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### **Fighting Violence Against Women: the Role of Female Political Representation**

**A. Bochenkova, P. Buonanno, S. Galletta**

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# Fighting Violence Against Women: the Role of Female Political Representation <sup>\*</sup>

Alena Bochenkova<sup>1</sup>, Paolo Buonanno<sup>1</sup>, Sergio Galletta<sup>2</sup>

<sup>1</sup>*University of Bergamo*

<sup>2</sup>*ETH Zürich*

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## Abstract

We investigate the effect of women’s political leadership in local government on homicide and violence against women. Using a regression discontinuity design we compare Brazilian municipalities where a female candidate barely won to those where a female candidate barely lost mayoral elections. Having a female mayor reduces intentional homicide rate of women by 20% and violence (physical, psychological, sexual) by 40%. These results are not due to pre-existing municipalities characteristics or other observable mayor characteristics. Overall, our findings provide compelling evidence that women holding office are effective in addressing violence against women.

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*Keywords:* female politicians, gender, femicide, violence, Brazil, RDD

*JEL classification:* J16, D72, K42, N36

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*Email addresses:* [alena.bochenkova@unibg.it](mailto:alena.bochenkova@unibg.it) (Alena Bochenkova), [paolo.buonanno@unibg.it](mailto:paolo.buonanno@unibg.it) (Paolo Buonanno), [sergio.galletta@gess.ethz.ch](mailto:sergio.galletta@gess.ethz.ch) (Sergio Galletta)

# 1. Introduction

A growing body of academic research studies the effect of female political representation on policy decisions and outcomes, suggesting that female policymakers are more socially oriented than male ones (Hessami and da Fonseca, 2020; Brollo and Troiano, 2016; Bruce et al., 2022). In this paper, we provide evidence of the effect of female political representation on violence. In particular, we analyze whether the gender of the policymaker affects violence against women (i.e., femicide, physical violence and sexual violence) by focusing on mixed-gender electoral races in Brazilian municipalities. As emphasized by the United Nations in the sustainable development goal “eliminating all forms of violence against all women and girls in the public and private spheres” is a crucial objective to achieve gender equality and empower all women and girls. Official statistics provide a clear picture of this global tragedy. Indeed, one in three women worldwide experience physical or sexual violence affecting both women well-being and their participation in society and politics.<sup>1</sup> Moreover, more than 50% of intentional women homicide are perpetrated by intimate partners or other family members.<sup>2</sup> Despite being a global issue, violence against women is much more prevalent in low and lower-middle income countries and regions, forcing many countries to adopt specific legislation to criminalize femicide and gender-based violence.<sup>3</sup> For instance in Brazil, according to official statistics, a woman is killed every two hours and assaulted every 15 seconds (Cerqueira and Bueno, 2020).

Over the past few decades, the share of women in politics has significantly increased in almost every country, shaping social and economic policy (Hessami and da Fonseca, 2020). Several empirical and experimental studies have documented that female empowerment and political representation affect policy decisions and outcomes, favoring social policies and interventions and reducing corruption and bribing (Chattopadhyay and Duflo, 2004; Brollo and Troiano, 2016; Eckel and Grossman, 2008). More limited is the evidence about the role of female representation in affecting violent crime.

Identifying the effects of female leaders on violence is challenging since policy decisions may be correlated to municipality characteristics. Therefore, we apply a Regression

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<sup>1</sup>According to UN 736 million women (roughly 30%) have been subjected to physical and/or sexual violence at least once in their life

<sup>2</sup>In 2017, according to UNODC, 87,000 women were intentionally killed.

<sup>3</sup>see Annex of UNODC for a detailed list of Latin American countries.

Discontinuity (RD) design focusing on close elections assuming that municipalities where a female candidate won against a man by a narrow margin represent a good counterfactual for those municipalities where the opposite occurred (i.e., a male candidate won against a woman by a narrow margin).

We find that the presence of a female mayor in Brazilian municipalities is associated with a significant and sizable reduction in femicide by 17% and in all the other measures for violence against women (physical violence, psychological violence, sexual violence and sexual harassment) by 30% to 40%. Our results are robust to the inclusion of standard controls and to several validation and falsification tests. Theoretically, female mayors can affect violence against women via a number of mechanisms. First, female mayors could enact policies that deter violence and increase awareness about this issue. Second, the presence of local female leaders can directly affect crime through a “role-model” effect. Third, law enforcement could become more sympathetic toward female victims (e.g., attitudes or incentives). Finally, female mayors might differ in their policy preferences in building a peaceful and equitable society: having a less adverse environment could give female victims greater self-confidence and a lower tolerance for being badly treated.

Our paper mainly contributes to two strands of the literature: women in politics and violence against women. First, recent studies provide broad evidence that female political representation affects policies ([Hessami and da Fonseca, 2020](#)), improves education and health provision ([Chattopadhyay and Duflo \(2004\)](#); [Clots-Figueras \(2012\)](#); [Bhalotra and Clots-Figueras \(2014\)](#); [Bruce et al. \(2022\)](#)), improves public institutions (less corruption/rent-seeking) ([Brollo and Troiano, 2016](#); [Jha and Sarangi, 2018](#); [Baskaran et al., 2018](#)) and has no clear effect on public spending ([Bagues and Campa, 2021](#); [Ferreira and Gyourko, 2014](#); [Baltrunaite et al., 2019](#)) at least in more developed countries. Second, this paper is related to the expanding literature on violence against women. For instance, [Iyengar \(2009\)](#) find that mandatory arrest in the case of domestic violence increased femicide, while [Chin and Cunningham \(2019\)](#) find no conclusive evidence. [Luca et al. \(2015\)](#) suggest that policies that restrict access to alcohol may help reduce gender violence in India, while [Aizer \(2010\)](#) provides evidence that a decrease in the gender wage gap reduce violence against the women. [Iyer et al. \(2012\)](#) finds that an increase in female representation in local government induces a large and significant rise in documented crimes against women in India reflecting improvements in reporting rather than a rise in actual crimes. Besides these results on what causes violence against women, [Sabia et al. \(2013\)](#) and [Siddique \(2021\)](#) find that sexual violence against women has

important effects on the subsequent labor market outcomes of the victims.

Thus, we complement the related literature by providing the first clear evidence of the existing link between female political representation and femicide and violence against women.

