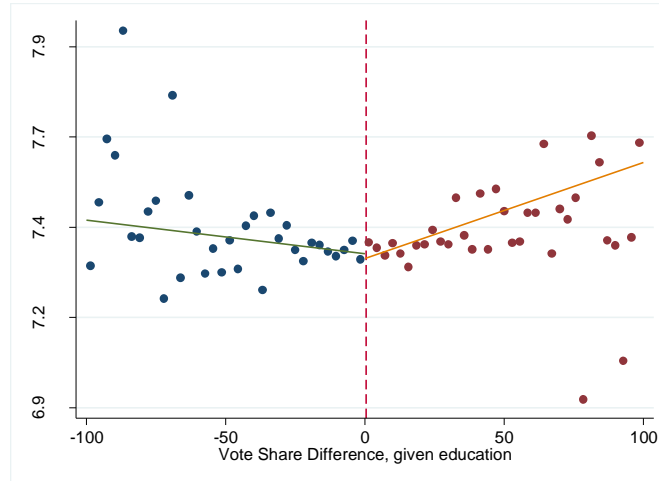
Graph I.b. – Total Expenditure per capita on vote share difference, given difference in experience
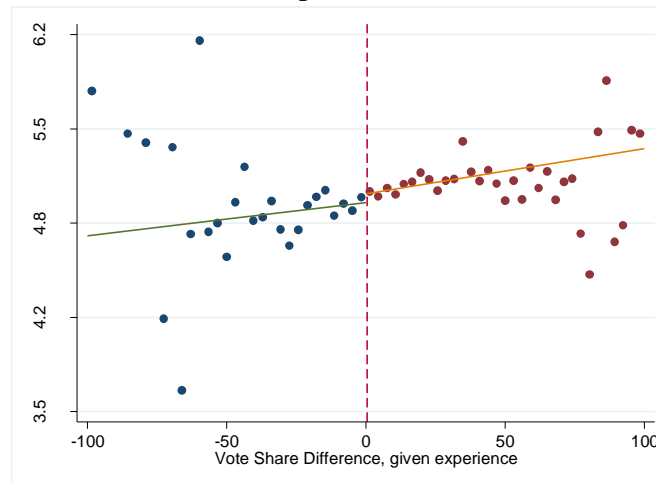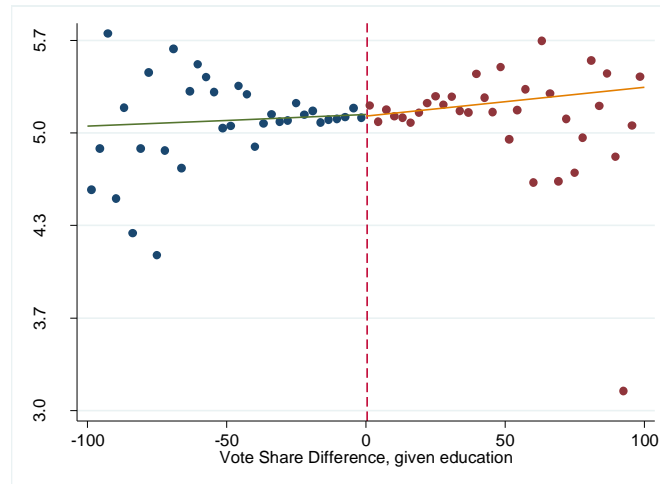