The paper proceeds as follows. Section 2 provides institutional details. Section 3 and Section 4 describe our data and empirical strategy, respectively. Section 5 presents our results and discusses the possible mechanisms at play. Section 6 concludes.

## 2. Institutional background

### 2.1. Violence in Brazil

Similar to other countries in Latin America, Brazil has a high level of violence against women. This is a long-term and persistent phenomenon that only in the recent years has gained attention thanks to the effort of women’s activists and politicians that were able to push forward several specific legislative reforms to criminalize femicide and gender-based violence. Indeed, in 2006 the Brazilian legislators pass the Law no. 11.340 (known as the “Maria da Penha” Law on Domestic and Family Violence, which establishes criminal sanctions against perpetrators of domestic violence against women, domestic violence courts but also requires Brazilian authorities to protect and assist the victims of violence through special police bodies and stations and shelters for women. In the following years additional initiatives took place and further legislation was approved. For instance, in 2013 was promoted the initiative “Mulher, Viver sem Violencia” that aimed at improving public policies in favor of women victims of violence, while in 2015 was enacted the Femicide Law, which changed the Brazilian Penal Code, by including femicide as a qualifier for the crime of homicide.

Despite this effort in fighting violence against women, there were no substantial changes to the overall level of violence.<sup>4</sup> For example, the female homicide rate (FHR) was 4.2 per 100 thousand in 2018, slightly decreasing from the previous 15 years in which the average homicide rate was about 4.3. Looking at the geographical distribution, we can see that the most violent states in 2018 are Roraima (FHR= 18.8), Ceará (FHR= 10.2) and Acre (FHR=8.0), while the less violent are São Paulo (FHR= 1.9), Santa

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<sup>4</sup>It is worth point out that we are not suggesting that those laws were not effective, as might be the case that violence would have increased in absence of those reforms.

Catarina (FHR= 2.6) and Piauí (FHR= 3.1). The heterogeneity in the level of violence across municipalities is quite sizable, as demonstrated by the fact that, in 2018, around 75% of municipalities did not have cases of female homicides in their territory, while those municipalities with at least one case FHR ranges between almost 0 to more than 100, with an average of 13.4.

Our empirical analysis aims to highlight whether this cross-sectional heterogeneity could be in part explained by the gender of the local political leader.

## 2.2. Local politics

Brazil is a federal republic governed under a presidential system, and organized in a federal government, 26 states and 5,570 municipalities. Each municipality has an autonomous local government, comprising a mayor (Prefeito) and a legislative body (Câmara Municipal). Local governments are responsible for the provision of several local public goods (e.g., primary education, culture, health care, housing, transportation and municipal infrastructure). The mayor plays a central role in defining the expenditure programs, while the city council is responsible for enacting municipality laws and overseeing the mayor on the usage of public resources.

Mayors are elected in a one-round election in municipalities with less than 200,000 registered voters, while a run-off could take place in municipalities with more 200,000 voters, when no mayoral candidate achieves at least 50% of the votes in the first round. Mayors can be in office for up to two four-year terms. City councilors are elected based on an open list proportional representation system, in which parties' share of seats is proportional to the number of votes cast on their candidates. According to population size, the number of councilors varies from a minimum of 9 to a maximum of 55. All elected municipal officials take office from the 1st of January of the year subsequent the elections.

With respect to equal gender representation in politics, since 1997 the electoral law requires a minimum of 30% of candidates of each sex on electoral lists (e.g., party or coalition). Despite the electoral quota, the percentage of women in politics in Brazilian is relatively low both in the national and the local governments. Currently, 75 of the 513 deputies are women (14.6%), as well as 11 out of 81 senators (13.6%). Appendix Table [A.1](#) provides some statistics on the presence of women in local politics in the sample (three consecutive terms) we employ for the analysis. Looking at the share of female mayoral candidates and female mayors we see that the participation of women in local



elections is relatively small (in 2004, 8% and 7% respectively), but increases over time (an increase of 4 p.p for both measures from 2004 to 2012). Instead, the share of female councilors is steadily around 13%.

## 3. Data

### 3.1. Homicide and violence data

Our analysis considers two main categories of crime against the person: i) homicide and ii) violence against the person. Data on homicide come from the Brazil Ministry of Health's TABNET Platform and cover the period 2000-2016. The Mortality Information System (Sistema de Informação de Mortalidade - SIM) provides detailed data at the municipality-year level about the causes of individuals' death. We consider intentional homicides defined as the number of deaths provoked by external causes through aggression- the group X85-Y09 of the International Classification of Diseases (ICD 10). However, for additional analysis in the robustness section we also consider from the same source deaths due to traffic accidents and suicides collected as well as a general measure of mortality excluding homicide. All measures are expressed as rate for 100.000 inhabitants. One of the main advantages of using murder as a proxy for violence is related to under-reporting. Indeed, it is well-known that official crime statistics may suffer from under-reporting that is much less relevant for murders ([MacDonald, 2002](#)). Data on violence comes from the Violence and Accidents Surveillance System (Sistema de Vigilância de Violências e Acidentes - VIVA) which provides municipality-year level data about different types of violence for the period 2009-2016. Our analysis focuses on the cases of physical, psychological, sexual violence and sexual harassment against women expressed at a rate of 100.000 inhabitants. Relevantly, the law mandates the health providers to report suspected or confirmed cases of domestic violence and/or other violence as well as sexual violence. To a certain extent, this provision of the law reduces the relevance of under-reporting issues.

### 3.2. Local Elections data

We focus on data about municipal elections for three electoral terms (2005-2008, 2009-2012, 2013-2016). Our data source is the Brazilian Electoral Court (Tribunal Superior Eleitoral). For each municipality-election we know for each candidate: vote share, sex,

education (graduated or not), age, party of affiliation. It is worth noting that, as we apply an RD design in the empirical analysis, only municipalities with mix-gender race are considered, therefore the final sample will be composed of all municipalities-term in which the two top candidates were of different sex. Overall, we have 3,080 observations, of which 804 are from the term 2005-2008, 1023 from the term 2009-2012 and 1253 from the term 2012-2016.

### 3.3. Other data

We complement the previous data with a set of municipal characteristics from Brazilian Institute of Geography and Statistics (IBGE) collected for the 2000 Brazilian decennial census. The data includes municipality-level covariates, such as population, the share of female population, average income per capita, the percentage of active individuals in the total population and of individuals employed in different economic sectors, income inequality with a GINI index, the percent of population living below national poverty line and illiterate individuals older than 15 years.

Summary statics of all variables are reported in Appendix Table A.2, while their description and sources are in Appendix Table A.3.

## 4. Empirical Strategy

Identifying the causal effect of having a female mayor on violence against women is challenging. Simply comparing violent outcomes of municipalities governed by a female to those governed by a male mayor would not deliver a causal estimate as the assignment of mayor sex is not random. Therefore, we apply a RD design in mixed gender electoral races using the following empirical specification:

$$Y_{ist} = \alpha + \beta F_{ist} + f(MV_{ist}) + \mathbf{X}_{ist} + \epsilon_{ist} \quad (1)$$

where the dependent variable,  $Y_{ist}$ , denotes the sum of cases of violent events that took place in municipality  $i$ , belonging to state  $s$ , in term  $t$ .  $F_{ist}$  is a dummy variable indicating if a woman win the mayoral race in election  $t$  in municipality  $i$ , while the running variable  $MV_{ist}$  is the margin of victory in elections defined as the difference in the votes received by the two most voted candidates.  $f()$  is a polynomial function calculated on the margin of victory.  $\mathbf{X}_{ist}$  include a set of municipal pre-determined covariates, contemporaneous

mayoral characteristics, term and state fixed effects that we include in our preferred specification to improve precision in our estimates (Calonico et al., 2019). Finally,  $\epsilon_{ist}$  is the error term.  $\beta$  is our coefficient of interest, which under specific assumptions (i.e., continuity of the density of the margin of victory and that the treatment does not affect other covariates), its estimate provides a causal effect. We show in the Appendix the results from standard validity checks of RD design. Specifically, we show that the density of the running variable is continuous at the threshold (Appendix Figure A.1) and that pre-determined characteristics are balanced (Appendix Table A.4).<sup>5</sup>

For the actual implementation, we use a linear function with rectangular kernel and employ a mean-squared error (MSE) optimal bandwidth (Calonico et al., 2014), while errors are clustered at the municipality level to account for serial correlation in the error component.

## 5. Results

### 5.1. Violence against women

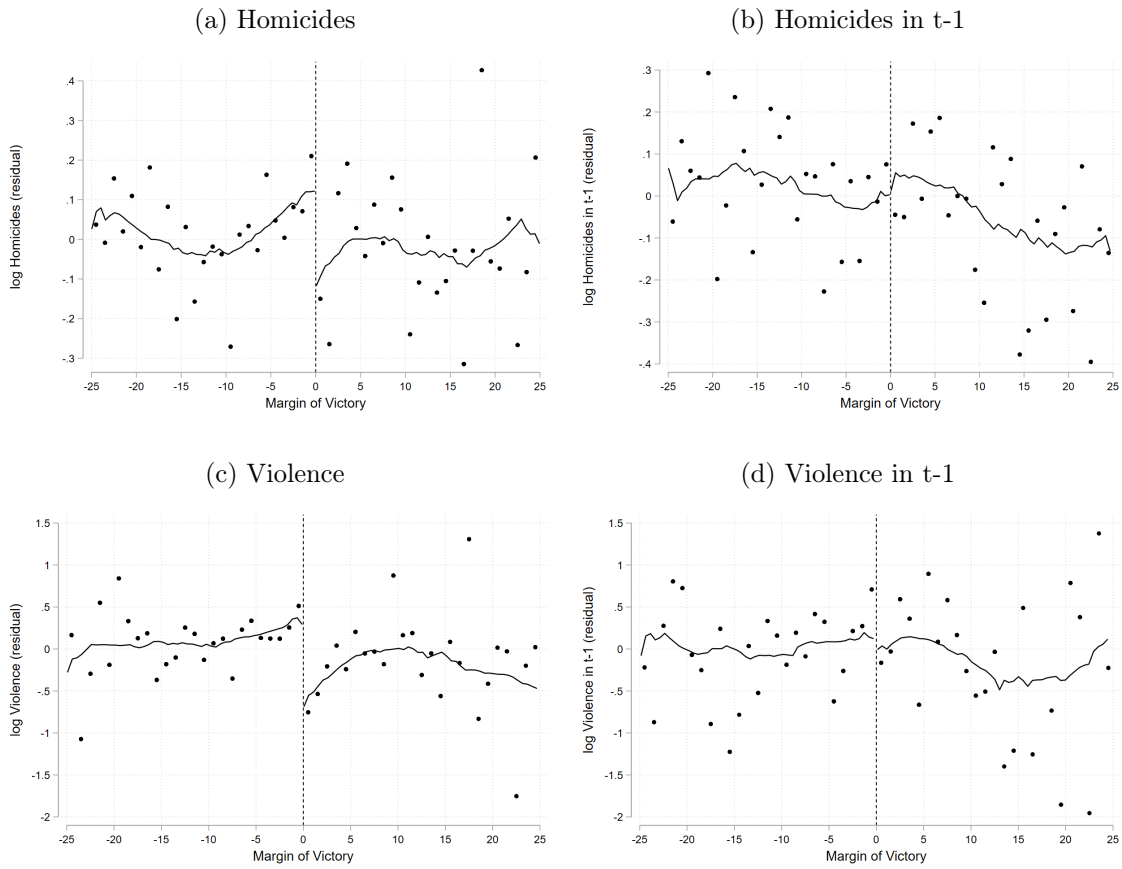
Our results are graphically presented in Figures 1 and 2 and show the relationship between the margin of victory and the per capita number of violent outcomes (in log) once we partial out covariates and fixed effects.<sup>6</sup> In Figure 1 we report the results when focusing on female homicides and violent acts against women (i.e., aggregating all type of violence), using alternatively the contemporaneous or prior term outcome. Interestingly, we can identify discontinuity at the threshold for the contemporaneous outcome, while no clear discontinuity is displayed for the outcome on the previous term. Overall, the graphical evidence hints at the presence of an effect of having a female mayor on violent acts against women, which is not confounded by pre-existing differences. In Figure 2 we detailed more the type of violent acts by reporting results separately for physical

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<sup>5</sup>Similarly to other contexts we find that female candidates improve the overall quality of the pool of candidates (Baltrunaite et al., 2014). In particular, we show that female mayors are more educated of male mayors. We provide evidence that our results are not affected by this discontinuity. First, we show that by interacting them with the treatment status the results do not change, and if anything they are more precise (Appendix Table A.8). Second, using and RD design we show that mayor’s education do not matter for violence against women (Appendix Table A.10).