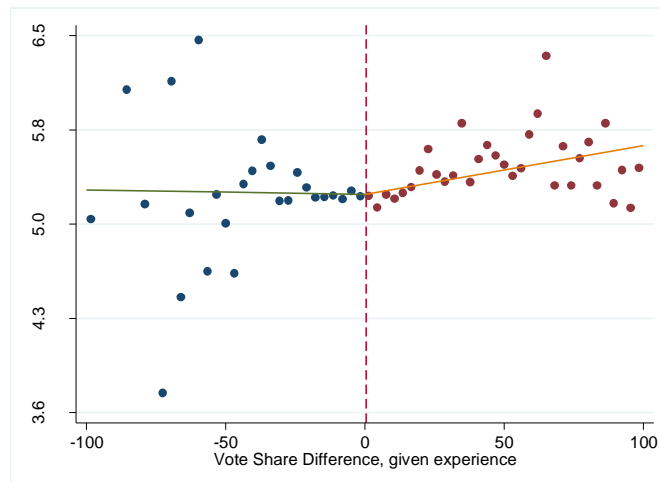Graph I.c. – Expenditure per share difference, difference in
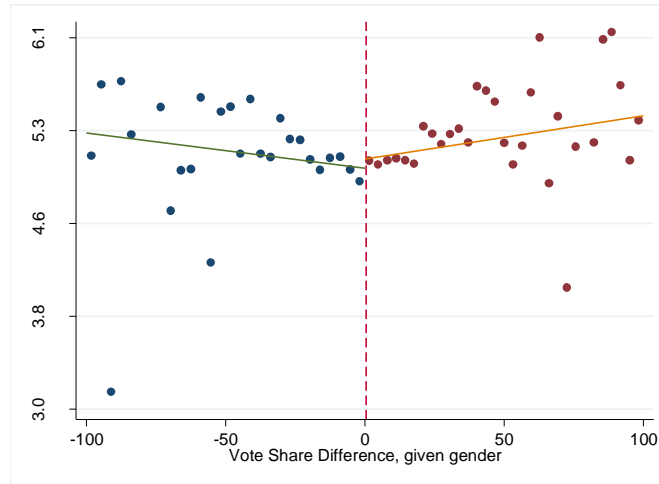

Total capita on vote given gender

19

Graph II.a. – Tax revenue per capita on vote share difference, given difference in educational achievement
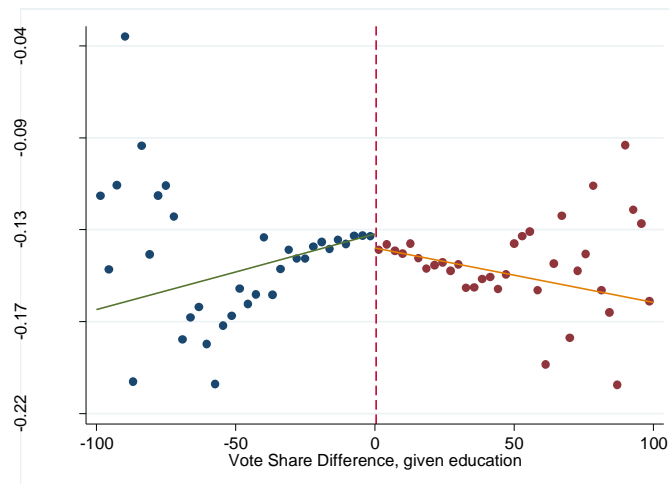

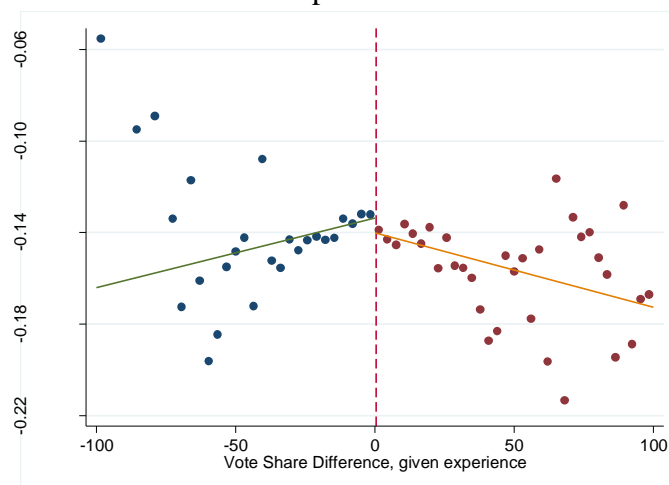Graph II.b. – Tax revenue on vote share difference, given difference in experience

Graph II.c. – Tax revenue on vote share difference, given difference in gender

Graph III.a. – Expenditure Composition on vote share difference, given difference in educational achievement

Graph III.b. – Expenditure Composition on vote share difference, given difference in experience

Graph III.c – Expenditure Composition on vote share difference, given difference in gender