<sup>6</sup>In both figures, the plotted points are conditional means from the residuals, with a size of 1, and the solid line is the predicted values of local linear smoother with rectangular kernel and a bandwidth of 7.

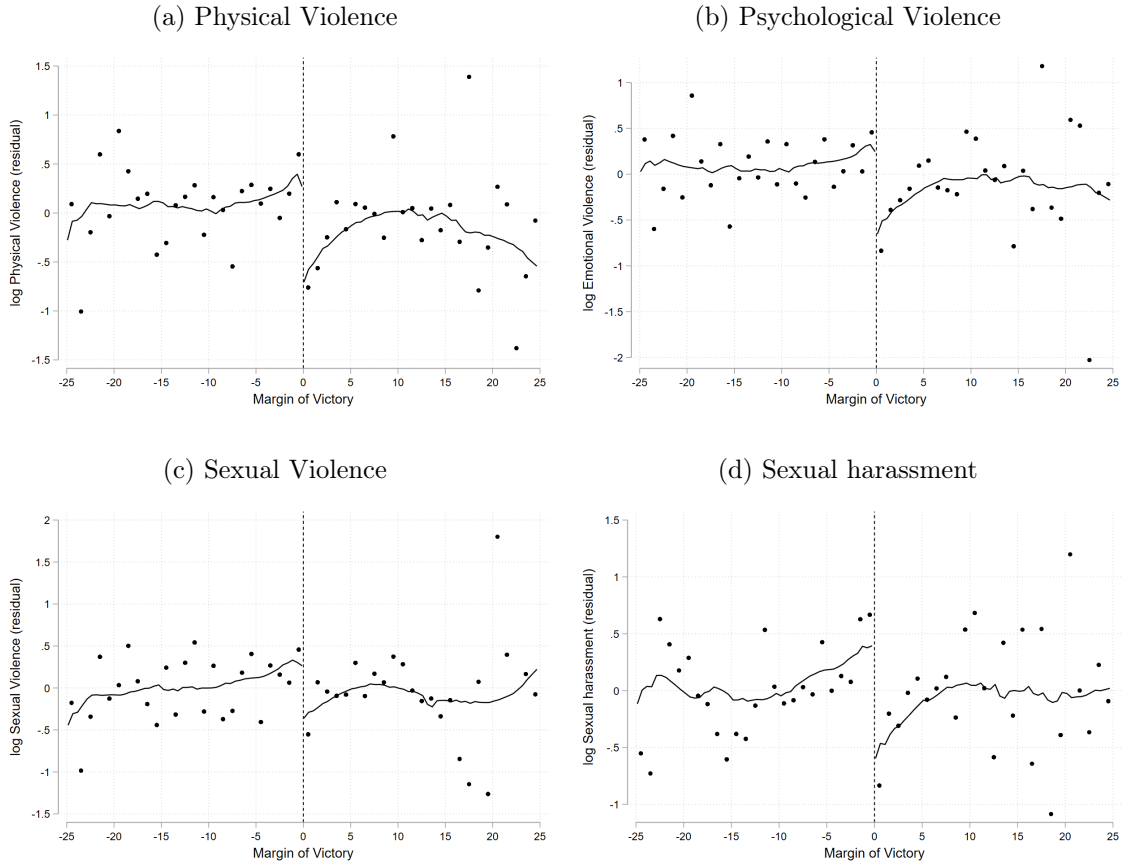
Figure 1: Female Mayor and Violence against Women



*Notes:* In each panel the dependent variable is the residual from a regression of the reported type of event on a set of municipal and individual covariates as well as year and state fixed effects. Plotted points are conditional means with a bandwidth of 1. The solid line is the predicted values of a local linear smoother with a rectangular kernel and a bandwidth of 7.

violence (panel a), psychological violence (panel b), sexual violence (panel c) and sexual harassment (panel d). Consistently with the initial finding there are discontinuity at the threshold for the three types of violent acts taken separately and in addition also to sexual harassment.

Figure 2: Female Mayor and different type of Violence against Women



*Notes:* In each panel the dependent variable is the residual from a regression of the reported type of event on a set of municipal and individual covariates as well as year and state fixed effects. Plotted points are conditional means with a bandwidth of 1. The solid line is the predicted values of a local linear smoother with a rectangular kernel and a bandwidth of 7.

In Table 1 we report the formal estimates as defined in the empirical strategy section.<sup>7</sup> In the first panel we show the RD estimates when we do not include controls, while in the second panel we include as covariates municipal level pre-determined charac-

<sup>7</sup>We report in the online Appendix Tables A.9 and A.6 our estimates by vary the size of the bandwidth and order of polynomial function, respectively. Next, in online Appendix Figure A.2 we report graphically coefficients' estimates and confidence intervals of a series of placebo checks in which we arbitrarily change the cut-off value. Overall, we find our results to be robust to this set of sensitivity checks.

Table 1: Female Mayor and Violence Against Women

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
Panel A: without covariates					
<b>Female Mayor</b>	-0.250** (0.117)	-0.617*** (0.237)	-0.491** (0.226)	-0.389* (0.212)	-0.790*** (0.259)
bandwidth	10.08	11.8	14.36	13.44	12.03
n. obs.	[388,390]	[369,350]	[375,334]	[252,214]	[166,146]
outcome mean (100k pop.)	29.3	357.4	231.1	52.3	41.2
Panel B: with covariates					
<b>Female Mayor</b>	-0.186* (0.103)	-0.572*** (0.200)	-0.524*** (0.202)	-0.414** (0.174)	-0.509** (0.211)
bandwidth	9.99	8.95	10.76	10.38	8.33
n. obs.	[385,390]	[279,282]	[295,275]	[197,177]	[111,110]
outcome mean	29.4	346.5	212.4	53.0	38.7

Notes: The dependent variable is defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

teristics, mayoral characteristics, term and state fixed effects. The effects highlighted in the graphical reporting are confirmed in the estimates.<sup>8</sup> Homicide rates (column 1) are between 22% (i.e.,  $100 \times [\exp(-0.250) - 1]$ ) to 17% (i.e.,  $100 \times [\exp(-0.186) - 1]$ ) lower in presence of a female mayor with a level statistically significance that ranges between 10% and 5%. As the homicide rate in a term is on average 29 per 100 thousand female inhabitants, the estimated effect would imply a reduction of around 5 cases per 100 thousand women. For all types of violence (from column 2 to 4) and sexual harassment (column 5) we find again significant and negative effects, which are larger than the one estimated for homicide rates. Physical violence is reduced by 43% to 46%, psychological violence of between 38% and 40%, sexual violence of around 33% and sexual harassment of between 54% to 39%. All coefficients reach the conventional level of statistical significance.

Table 2: Female Mayor and Violence: Placebo

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(All type of Violence)	ln(Other Homicides)	ln(Traffic Accidents)	ln(Suicide)
Panel A: Male victim					
<b>Female Mayor</b>	0.063 (0.081)	-0.298 (0.308)	-0.015 (0.043)	0.013 (0.053)	-0.077 (0.073)
bandwidth	10.70	11.52	13.54	14.08	12.79
n. obs.	[726,631]	[198,162]	[967,824]	[983,827]	[ 722,638]
outcome mean (100k pop.)	153.7	240.1	325.4	184.9	54.5
Panel B: Female victim					
<b>Female Mayor</b>	-0.186* (0.103)	-0.558*** (0.184)	-0.006 (0.060)	0.074 (0.076)	-0.004 (0.100)
bandwidth	9.99	11.17	10.68	11.39	12.11
n. obs.	[385,390]	[372,341]	[719,645]	[641,559]	[369,337]
outcome mean	29.4	544.1	88.3	48.0	23.5

Notes: The dependent variable is defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local quadratic estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

## 5.2. Additional Results

In this section, we provide evidence about the relation of having a female mayor and other outcomes. First, we test whether the effect of having a female mayor on violent acts is present also when looking at men as victims. Therefore, we report in panel A of Table 2 the estimates from our main specification, using this time as dependent variables violence against men. Column 1 and 2 show that there is no effect on homicides rate and (total) violence, respectively.<sup>9</sup> This result seems to reinforce the idea that having a female mayor does not have a general effect on violent crimes, but, rather the effect is limited to violence against women. It also rules out the possibility that our main result could be driven by some change associated with the arrival of a female mayor in power that would alter the overall level of violence. For example, this would be the case if one expects a female mayor to apply stronger policies to contrast inequality or to be effective in positively affecting economic growth, given the link between economic condition and violence (Aizer, 2010).

Next, we report a set of additional results addressing other possible concerns related to the main evidence being just the consequence of some structural reforms affecting unintentional homicide occurring during a female mayor’s tenure. Again in Table 2, we show the effect of having a female mayor on general mortality (column 3), motor vehicle fatality accidents rate (column 4) and suicide rate (column 5) for both males (panel A) and females (panel B) separately. Overall, the coefficients are very close to zero and none of them is statistically significant, suggesting the specific deterrence effect towards crime against women.

## 5.3. Discussion on the mechanisms

Our results point to a clear “reduced form” effect of having a female mayor on violence against women. However, the actual mechanisms that made this possible are not simple to clearly identify with the available data. Therefore, in this section, we discuss a set of potential channels that could explain our evidence and that are in line with previous findings. First, women might propose or enact policies with different objectives from

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<sup>8</sup>To provide the correct percentage effect of the estimated treatment we apply the transformation  $100 \times [\exp(\text{estimated effect}) - 1]$ .

<sup>9</sup>We do not report the results separately for each type of violence because of the limited number of events, which drastically reduces the number of observations and therefore the reliability of the estimates.



those preferred by men simply because gender matters in the kind of life experiences one has. This seems plausible in our context as women can be expected to be more sympathetic than men toward the specific type of crime studied in this paper. Yet this is unlikely to happen directly via law and order as in the Brazilian setting police activity and law enforcement are tasks assigned to upper levels of government. Nevertheless, we cannot exclude some indirect influences that make the police more responsive to crimes against women, for instance by making the issue more salient. In addition, it is worth noting that violence against women could be indirectly affected by other policies that female mayors are more likely to pursue. For instance, female mayors might be more willing to help women to have access to economic and social resources and to support the introduction of pro-women institutions to protect women under threat.

Next, besides policy changes one can expect our results to be explained by a role model hypothesis where having a female mayor would help change the norms that accept violence against women. For instance, one can expect the exposure of women to successful female politicians to empower women which will be more likely to stand against acts of violence ([Jensen and Oster, 2009](#)). Similarly, there might be changes in how men perceive the role of women in society, therefore, changing the interactions between the two sexes.

## 6. Conclusion

This paper highlights the effect of female political leadership on femicide and violence against women. By using Brazilian municipality level data for the period 2005-2016 and exploiting an RD design in close elections, we provide evidence that the election of a female mayor causes a large, negative and significant effect on femicide and violence against women. Our findings are robust to placebo regressions and to standard validation and falsification tests in the RD design. This effect is not confounded by the initial presence of violence and is not part of a more general reduction in violence. Our evidence emphasizes one positive aspect of increasing female representation in public offices. More research is needed to empirically test what are the channels through which women in politics are affecting violence (e.g., role model or changes in policies).

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# A. Appendix

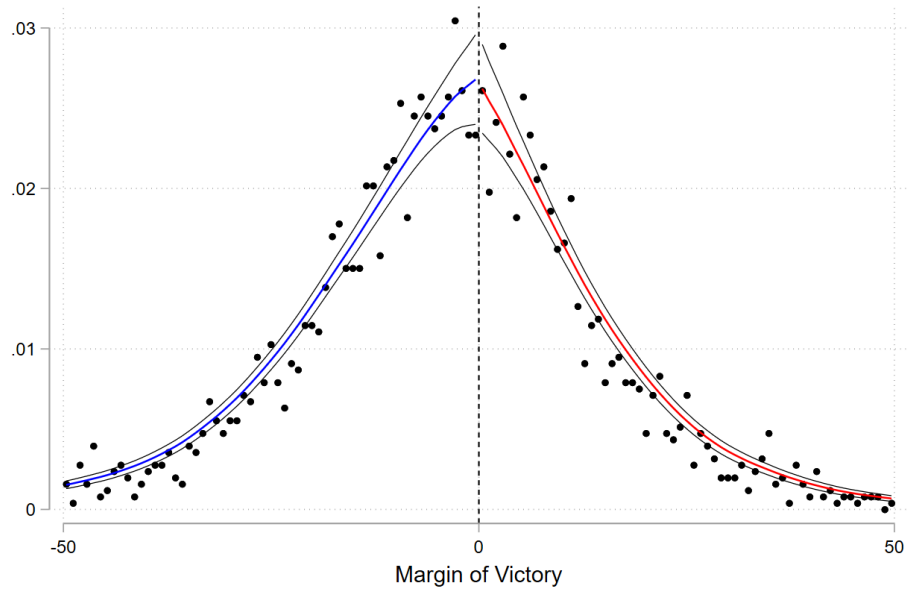
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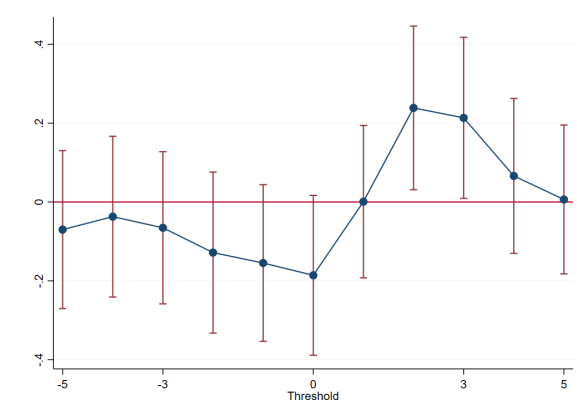
Figure A.1: Continuity of the density of the margin of victory



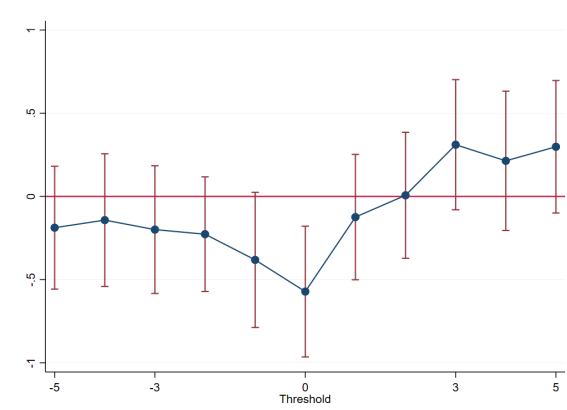
Notes: McCrary's test on the density of the running variable at the threshold - Estimated Discontinuity:  $-0.014$  s.e.(0.079).

Figure A.2: Different cut-off

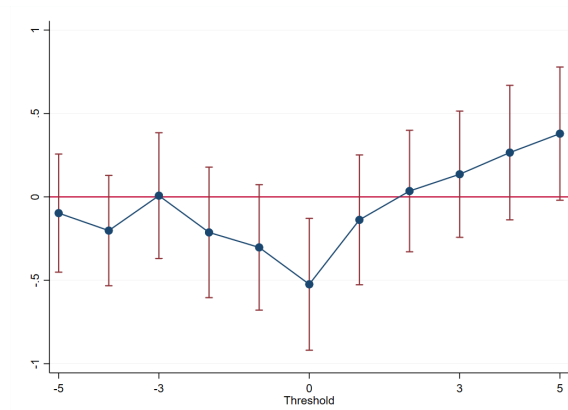
(a) Homicides



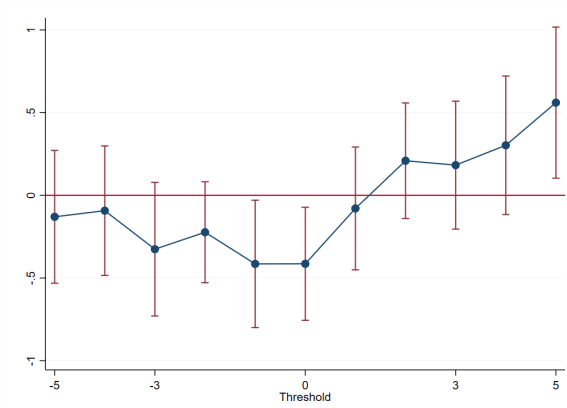
(b) Physical Violence



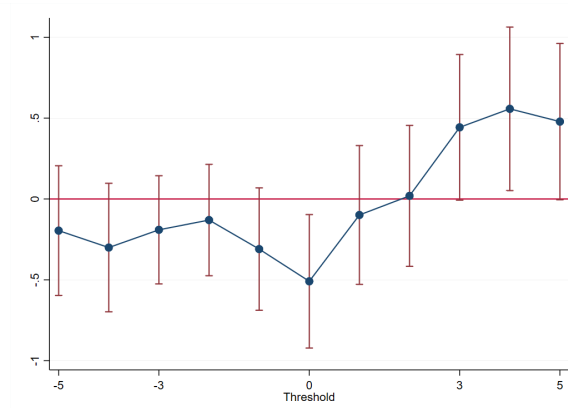
(c) Psychological Violence



(d) Sexual Violence



(e) Sexual harassment



Notes: This figure displays the effect of female mayors on the number of homicide and violence cases for different (and placebo) cutoffs. The largest negative and significant coefficients are at the 0 threshold.

Table A.1: Women in Local Elections

Term	Female Mayoral candidates	Female Mayor	Female Councilors
2005-2008	8.6%	7.4%	12.6%
2009-2012	10.9%	9.1%	12.6%
2013-2016	13.5%	11.8%	13.6%

Notes: The table reports the share of women among the top two candidates in mayoral elections, the share of female mayor and the share of female in the city council, for the three electoral terms used in the analysis.

Table A.2: Summary Statistics

	Obs	Mean	Std.Dev.	Min	Max
<b>Panel A. Main Variables</b>					
MVfemale	3,080	-3.823204	22.77738	-100	100
MVdegree	1,140	.0399253	.2161867	-.9558736	1
<b>Panel B. Violence data</b>					
<b>Female</b>					
Homicide	3,080	.0001544	.0002156	0	.0030002
Other Homicides	3,080	.0007986	.000569	0	.0064599
Physical Violence	3,080	.0016847	.0044631	0	.0721649
Psychological Violence	3,080	.0008761	.0034212	0	.1305842
Sexual Violence	3,080	.0001373	.0004038	0	.007948
Sexual Harassment	1,344	.0001812	.0004326	0	.0046707
All type of violence	3,080	.0026981	.007563	0	.2027491
Traffic Accidents	3,080	.0003552	.0003942	0	.0051852
Suicides	3,080	.0001006	.0001828	0	.0017986
<b>Male</b>					
Homicide	3,080	.0013927	.001354	0	.0100759
Other Homicides	3,080	.0032216	.001314	0	.0101246
Physical Violence	3,080	.000411	.0018441	0	.034949
Psychological Violence	3,080	.0001873	.0007128	0	.012789
Sexual Violence	3,080	1.87e-06	.000026	0	.0008826
Sexual Harassment	12	.0001314	.000097	0	.0003572
All type of violence	3,080	.0006001	.0023246	0	.0402211
Traffic Accidents	3,080	.0017807	.001016	0	.0071828
Suicides	3,080	.0004165	.0004308	0	.0058824
<b>Panel C. Municipality level characteristics</b>					
Population (2000)	3,080	23637.57	66662.29	873	2141402
Female population (2000)	3,080	11895.65	34935.04	414	1139166
Income (2000)	3,080	543.156	310.003	55.567	3062.481
Agriculture (2000)	3,080	16.427	8.937	.041	66.199
Industry (2000)	3,080	3.724	3.736	0	35.390
Commerce (2000)	3,080	7.161	3.593	.264	27.764
Employed population (2000)	3,080	36.904	7.711	11.862	74.464
Poverty (2000)	3,080	10.426	7.972	.388	45.661
Gini Coefficient (2000)	3,080	.557	.068	.297	.880
Illiterates (2000)	3,080	24.404	12.799	1.595	60.661
Female heads of household (2000)	3,080	5.239	1.706	1.08	14.244
Female before	3,080	.275	.446	0	1
<b>Panel D. Individual level characteristics</b>					
Age	3,080	48.265	9.392	23	82
Graduated	3,080	.511	.499	0	1
Party PT	3,080	.094	.292	0	1
Party PSDB	3,080	.138	.345	0	1
Party DEM	3,080	.049	.215	0	1
Party PMDB	3,080	.195	.396	0	1

Notes: The variable All type of violence includes physical, sexual and psychological; The variable Other homicides includes all cases of homicides except caused by aggression (ICD10, All categories except X85-Y09)



Table A.3: Data Description

Variable	Description	Source
<b>Dependent variables</b>		
Female (Male) Homicide	Cases of intentional homicides by gender of the victim per 100k inhabitants (ICD10, Categories X85-Y09)	SIM <sup>1</sup>
Female (Male) Other Homicides	Cases of unintentional homicides by gender of the victim per 100k inhabitants (ICD10, All categories except X85-Y09)	SIM
Physical Violence	Cases of physical violence against women per 100k inhabitants	SINAN <sup>2</sup>
Psychological Violence	Cases of physical violence against women per 100k inhabitants	SINAN
Sexual Violence	Cases of sexual violence against women per 100k inhabitants	SINAN
Sexual Harassment	Cases of sexual harassment against women per 100k inhabitants	SINAN
Female (Male) Traffic Accidents	Cases of traffic accidents by gender of the victim per 100k inhabitants	SIM
Female (Male) Suicides	Cases of suicides by gender of the victim per 100k inhabitants	SIM
<b>Municipal characteristics</b>		
Population (2000,2010)	Number of inhabitants in the municipality (Census 2000 and 2010)	IBGE <sup>4</sup>
Female population (2000,2010)	Number of females in the municipality (Census 2000 and 2010)	IBGE
Income (2000)	Average income of the working population of the municipality	IBGE
Agriculture (2000)	Percentage of citizens employed in the agriculture sector	IBGE
Industry (2000)	Percentage of citizens employed in the industry sector	IBGE
Commerce (2000)	Percentage of citizens employed in the commerce sector	IBGE
Employed population (2000)	Percentage of employed persons in relation to population	IBGE
Poverty (2000)	Percentage of poor people in relation to population	IBGE
Gini Coefficient (2000)	Gini Coefficient	IBGE
Illiterates (2000)	Percentage of people aged 15 and over who cannot read or write a simple note	Ipeadata <sup>3</sup>
Female heads of household (2000)	Percentage of female heads of households, without a spouse and with children under 15 years of age at home	Ipeadata
Female before	Mayor in the previous term was female	TSE <sup>5</sup>
<b>Mayoral characteristics</b>		
Age	Age of mayor in election term	TSE
Graduated	Mayor has a degree (Superior Completo )	TSE
Married	Mayor is married	TSE
Party PT	Mayor belongs to Partido dos Trabalhadores	TSE
Party PSDB	Mayor belongs to Partido da Social Democracia Brasileira	TSE
Party DEM	Mayor belongs to Democratas	TSE
Party PMDB	Mayor belongs to Movimento Democrático Brasileiro	TSE

Notes: 1. The Mortality Information System (SIM); 2. The Information System for Notification of Diseases (SINAN); 3. The Institute of Applied Economic Research (IPEA); 4. Instituto Brasileiro de Geografia e Estatística (IBGE); 5. Tribunal Superior Eleitoral (TSE)

Table A.4: Municipal a mayoral characteristics balance at the threshold

Variable	RD Estimator	std. error	N. Obs.	Bandwidth
<i>Municipality level</i>				
Population (2000)	679.472	4373.348	[ 248 , 246]	8.48
Female population (2000)	-1.655	1.452	[490, 403]	18.34
Share of pop. in agriculture (2000)	-1.806	1.461	[ 399 , 345]	14.39
Share of pop. in industry (2000)	0.080	0.708	[ 344 , 316]	11.91
Share of pop. in commerce (2000)	0.062	0.618	[ 319 , 300]	10.86
Share of pop. in Employed (2000)	-0.082	1.538	[ 371 , 335]	13.31
Gini Coefficient - Income (2000)	-0.013	0.013	[ 320 , 300]	10.95
Share poor pop. (2000)	-1.288	1.529	[ 337 , 310]	11.42
Income (2000)	-52.511	57.005	[ 314 , 296]	10.75
Share of pop. illiterates (2000)	-0.029	2.416	[ 298 , 288]	10.26
Share of households with Female head (2000)	0.442	0.310	[ 339 , 316]	11.73
Female mayor in previous terms	0.017	0.049	[ 884 , 783]	12.08
<i>Individual level</i>				
Party PT	-0.028	0.035	[ 925 , 811]	12.79
Party PSDB	-0.004	0.035	[ 931 , 814]	12.90
Party DEM	-0.014	0.024	[ 905 , 798]	12.44
Party PMDB	-0.054	0.043	[ 832 , 731]	11.08
Age	0.499	0.994	[ 993 , 842]	13.85
Graduated	0.190***	0.050	[ 1047 , 881]	15.05

Table A.5: Female Mayor and Violence Against Women: Pre-treatment effect

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
	Pre - treatment				
<b>Female Mayor</b>	-0.006 (0.076)	0.098 (0.196)	0.084 (0.201)	0.145 (0.174)	0.137 (0.228)
bandwidth	10.96	8.96	9.12	10.56	8.25
n. obs.	[530,519]	[291,311]	[251, 266]	[209,203]	[109,128]

Notes: The dependent variable is defined as the sum of violent events in a pre-electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

Table A.6: Female Mayor and Violence Against Women: quadratic polynomial RD estimator

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
Panel A: without covariates					
<b>Female Mayor</b>	-0.215*	-0.940***	-0.959***	-0.776***	-0.824***
	(0.125)	(0.307)	(0.292)	(0.285)	(0.274)
bandwidth	19.94	15.33	17.11	14.32	26.74
n. obs.	[677,564]	[452,403]	[429,364]	[264,219]	[283,202]
outcome mean (100k pop.)	28.5	367.0	231.3	51.9	41.4
Panel B: with covariates					
<b>Female Mayor</b>	-0.270**	-0.703***	-0.676***	-0.515**	-0.573**
	(0.132)	(0.256)	(0.235)	(0.243)	(0.249)
bandwidth	14.60	13.20	16.74	13.74	18.19
n. obs.	[548,491]	[406,373]	[422,363]	[261,216]	[225,178]
outcome mean	28.8	362.6	230.2	52.1	41.3

Notes: The dependent variable is defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local quadratic estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \* p < 0.1, \*\* p < 0.05 and \*\*\* p < 0.01.

Table A.7: Female Mayor and Violence Against Women: Extensive margin

	(1)	(2)	(3)	(4)	(5)
	Homicides	Physical Violence	Psychological Violence	Sexual Violence	Sexual Harassment
<b>Female Mayor</b>	0.043 (0.052)	0.012 (0.034)	-0.042 (0.040)	-0.052 (0.041)	0.002 (0.045)
bandwidth	11.43	17.69	13.89	14.53	10.98
n. obs.	[855,754]	[1181,949]	[996,843]	[1020,863]	[822,724]
outcome mean (100k pop.)	0.546	0.782	0.750	0.752	0.768

Notes: The dependent variable is defined as the dummy of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \* p < 0.1, \*\* p < 0.05 and \*\*\* p < 0.01.

Table A.8: Female Mayor and Violence Against Women: Interaction with level of education

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
<b>Female Mayor</b>	-0.183* (0.103)	-0.410** (0.200)	-0.342* (0.202)	-0.423** (0.174)	-0.405** (0.210)
bandwidth	9.99	8.95	10.76	10.38	8.33
n. obs.	[385,390]	[279,282]	[295,275]	[197,177]	[111,110]

Notes: The dependent variable are defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. The level of education is defined as 1 if the mayor has a degree (Superior Completo). Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

Table A.9: Female Mayor and Violence Against Women: Different bandwidth

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
	Double				
<b>Female Mayor</b>	-0.045 (0.079)	-0.350*** (0.154)	-0.293** (0.156)	-0.061 (0.144)	-0.538*** (0.175)
bandwidth	19.99	17.91	21.52	20.76	16.66
n. obs.	[ 678,564]	[522,436]	[496,400]	[342,255]	[213,172]
	Half				
<b>Female Mayor</b>	-0.243* (0.157)	-0.682*** (0.255)	-0.455** (0.251)	-0.35 (0.255)	-0.636*** (0.236)
bandwidth	5.00	4.48	5.38	5.19	4.16
n. obs.	[196,197]	[146,149]	[141,150]	[85,88]	[58,56]

Notes: The dependent variable are defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. The two optimal bandwidth choices were used: double and half. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .

Table A.10: Mayor's level of education and Violence Against Women

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
<b>Female Mayor Education</b>	-0.108 (0.068)	-0.000 (0.203)	0.176 (0.229)	-0.040 (0.206)	-0.154 (0.283)
bandwidth	0.11	0.10	0.10	0.08	0.06
n. obs.	[556,922]	[241,710]	[199,612]	[93,342]	[45,185]
outcome mean (100k pop.)	30.1	86.1	41.2	21.3	-14.3

Notes: The dependent variable is defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .



Table A.11: Female Mayor and Violence Against Women: adding pre-treatment outcome variable as covariates

	(1)	(2)	(3)	(4)	(5)
	ln(Homicides)	ln(Physical Violence)	ln(Psychological Violence)	ln(Sexual Violence)	ln(Sexual Harassment)
<b>Female Mayor</b>	-0.186*	-0.453***	-0.471***	-0.409**	-0.375*
	(0.101)	(0.179)	(0.186)	(0.186)	(0.197)
bandwidth	10.28	10.49	11.44	9.14	8.54
n. obs.	[401,396]	[330,314]	[315,294]	[168,158]	[115,114]

Notes: The dependent variable is defined as the sum of violent events in an electoral term in per-capita terms. The column-heads identify the type of violent events. Covariates include municipality level and mayoral level characteristics as well as electoral term and state fixed effects and pre-treatment effect. Municipality features include population size, occupational composition, income level, income inequality and previous experience with a female mayor. Mayoral features are age, level of education and party of affiliation (PT, PSDB, DEM, PMDB). Estimates in Column 1 are based on data from three electoral terms (2004-2016), while in Columns 2 to 5 the estimates use data for two electoral terms (2008-2016). The coefficients are constructed using local linear estimators with rectangular kernel. Robust standard errors clustered at the municipality level in parenthesis \*  $p < 0.1$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ .