

# Exogenous Commodity Shocks and the Electoral Returns to Office: Evidence from Brazil

Lucas M. Novaes<sup>1</sup> Luis E. Schiumerini<sup>2</sup>

**Abstract:** Do external shocks to the economy affect the electoral fortunes of incumbents? Drawing data from Brazilian municipal elections, this paper shows that while increases in the price of agricultural commodities greatly enhance the probability of reelection of incumbent mayors, negative shocks place them at an incumbency disadvantage vis-à-vis challengers. Coupling a measure of exogenous price volatility for each municipality with a “close election” regression discontinuity design, we rule out alternative explanations pointing to differences in incumbents and challengers, strategic candidate entry and exit, or structural differences across municipalities. Furthermore, we show that commodity inflation is particularly consequential in rural municipalities, and that the electoral success of incumbents only responds to inflation during the last year of an incumbent’s term. By showing that voters cannot adequately distinguish exogenous factors from incumbents’ actions nor evaluate performance during a full incumbent term, we contribute to the growing evidence on the limitations of retrospective voting. We also underscore that exposure to adverse economic shocks, which afflicts many developing economies, may represent a heretofore unrecognized failure of democratic accountability.

**Resumo:** Choques externos influenciam o desempenho de políticos no exercício do mandato? Através de dados de municípios brasileiros, este artigo mostra que um aumento no preço internacional de commodities agrícolas aumenta a probabilidade de reeleição de prefeitos, e choques negativos os coloca em desvantagem em relação aos seus competidores. Combinando uma medida de volatilidade de preços individual para cada município e um desenho de regressão descontínua, descartamos hipóteses alternativas, como diferenças entre competidores, diferenças estruturais entre municípios ou entrada e saída estratégica de candidatos. Mostramos que inflação de preço das commodities é extremamente relevante para resultados eleitorais, mas também que eleitores só respondem a choques no último ano de mandato de seus prefeitos. Ao mostrar que eleitores são incapazes de distinguir entre sorte e competência, e também se mostram míopes na sua capacidade de analisar sinais da economia, contribuimos à crescente literatura que mostra limites na capacidade do eleitor em votar retrospectivamente e de maneira racional. Também mostramos que exposição a choques econômicos adversos, comum à países em desenvolvimento, diminui o *accountability* democrático. **JEL: D72.**

## 1 Introduction

Retrospective voting is at the heart of normative and descriptive theories of democracy. By deciding whether the incumbent should remain in office on the simple basis of past performance, voters are able to select the best candidates and/or generate incentives for good performance ([Achen and Bartels 2014](#)).

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<sup>1</sup>University of California, Berkeley, email: novaes@berkeley.edu

<sup>2</sup>Yale University, email: luis.schiumerini@yale.edu

Abundant cross-national evidence suggests that voters use this type of retrospective rule across various political settings (Fiorina 1981; Duch and Stevenson 2008). The democratic efficacy of retrospective voting, however, has been cast into doubt by recent studies showing that voters often make attribution errors in their evaluations of incumbent performance (Healy and Malhotra 2013). Studies of US elections have documented that, for example, voters blame incumbents for ostensibly exogenous events, such as shark attacks and flu outbreaks.<sup>3</sup> Outside the US, a study of Latin American democracies by Campello and Zucco (2014) shows that factors exogenous to leaders' decisions, such as commodity prices and foreign interest rates, have considerable effects on presidential popularity and reelection rates. If voters hold incumbents accountable for outcomes politicians cannot influence or control, elections may not be selecting the best candidates for office.

Empirically discerning attribution errors in retrospective evaluations requires disentangling merit from luck. In the realm of economic voting, since incumbents can influence the economy, it is difficult to establish if leaders are responsible or if exogenous factors determine economic outcomes. Scholars commonly address this problem by evaluating the electoral impact of external sources of economic volatility, which is presumed exogenous of incumbents' actions. The decisions incumbents take, however, can influence global markets, or, at the very least, shape the domestic effects of external shocks. This is especially likely in presidential elections, the primary focus of existing studies on misattribution. Presidents have ample resources and political incentives to affect worldwide economic variables. For example, a market-oriented incumbent party is more likely to expose the domestic economy to international financial volatility than parties with a protectionist agenda. Economic shocks may not be exogenous at all if shocks afflict countries whose incumbents shape policy according to their political platforms. In such cases, voting to keep or remove incumbents from power based on the international economy can be all but rational.<sup>4</sup> Another inferential problem is that some countries are more sensitive to international shocks than others.

We address these issues by exploiting exogenous variation on two factors that are critical for retrospective voting: economic volatility and incumbency. We assess the impact of agricultural international price volatility on Brazilian municipalities one year before each mayoral electoral cycle. Our key independent variable is an index of agricultural commodity inflation, measured as the change in agricultural prices weighted by the importance each crop had in the past on each municipality. Mayors have limited microeconomic latitude to influence their local economy, and have no macroeconomic tools to protect themselves

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<sup>3</sup>The relationship between exogenous events and retrospective evaluations is the subject of a growing research agenda on misattribution. See Achen and Bartels (2002); Healy and Malhotra (2009); Healy, Malhotra and Mo (2010); Healy and Malhotra (2010).

<sup>4</sup>Past political decisions affect how an economy responds to future shocks. For example, oil producing countries set mechanisms to cope with lower prices. Norway, Saudi Arabia, and United Arab Emirates (UAE) have established sovereign funds to hedge against short-term price volatility. UAE has produced a fund of around 10 thousand dollars per capita. Other oil producing countries have not opted to established large funds, or domestic constraints prevented them from forming a large purse. Still, despite several international sanctions, Iran's sovereign fund covers around 800 dollars per capita. On the other hand, Venezuelan sovereign fund has saved mere 27 dollars per capita. Even if oil prices had fallen for exogenous reasons (due to, for example, the advent of fracking technology), the economic and social woes of an oil-producing country are in large part a result of past decision of their incumbents.

against economic shocks. Mayors have even less leverage to influence the economy one year before the elections. As a further empirical safeguard, we employ a “close election” regression discontinuity design to rule out the possibility that certain types of incumbents are more likely to take actions that encourage or mitigate external shocks.

Results show that incumbents’ electoral prospects are highly sensitive to exogenous price shocks. In comparison to challengers, incumbent candidates do not appear to run more or less often as a result of international price volatility, but have significantly higher probability of winning the subsequent election. This effect is stronger in rural economies, where commodities represent a larger fraction of the total income. We also uncover that mayors in rural municipalities suffer from an incumbency disadvantage, which can only be mitigated by an exceptionally positive price shock. Consistent with research on U.S. presidential elections, voters appear to be myopic, and only respond to the volatility during electoral years ([Achen and Bartels 2004](#); [Bartels 2008](#); [Huber, Hill and Lenz 2012](#); [Healy and Lenz 2014](#)).

This paper makes various contributions to the literature on democratic accountability. We identify economic volatility as a contextual factor that can lead voters to mistakenly keep or oust politicians from office. Since emerging economies are more exposed to short-term hardships and bonanzas ([Pritchett 2000](#)), our research suggests that elections may offer a weaker instrument of accountability in developing than in advanced democracies. Empirically, jointly leveraging commodity shocks and a subnational research design provides a more solid basis of identification than studies based on presidential elections.

This paper is organized in seven sections. Section 2 provides a background on retrospective voting in Brazilian mayoral elections and motivates the plausibility of misattribution as a potentially systematic blessing or curse for incumbents. Section 3 outlines our research design, including our strategy to measure exogenous commodity inflation and its impact on elections, and also conducts robustness checks for our design. Section 4 presents the main results concerning the impact of commodity inflation on incumbency effects. Section 5 investigates whether inflation affects elections through GDP growth and Section 6 evaluates whether voters respond to inflation myopically. Section 7 concludes by summarizing our main findings and drawing the implications of our findings for democracy.

## **2 Brazilian Mayoral Elections: Commodity Shocks, Retrospective Voting and Incumbent Vulnerability**

There is substantial evidence suggesting that the electoral success of Brazilian presidents, deputies, governors, and mayors is associated with their performance in office ([Pereira and Rennó 2003, 2007](#); [Pereira, Melo and Figueiredo 2009](#); [Pereira and Melo Forthcoming](#); [Zucco 2010](#)). The prevalence of retrospective voting makes Brazilian elections a fertile setting to study whether voters can correctly attribute incumbent responsibility for observed performance. We focus on mayoral elections, which not only provide rich variation in electoral outcomes across 5,564 municipalities. Moreover, municipalities are exposed to external economic shocks that are arguably orthogonal to incumbents’ actions. Taking advantage of the crucial role of agriculture in Brazilian municipalities, and the negligible influence mayors have over international

commodity prices, we can investigate if exogenous price shocks influence voting behavior or if, instead, voters can correctly separate merit from luck.

Local politics play a key role in Brazilian political and policy arenas. Unlike most federations, the Brazilian Constitution recognizes municipalities as constitutional entities, with the same institutional status of states. Furthermore, municipalities are responsible for the social services that most directly influence the welfare of Brazilian citizens, such as health, primary education, inner-city public transportation, and land use. Given the importance of Brazilian municipalities, performance in office is central for voters to decide in whom they should vote.<sup>5</sup> The salience of performance evaluations is exacerbated by the weakness of Brazilian local parties.<sup>6</sup> Local party organizations are autonomous from party upper branches, and mayors run personalistic campaigns (Codato, Cervi and Perissinotto 2013; Novaes 2014). Local coalitions are oversized and ideologically diffuse, diluting national party reputations in municipal elections (Dantas 2007; Lavareda and Telles 2011).<sup>7</sup>

The existing literature on retrospective voting in Brazilian mayoral elections has focused on anti-incumbent retrospective voting. Some scholars attribute this behavior to corruption. In an influential article, Ferraz and Finan (2011) show that Brazilian mayors are electorally punished for administrative irregularities disclosed before elections.<sup>8</sup> Titiunik (2008) and Klačnja and Titiunik (2014) argue that corruption is so widespread that voters systematically oust mayors from office, leading to a structural incumbency disadvantage. This speculation is bolstered by evidence that, in fact, incumbent mayors have lower odds of winning an election than challengers. Another perspective on retrospective voting contends that the fortunes of Brazilian mayors show wide subnational variability, and that it is rooted in fiscal constraints. Consistent with this hypothesis, there is evidence showing that differences in access to fiscal resources systematically shapes incumbent performance, placing some mayors at an incumbency advantage and others at an incumbency disadvantage (Schiumerini 2015).<sup>9</sup>

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<sup>5</sup>Municipal governments are separated between an executive branch headed by the mayor, and a local council primarily tasked with legislative oversight. In municipalities with less than 200,000 registered voters, mayors are selected using single-member district plurality rules; in municipalities with more than 200,000 registered voters, mayors are selected using majority rules with a potential runoff. Local councilors are selected with open-list proportional representation using the d'Hondt formula. Mayors serve for four-years and are allowed to run one consecutive reelection. Since 1997, mayors (as well as governors and presidents) have been allowed to run for one consecutive reelection. The first municipal election allowing reelection was 2000, and the first one with binding term limits was 2004.

<sup>6</sup>The nature of the Brazilian party system has been hotly debated by comparativists. Until recently, parties were characterized as weak, personalistic, and chiefly oriented towards patronage and pork-barrelling (Mainwaring 1997; Samuels 1999, 2003; Desposato 2006). This negative view has been compellingly superseded by a recent wave of research showing signs of party strengthening in the areas of Congressional lawmaking (Figueiredo and Limongi 1995, 2000), electoral coordination (Limongi and Cortez 2010), and in shaping voters' stances on national issues (Samuels and Zucco 2014). Despite suggestive evidence of party system institutionalization at the national and state levels, there is no indication that this hypothetical trend applies to municipal politics.

<sup>7</sup>Mayoral candidates form pre-electoral coalitions in 87% of the races. The mean number of parties in an electoral coalition is 4.8. Calculations based on data from the Brazilian Federal Electoral Tribunal.

<sup>8</sup>Winters and Weitz-Shapiro (2013) present survey experimental evidence showing that voters are willing to punish corruption even when mayors deliver a good performance.

<sup>9</sup>This is consistent with Pereira and Melo (Forthcoming), who show that Brazilian mayors can compensate the adverse

Despite disagreeing on the extent of the incumbency disadvantage, the scholarly consensus indicates that rather than a blessing, incumbency can become a curse under some conditions. We contribute to this literature by investigating the role of misattribution in these variable incumbency effects. If municipalities are exposed to external shocks to incumbent performance and voters misattribute these shocks to incumbents' actions, incumbents can be systematically advantaged or disadvantaged conditional on the nature of these shocks.

One area subject to external shocks is agriculture. Domestic agricultural prices largely reflect global demand and supply fluctuations (Mundlak and Larson 1992), and short-term shifts on supply are as unpredictable as they are common, leading to sharp income fluctuations in commodity-dependent locations (Deaton 1999). Thus, we should expect international price volatility to have an impact on domestic constituency incomes, possibly affecting their assessment of incumbents' performance. Our driving hypothesis is that when the value of the local agriculture production exogenously increases, voters erroneously attribute such increase to their local incumbent. In this case, we should observe higher odds of reelection for incumbents located where producers receive a higher price for their output. More precisely, higher inflation in commodity prices leads to a higher incumbency advantage –measured as probability of victory. Furthermore, we anticipate that the impact of commodity inflation will increase with the degree of ruralness of a municipality.

### 3 Research Design

Our research design has two components, which we address separately in this section. We start by describing our empirical strategy to isolate exogenous variation in municipal commodity inflation. We then discuss how to embed our inflation measure on a regression discontinuity design to evaluate how inflation shapes the returns to incumbency. The last part of this section conducts robustness checks assessing the validity of our research design.

#### Determining Agricultural Commodity Shocks

Brazil is an agricultural heavyweight. According to the Brazilian Agricultural Ministry, the country is the largest producer and exporter of coffee beans, oranges, and sugar. It ranks second in the production and exports of soybeans, and it is the third largest exporter of maize.<sup>10</sup> Except for the Amazon region, production of agricultural commodities is scattered throughout the whole territory. Although some regions are heavier producers of one or two crops, most municipalities produce a mix of several different products.

We leverage this rich and varied commodity production to trace the effects of higher exogenous agricultural prices on electoral outcomes. We construct an inflation index that varies for each individual municipality and each electoral period, producing different shocks for all units. Our index considers all

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consequences of corruption by delivering public goods.

<sup>10</sup>As of 2010. Data available at: <http://www.agricultura.gov.br/>

crops whose prices are collected in international markets by the International Monetary Fund –namely bananas, cocoa, coffee, maize, orange, rice, soybeans, sugar, and tobacco. The value of these agricultural products account for more than 70 percent of all Brazilian agricultural output, and rural gross domestic product (which also include livestock) takes 23 percent of the country’s GDP.<sup>11</sup> Calculating price change is straightforward. For each crop  $c \in \{1, n\}$ , our measure is constructed as follows:

$$\theta_c = \frac{P_{c,t+1} - P_{c,t}}{P_{c,t}} \tag{1}$$

We choose the year preceding the election, and not the entire term of the incumbent for theoretical and empirical reasons.<sup>12</sup> First, most students of retrospective voting agree that voters rely on short-term cues for retrospection (Achen and Bartels 2004; Bartels 2008). Using survey experiments explicitly designed to understand the microfoundations of this pattern, Huber, Hill and Lenz (2012) and Healy and Lenz (2014) demonstrate that individual level biases inhibit voters from weighting economic performance equally. Second, we want to test if voters incorrectly attribute good or bad times generated by exogenous factors to the incumbent. A longer time-horizon allows incumbents to respond to prior shocks and, correctly or not, give incentives at the municipal level to change the agricultural production matrix, or use surplus tax revenue to their advantage. Restricting the time frame to the year prior to the election alleviates that concern, as mayors would not have enough time to interfere with production.

To create an individual inflation index for all municipalities on each year, we build weights that take into account how much each crop contributed to municipal agricultural output in the past. Thus, for example, if total output was 800,000 and maize contributed with 200,000 and soybeans another 300,000, they will have a weight of 1/4 and 3/8, respectively. Weights are constructed using output two years prior to elections.<sup>13</sup>

## Estimating the Impact of Price Shocks on Elections

We assess the causal impact of commodity shocks on electoral outcomes by embedding our inflation index in a “close election” regression discontinuity design (RDD). First introduced to electoral settings by Lee (2008), RDD provides the best empirical strategy to estimate the causal effect of incumbency on electoral performance. RDD exploits the simple intuition that the outcome of very close elections is determined by election-specific factors, which are not correlated with characteristics of the electoral districts in which elections take place. Imagine that a generic party  $p$  at time  $t$  wins an election by a narrow margin in district  $A$  and loses by a similarly narrow margin in district  $B$ . This implies that party  $p$  is being randomly assigned to run as the  $t + 1$  in district  $A$  and as the challenger in district  $B$ . Thus, comparing  $p$ ’s electoral

<sup>11</sup>Source: Brazilian Statistical Institute - IBGE.

<sup>12</sup>Price data from IMF Primary Commodity Prices, collected through [www.quandl.com](http://www.quandl.com).

<sup>13</sup>Thus, for each municipality  $i$  and electoral period  $t \in \{2008, 2012\}$  we build a vector  $\omega$  such that  $\omega_{it} = \{ \frac{v_{1it}}{V_i}, \dots, \frac{v_{nit}}{V_i} \}$  where  $v_{c,it}$  is the value of crop  $c$  in time  $t$  and municipality  $i$ , and  $V_i$  is the total agriculture value in that same municipality. If  $\theta_t = \{\theta_1, \dots, \theta_n\}$ , each municipality on each electoral period will have an inflation index  $\Pi$  such that:  $\Pi_{i,t} = \theta_t \times \omega_{i,t}$

performance in  $t + 1$  in districts  $A$  and  $B$  yields an unbiased estimate of the causal effect of incumbency. We extend this intuition to better identify the effect of commodity shocks on Brazilian mayoral elections. Focusing on very close elections in  $t$ , we assess how the causal effect of incumbency varies as a function of commodity inflation. We make two adjustments to adapt RDD to the Brazilian mayoral setting. First, given the high level of personalism, our unit of analysis will be incumbent candidates rather than incumbent parties. In turn, the focus on candidates forces us to exclude municipalities in which incumbents cannot run in  $t + 1$  due to term limits.

Our RDD model of heterogeneous incumbency effects takes the following form:

$$Y_{k,i,t+1} = \alpha + \beta_1 Incumbency_{k,i,t} + \beta_2 \Pi_{k,i,t+1} + \beta_3 Incumbency_{k,i,t} * \Pi_{k,i,t+1} + \delta_{k,i,t} \quad (2)$$

$$\forall k,i,t \text{ s.t. } |M_{k,i,t}| < \epsilon$$

where  $Y_{k,i,t+1}$  is a measure of electoral performance for candidate  $k$ , in municipality  $i$ , at election  $t + 1$ .  $Incumbency_{k,i,t}$  is a binary indicator of victory at election  $t$ , and captures assignment to the incumbency treatment;  $\delta_{k,i,t}$  is an error term;  $|M_{k,i,t}|$ , the forcing variable, is the difference in vote margin of the winner and the runner-up in election  $t$ ; and  $\epsilon$  is an arbitrarily small vote margin, which we operationalize by considering three bandwidths: [Imbens and Kalyanaraman \(2012\)](#)'s optimal bandwidth (henceforth  $IK$ ), and substantively small bandwidths of 2.5% and 1%.  $\beta$  identifies the average incumbency effect. The coefficient of interest is the interaction term,  $\beta_3$ , which captures how the incumbency effect varies as a function of commodity shocks. While commodity shocks are post-treatment, they cannot be plausibly influenced by incumbency.

Our main measure of electoral performance is an indicator of re-election.  $Victory_{k,i,t}$  is a binary measure of victory for the candidate in municipality  $i$  at time  $t$ .<sup>14</sup> We also test if inflation affects the decision of incumbents and challengers to run the election.  $Run_{k,i,t}$  is a binary measure of whether the candidate contests the election in municipality  $i$  at time  $t$ .

## Robustness Checks

Our empirical strategy relies on two exogeneity assumptions. The first assumption, addressed through RDD, is that winners and losers of close elections should not differ systematically in characteristics that influence the returns to office. Testing this assumption is straightforward with covariates that tap observable candidate characteristics. If winning a close election is “as-if” random we should not observe systematic differences.<sup>15</sup> Table 1 presents results of the balance tests for each covariate, discontinuity

<sup>14</sup>Though vote share is the standard dependent variable in the literature, it is unreliable in elections with more than two contenders. New entrants may depress the share of incumbents, and exit of former challengers boost votes for the incumbent, adding variation to the outcome that does not properly reflect electoral performance.

<sup>15</sup>Failure to pass this test led [Caughey and Sekhon \(2011\)](#) to question the internal validity of [Lee](#)'s RD in the US. However, as argued and demonstrated by [Eggers et al. \(2015\)](#) the severe imbalance may not travel to other political systems. In fact, a similar balance test provides strong evidence of the validity of RDD in Brazil.

Variable	Full Sample OLS	M<IK	M<2.5%	M<1%	M<IK	M<2.5%	M<1%
		Local Linear			Difference in means		
Run in t-1	0.592 (0.011)***	-0.009 (0.012)	0.023 (0.024)	0.043 (0.038)	-0.012 (0.008)	0.009 (0.016)	0.012 (0.024)
Lagged vote share	-0.031 (0.003)***	0.008 (0.004)**	0.018 (0.007)**	0.014 (0.011)	-0.024 (0.003)***	0.005 (0.005)	0.012 (0.007)
PMDB	0.003 (0.01)	-0.027 (0.021)	0.021 (0.042)	0.076 (0.069)	-0.021 (0.014)	-0.008 (0.028)	-0.005 (0.043)
PT	0.015 (0.007)**	0.017 (0.013)	-0.004 (0.026)	-0.037 (0.04)	0.026 (0.008)***	0.016 (0.017)	0 (0.025)
PSDB	0.012 (0.008)	-0.019 (0.017)	-0.044 (0.033)	-0.034 (0.052)	0.01 (0.012)	-0.027 (0.022)	-0.026 (0.032)
DEM	0.001 (0.008)	0.018 (0.016)	0.015 (0.035)	-0.122 (0.056)**	-0.015 (0.011)	0.001 (0.023)	0.002 (0.035)
Female	-0.03 (0.007)***	-0.015 (0.014)	-0.029 (0.029)	0.017 (0.042)	-0.013 (0.009)	-0.033 (0.019)*	-0.002 (0.026)
Single	-0.031 (0.009)***	-0.02 (0.017)	-0.008 (0.035)	0.016 (0.057)	-0.024 (0.012)**	-0.018 (0.023)	0.008 (0.035)
Retiree	0.004 (0.004)	0.002 (0.009)	0.016 (0.018)	0.018 (0.035)	0.011 (0.006)*	0.001 (0.012)	0 (0.022)
Lawyer	-0.001 (0.005)	-0.009 (0.011)	-0.014 (0.022)	-0.013 (0.033)	-0.007 (0.007)	-0.006 (0.014)	0.008 (0.021)
Doctor	0.008 (0.006)	0 (0.013)	0.048 (0.027)*	0.063 (0.047)	0.002 (0.009)	0.027 (0.017)	0.025 (0.029)
N	21,471	11,557	10,834	10,718	11,557	10,834	10,718

**Table 1.** Balance Statistics. Results of balance tests comparing winners and losers of non term-limited close elections across pre-treatment covariates. Coefficients represent differences estimated through either local linear regression or difference in means across various bandwidths. Standard errors in parenthesis,  $^{\dagger} p < .10$ ;  $*p < .05$ ;  $**p < .01$ ;  $***p < .001$

bandwidth, and RD specification. As a benchmark, we show the difference between winners and losers in the full sample, before conditioning on close elections. In the full sample, winners are more likely to belong to major parties, are less likely to be women and, conditional on having run, tend to receive lower vote share in past elections. These differences vanish as we focus on close elections. Only one difference persists when we focus on the smallest 1% bandwidth, and only obtains when estimating differences through local linear regression. The improvement achieved by focusing on close elections and the net balance in the smallest window bolster the credibility of RD as a strategy to estimate incumbency effects.

The second assumption is the exogeneity of municipal commodity inflation, which should be independent of municipal characteristics. We evaluate it through a placebo test motivated by Equation 3. If inflation is exogenous, future values of inflation should not influence contemporary incumbency effects.

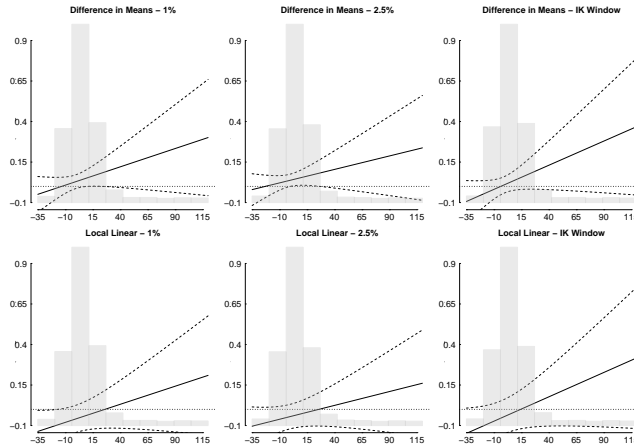


Formally, we set up a regression discontinuity model such that:

$$Y_{i,t+1} = \alpha + \beta_1 \text{Winner}_{it} + \beta_2 \dot{\Pi}_{i,t+2} + \beta_3 \text{Winner}_{it} * \dot{\Pi}_{i,t+2} + \delta_{it} \quad (3)$$

$$\forall it \text{ s.t. } |M_{it}| < \epsilon.$$

There are two important differences between equation 3 and our workhouse equation 2, all in  $\dot{\Pi}_{i,t+2}$ . First, in equation 3 prices come from the year after the election in  $t + 1$ . For example, if a winning candidate in 2004 runs for re-election in 2008, the prices in  $\dot{\Pi}_{i,t+2}$  are taken from 2009. Note that although prices are serially correlated, the variation in prices is not. Future price variation should not be a function of past variation in a price-taker market. The other difference is more subtle. Although price variation is not a function of past inflation, the weights are determined by past crop value. We cannot update the weights since future weights are a function of past inflation. Therefore, we keep the same weights of our main estimation in the placebo test.<sup>16</sup>



**Figure 1.** Placebo Test: Heterogeneous Incumbency Effects of Future Inflation. The solid lines depict the predicted contemporary incumbency effect conditional on different values of future inflation. The dashed black lines represent 95% confidence intervals. The overlaid histogram depicts the overall distribution of inflation. Each plot presents results for different combinations of discontinuity bandwidth and RD specification. In the first row, the specification is difference in means regression and in the second row the specification is local linear regression. Each column corresponds to a different discontinuity bandwidth.

The variable of interest in the placebo test is the interaction between incumbency and inflation. To properly assess the impact of inflation on the returns to incumbency in a regression with an interaction, Figure 1 plots the predicted incumbency effect for different values of inflation. The solid lines denote the marginal incumbency effect and the dashed lines the 95% confidence interval. The results show that there is no effect of future inflation on past electoral outcomes on all three models.

<sup>16</sup>Specifically,  $\dot{\Pi}_{i,t+2} = \theta_{t+2} \times \omega_{i,t}$ , where  $t + 2$  is the year after the outcome election.

## 4 Results

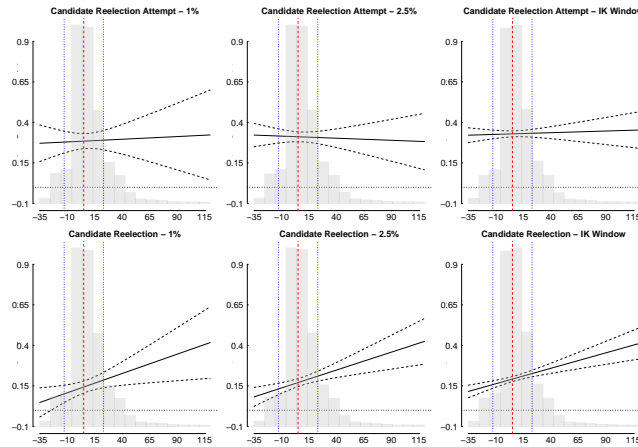
**Table 2.** Inflation and Candidate Incumbency Effects

	Candidate Reelection Attempt			Candidate Victory		
	Difference in Means					
(Intercept)	0.3407***	0.3407***	0.3407***	0.1724***	0.1724***	0.1724***
	(0.0049)	(0.0049)	(0.0049)	(0.0039)	(0.0039)	(0.0039)
$\Pi_{ki_{t+1}}$	0.0000	0.0000	0.0000	-0.0006**	-0.0006**	-0.0006***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$Incumbency_{ki_t}$	0.3527***	0.3612***	0.3769***	0.1441***	0.1575***	0.1595***
	(0.0174)	(0.0348)	(0.0507)	(0.0141)	(0.0276)	(0.0401)
$\Pi_{ki_{t+1}} * Incumbency_{ki_t}$	0.0004	-0.0009	0.0004	0.0021**	0.0015	0.0036†
	(0.0008)	(0.0017)	(0.0024)	(0.0007)	(0.0014)	(0.0019)
	Local Linear					
(Intercept)	0.4219***	0.4219***	0.4219***	0.2466***	0.2466***	0.2466***
	(0.0067)	(0.0067)	(0.0067)	(0.0054)	(0.0053)	(0.0053)
$\Pi_{ki_{t+1}}$	-0.0003	-0.0003	-0.0003	-0.0009***	-0.0009***	-0.0009***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$Incumbency_{ki_t}$	0.2516***	0.2788***	0.0885	0.0619*	0.0860	0.0353
	(0.0320)	(0.0663)	(0.0995)	(0.0258)	(0.0524)	(0.0784)
$\Pi_{ki_{t+1}} * Incumbency_{ki_t}$	0.0007	-0.0006	0.0004	0.0024***	0.0017	0.0037*
	(0.0008)	(0.0017)	(0.0024)	(0.0007)	(0.0013)	(0.0019)
$N$	11557	10834	10718	11557	10834	10718
Bandwidth	IK	2.5%	1%	IK	2.5%	1%

Standard errors in parentheses  
† significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

We estimate heterogeneous incumbency effects conditional on inflation using two specifications. The first specification, difference in means, uses a linear probability model to estimate the difference in probability of victory of incumbents and challengers in close elections and how it varies across different levels of inflation. The second specification, local linear regression, augments the difference in means with an interaction between the vote margin and the indicator of incumbency. The results of the estimation are presented in Table 2. The first three columns show that across specifications and discontinuity bandwidths, municipal inflation does not produce any difference in the probability of incumbents contesting an election relative to challengers. This can be observed in the lack of statistical significance of the interaction term that assesses how the returns to incumbency vary with inflation. By contrast, inflation has a statistically significant effect on the electoral fortunes of incumbents when the metric is probability of victory in the subsequent election. Taken together, this evidence suggests that inflation does not shape the electoral

success of incumbents through strategic entry or exit decisions.

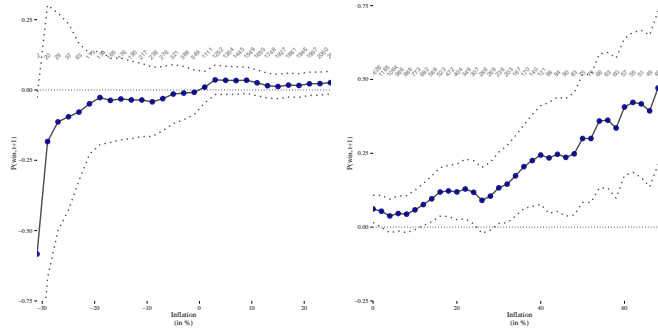


**Figure 2.** Heterogeneous Incumbency Effects Conditional on Inflation. The solid lines depict the predicted incumbency effect conditional on different values of inflation. The dashed black lines represent 95% confidence intervals. The dashed vertical red line indicates median inflation, and the dashed vertical blue lines indicate standard deviations from the median. The overlaid histogram depicts the overall distribution of inflation. Each plot presents results for different combinations of discontinuity bandwidth and outcome. In the first row, the outcome is candidate reelection attempts, and in the second row, the outcome is candidate reelection. Each column corresponds to a different discontinuity bandwidth.

By how much does inflation shape the electoral fortunes of incumbents? Though the range of coefficients from .17% to .37% appear non trivial, the best way to assess the substantive impact of inflation on the returns to incumbency is by plotting the predicted incumbency effect for different values of inflation as in Figure 2. The solid line depicts the predicted incumbency effect for different value of inflation and confirms that inflation has no systematic impact on the reelection attempts of incumbents. By contrast, inflation is highly consequential for the incumbency advantage measured in terms of probability of victory. This effect is particularly strong in the 1% window. Considering that the median of inflation is 1.3 (captured by the vertical red line) and the standard deviation is 18 (the vertical blue lines indicate one standard deviation above and below the median), one standard deviation in inflation leads to a 10% increase in the incumbency advantage. This estimate from elections determined by 1% vote margin should provide the most solid basis for estimating the causal effect of incumbency using RDD since these elections are truly won by razor-thin margins.

One concern with the preceding analysis is that the linearity assumption of OLS is leading us to extrapolate from municipalities that exhibit extreme levels of inflation. The right-skewed distribution of municipal inflation illustrated by the histogram underlaid in Figure 2 suggests that this is a likely possibility. For example, if municipalities with over 60% inflation also have an unusually high incumbency advantage, linear extrapolation may manufacture a positive relationship that is not supported by the data.

As a robustness check, we complement the OLS model with interactions with a non-parametric approach. We estimate separate RDD models of incumbency effects (within 2.5% bandwidths) for different



**Figure 3.** Incumbency Effects, by Level of Inflation in All Municipalities. Left plot shows negative shocks with estimations starting with study group of municipalities that received -30% inflation, and each subsequent group increases the inflation threshold by 2%. Right plot starts (from the right to the left) with study group of municipalities that received 70% inflation and decrease incrementally at 2%. Estimations at 2.5% margin, using difference of means.

values of inflation. The results are presented in Figure 3 which, for simplicity, depicts negative values of inflation on the left-hand side panel, and positive values on the right-hand side panel. Though a small number of observations limits statistical power, we can see that extremely negative values of inflation are associated with an incumbency disadvantage. As we approach the center of the distribution, estimates are more precise and we see neither incumbency advantage nor disadvantage. Turning to the right-hand side panel, we see that positive shocks appear to consistently help incumbents get reelected.

In sum, the analyses suggest that positive shocks in commodity prices can provide incumbent mayors with an advantage. While the evidence of an incumbency disadvantage is only suggestive, we can confidently conclude that incumbency advantage does not occur in municipalities experiencing negative commodity shocks.

### Rural Versus Urban Municipalities

So far we have devoted our attention to the effect of inflation on all municipalities, regardless of their economic dependence on agriculture. As explained in Section 3, our measure of inflation deliberately ignores the degree of municipal *ruralness*. The weights we use in each individual inflation index take into account how much one crop contributes to overall agricultural output, and not overall economic output. This means that metropolitan areas with small agricultural productions receive the same “treatment” that municipalities with soybean plantations. However, if retrospective voting is the mechanism through which international commodity prices affect local elections, this effect should be heightened in rural municipalities, whose income is more dependent on commodity production.

To test this expectation, we separate municipalities in two different groups according to the contribution agriculture has on the economy. To calculate the share of agricultural output we divide the value of agricultural production by the total municipal economic output. The *Urban* group comprises municipalities whose agricultural output is below the study group median minus one standard deviation. Analogously,

*Rural* are above the median plus one standard deviation. We separate groups on the basis of the year in which incumbents and losing candidates are defined ( $t$  in terms of our estimation framework).

**Table 3.** Inflation, Incumbency, and Rural Economies

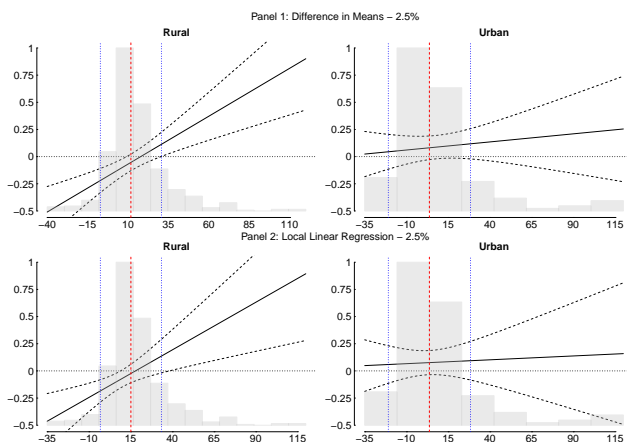
	Rural	Urban	Rural	Urban
Difference of Means				
Intercept	0.3637*** (0.0313)	0.2916*** (0.0372)	0.4166*** (0.0494)	0.3472*** (0.0597)
$\Pi_{ki_{t+1}}$	-0.0041** (0.0015)	-0.0012 (0.0015)	-0.0041 (0.0029)	-0.0006 (0.0023)
$Incumbency_{ki_t}$	-0.1571*** (0.0466)	0.0758 (0.0571)	-0.2370** (0.0740)	-0.0670 (0.0929)
$\Pi_{ki_{t+1}} * Incumbency_{ki_t}$	0.0088*** (0.0022)	0.0015 (0.0021)	0.0079† (0.0042)	0.0001 (0.0034)
Local Linear				
Intercept	0.4330*** (0.0545)	0.4029*** (0.0764)	0.4608*** (0.0932)	0.6160*** (0.1337)
$\Pi_{ki_{t+1}}$	-0.0038* (0.0015)	-0.0013 (0.0015)	-0.0042 (0.0029)	-0.0014 (0.0023)
$Incumbency_{ki_t}$	-0.2544** (0.0806)	-0.1914 (0.1178)	-0.3064* (0.1385)	-0.5423* (0.2088)
$\Pi_{ki_{t+1}} * Incumbency_{ki_t}$	0.0084*** (0.0022)	0.0017 (0.0021)	0.0079† (0.0042)	0.0013 (0.0034)
$N$	538	296	220	114
$R^2$	0.0328	0.0105	0.0458	0.0059
adj. $R^2$	0.0274	0.0004	0.0326	-0.0212
Resid. sd	0.4488	0.4675	0.4537	0.4718
Bandwidth	2.5%	2.5%	1%	1%

Standard errors in parentheses

† significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

The results of this exercise support the hypothesis that commodity inflation is only electorally consequential in rural economies. In Table 3, The coefficients for the interaction term show that inflation only influences incumbency effects in rural municipalities. Another striking result is the disadvantage incumbents face in rural municipalities. Mayors and incumbent parties in urban municipalities do not face any incumbency effect, but mayors in rural economies have to swim against the tide to be re-elected. Only when inflation is above 20.6% (or if the municipality is treated with an inflation 1.88 standard deviations above the average of its group) mayors lose their incumbency disadvantage.<sup>17</sup>

<sup>17</sup>That is, the  $\pi' = \pi - \bar{\pi}$  that solves  $\pi' * (\hat{\beta}_{inflation} + \hat{\beta}_{inflation*incumbency}) \geq -\hat{\beta}_{incumbent}$ , and where  $\bar{\pi}$  is the mean



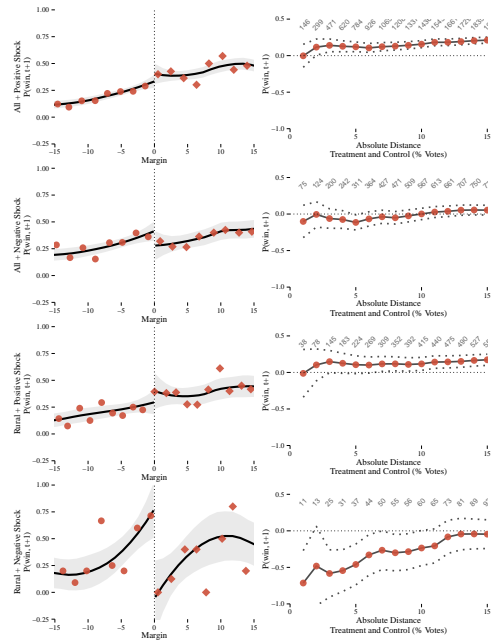
**Figure 4.** Heterogeneous Incumbency Effects On Candidates, Conditional on Rural or Urban Municipality. 2.5% margin, difference of means. The solid lines depict the predicted incumbency effect conditional on different values of inflation. The dashed black lines represent 95% confidence intervals. The dashed vertical red line indicates median inflation, and the dashed vertical blue lines indicate standard deviations from the median. The overlaid histogram depicts the overall distribution of inflation. In the first row, the RD specification is difference in means within 2.5%, and in the second row local linear regression within 2.5%. The first column focuses on rural municipalities and the second one on urban municipalities.

Figure 4 illustrates the differential impact of inflation across municipalities. The first column is the effect on rural municipalities, and the second column on urban municipalities. The slope of the solid line on each panel is equal to the interaction term plus the main effect of incumbency (whose exact value we can recover from table 3). The more positively inclined the slope is, the greater the effect of the inflation on incumbency, and rural municipalities present a slope considerably more inclined than urban municipalities. The point in which the solid line crosses the horizontal dashed line illustrates when the mayor should expect not to suffer an incumbency disadvantage. Since the median inflation on rural municipalities is 8.5% the period we analyze, most mayors faced a (statistically significant) disadvantage. Mayors in urban municipalities should neither fear to be disadvantaged, nor expect fortune’s helping hand.

To provide a complementary non-parametric perspective on how the electoral impact of commodity shocks depends on ruralness, Figure 5 depicts separate estimates of the causal effect of incumbency for different groups of municipalities. We illustrate incumbency effects using two different non-parametric strategies. The plots on the left column present scatterplots and lowess curves relating the probability of victory in  $t + 1$  and the vote margin of time  $t$  winners (vote margin above zero) and losers (vote margin below zero). As has become standard empirical practice, an RD estimate can be visualized by comparing the functions on each side of the discontinuity, located at zero. The second strategy, represented by the plots on the right column, presents separate difference in mean estimates for different values of vote margin. We apply each visualization to separate groups of municipalities stratified by the sign and magnitude of the

inflation in the study group.

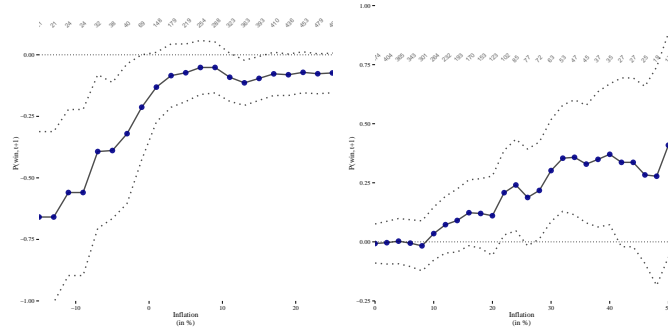
commodity shock and their ruralness. The first two rows show the effect on all municipalities according to the sign and magnitude of the price shock. The third and fourth rows do the same for rural municipalities. We operationalize positive and negative shock in a similar manner that we divided groups among rural and urban municipalities. If a municipality receives a shock above the median plus one standard deviation, it has received a positive shock. Similarly, a municipality hit with an inflation below the median minus a standard deviation receives a negative shock.



**Figure 5.** Incumbency effects according to the shock and type of municipality. The first column shows the graphical representations of the discontinuities. The solid line shows the LOWESS estimation, and the shaded area identifies 95% confidence intervals. The column on the right shows figures with each LATE, and confidence intervals at different distances between winning and losing candidates. Distance refers to the absolute distance between winning mayoral candidate (treated unit) and losing candidate (control unit). LATE are estimated incrementally starting at the 1% distance up to the 15% distance in 1% increments. Estimations includes only non term limited candidates.

As we see in Figure 5, mayors facing a negative shock are more disadvantaged on average. However, the estimates do not appear to be significant at the 95% level. In rural municipalities, the pattern is similar, but the effects for mayors facing a negative shock in rural municipalities is very sizable. At the 1% margin rural mayors experiencing severe deflation are 75% less likely to be re-elected.

Finally, Figure 6 zooms in on rural municipalities and depicts non-parametrically how different shocks affect incumbency effects. The plot on the left shows the effect of negative shocks, and acute deflation is damaging to incumbent’s reelection prospects, reaching a staggering 67% disadvantage if the incumbent in a rural municipality is facing a deflation of 20%. On the other hand, positive shocks help incumbents too, as the right plot shows. Although receiving a negative shock of such magnitude was rare in the period we analyze, Figure 6 shows that incumbency disadvantage persists for virtually all negative shocks.



**Figure 6.** Incumbency effects, according to the magnitude of the inflation in rural municipalities. Left plot shows negative shocks with estimations starting with study group of municipalities that received -20% inflation, and each subsequent group increases the inflation threshold by 2%. Right plot starts with study group of municipalities that received 50% inflation and decrease incrementally by 2%. Estimations at 2.5% margin, using difference of means.

## 5 What’s the Mechanism? The Economic Effects of Agricultural Inflation

An underlying assumption we make is that inflation causes the economy to grow or decline, and voters mistakenly attribute economic volatility to incumbents’ actions.<sup>18</sup>

**Table 4.** The Effect of Inflation on Municipal GDP

	DV: $\Delta GDP$		
	<i>IK</i>	2.5%	1%
Intercept	-0.00609 (0.00833)	-0.07327** (0.02326)	0.01149 (0.02089)
$\Pi_{i_{t+1}}$	0.00048*** (0.00011)	0.00075*** (0.00019)	0.00091** (0.00029)
<i>N</i>	3340	1039	420
$R^2$	0.00113	0.00539	0.00010
adj. $R^2$	0.00111	0.00528	-0.00002
Resid. sd	0.17366	0.20517	0.27042

Standard errors in parentheses

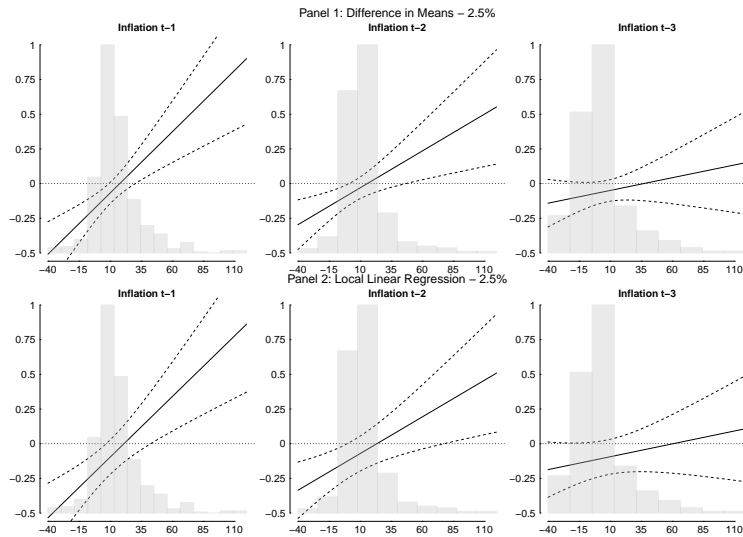
† significant at  $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

<sup>18</sup>We test this hypothesis in a simple model:  $\Delta GDP_{it} = \alpha + \beta \Pi_{it} + \delta_{it}$  where  $\Delta GDP_{it}$  is the year-on-year GDP change on municipality  $i$ . Table 4 reports the result for three different discontinuity windows. As expected, inflation influences municipal GDP.



## 6 Are Voters Myopic?

Another failure of retrospective voting occurs when voters evaluate performance myopically. A recurrent finding of studies of US presidential elections is that citizens do not reward economic growth during an incumbent’s entire term, but only during their last year. We have built this finding into our empirical strategy by focusing on electoral year inflation. Thus, the previous analysis cannot elucidate whether voters would react differently to the level of inflation in the previous years of the incumbent term. To document myopia, we should show that the electoral impact of inflation disappears or attenuates when we measure inflation over longer time spans.



**Figure 7.** Heterogeneous Incumbency Effects on Candidates’ Probability of Victory in Rural Municipalities with Different Inflation Time Frames. 2.5% Vote Margin Bandwidths. The solid lines depict the predicted incumbency effect conditional on different values of inflation. The dashed black lines represent 95% confidence intervals. The dashed vertical red line indicates median inflation, and the dashed vertical blue lines indicate standard deviations from the median. The overlaid histogram depicts the overall distribution of inflation. In the first row, the RD specification is difference in means within 2.5%, and in the second row local linear regression within 2.5%. Each column corresponds to a different inflation time frame.

Do voters respond similarly to inflation farther back during an incumbent’s term? We evaluate this question replicating the analysis of heterogeneous incumbency effect focusing on rural municipalities as defined before and considering inflation measured across three different time-frames: 1, 2 and 3 years before the mayoral election. Figure 7 shows the results, with each column corresponding to a different temporal distance between the election and the measure of inflation. The results are consistent with myopic voters. As we saw before, the electoral fortunes of mayors are highly sensitive to commodity inflation one year before elections take place. Though still significant, the effect of inflation two years before mayoral elections is weaker and noisier. The probability of victory of incumbents is insensitive to inflation three

years before their reelection bid. The patterns are similar across different RDD specifications (Compare the first and second rows of Figure 7).

## 7 Conclusion

In this paper, we exploited variation in commodity inflation across Brazilian municipalities to investigate whether exogenous commodity shocks systematically shape the returns to office. Our findings suggest that Brazilian voters cannot properly separate signal from noise, and end up placing mayors at an incumbency advantage or disadvantage on the basis of outcomes beyond their control. Our analysis also suggests that this misattribution is accompanied by myopic retrospection. These findings contribute to the growing body of literature showing that democratic accountability may rest on weaker microfoundations than previously assumed. If voters are unable to distinguish merit from luck, both the selection and sanctioning effects of elections may be compromised (Fearon 1999). Another theoretical contribution of our paper is to underscore that misattribution can represent a systematic source of incumbency effects. Since developing countries are more exposed to exogenous economic shocks, misattribution may explain why incumbency disadvantage has been more common in these settings than in advanced democracies. This finding also suggests that tracing the electoral impact of other sources of exogenous shocks can deepen our understanding of the nature of retrospective voting and incumbency effects in developing democracies. These economies are subject to volatility from abroad, such as other countries' interest and exchange rates, military intervention, and more commodity prices.

## References

- Achen, Christopher H and Larry Bartels. 2004. *Musical Chairs: Pocketbook Voting and the Limits of Democratic Accountability*. Unpublished Manuscript, Princeton University.
- Achen, Christopher and Larry Bartels. 2002. "Blind Retrospection: Electoral Responses to Drought, Flu, and Shark Attacks." Prepared for presentation at the Annual Meeting of the American Political Science Association, Chicago.
- Achen, Christopher and Larry Bartels. 2014. "Democracy for Realists." Unpublished Book Manuscript, Princeton University.
- Bartels, Larry. 2008. *Unequal Democracy: The Political Economy of the New Gilded Age*. Princeton University Press.
- Campello, Daniela and Cesar Zucco. 2014. "Merit, Chance, and the International Determinants of Government Success." Working Paper, Fundação Getulio Vargas.
- Caughey, Devin and Jasjeet Sekhon. 2011. "Elections and the Regression Discontinuity Design: Lessons from Close US House Races, 1942–2008." *Political Analysis* 19(4):385–408.
- Codato, Adriano, Emerson Cervi and Renato Perissinotto. 2013. Quem se elege prefeito no Brasil? Condi-

- cionantes do sucesso eleitoral em 2012. In *Candidatos, partidos e coligações nas eleições municipais de 2012*, ed. Bruno Speck. Rio de Janeiro: Fundação Konrad Adenauer.
- Dantas, Humberto. 2007. *Coligações em eleições majoritárias municipais: a lógica do alinhamento dos partidos políticos brasileiros nas disputas de 2000 e 2004* PhD thesis Universidade de São Paulo.
- Deaton, Angus. 1999. “Commodity prices and growth in Africa.” *The Journal of Economic Perspectives* pp. 23–40.
- Desposato, Scott W. 2006. “Parties for rent? Ambition, ideology, and party switching in Brazil’s chamber of deputies.” *American Journal of Political Science* 50(1):62–80.
- Duch, Raymond M. and Randolph Stevenson. 2008. *The Economic Vote: How Political and Economic Institutions Condition Election Results*. Cambridge: Cambridge University Press.
- Eggers, Andrew, Olle Folke, Anthony Fowler, Jens Hainmueller, Andrew Hall and James Snyder. 2015. “On the Validity of the Regression Discontinuity Design for Estimating Electoral Effects: New Evidence from Over 40,000 Close Races.” *American Journal of Political Science* 59(1):259–274.
- Fearon, James. 1999. Electoral Accountability and the Control of Politicians: Selecting Good Types Versus Sanctioning Poor Performance. In *Democracy, Accountability, and Representation*, ed. Adam Przeworski, Susan Stokes and Bernard Manin. New York: Cambridge University Press.
- Ferraz, Claudio and Frederico Finan. 2011. “Electoral Accountability and Corruption: Evidence from the Audits of Local Governments.” *American Economic Review* 101(4):1274–1311.
- Figueiredo, Argelina Cheibub and Fernando Limongi. 1995. “Partidos políticos na Câmara dos Deputados: 1989-1994.” *Dados* 38(3):497–524.
- Figueiredo, Argelina Cheibub and Fernando Limongi. 2000. “Presidential Power, Legislative Organization, and Party Behavior in Brazil.” *Comparative Politics* pp. 151–170.
- Fiorina, Morris. 1981. *Retrospective voting in American Elections*. New Haven: Yale University Press.
- Healy, Andrew and Gabriel Lenz. 2014. “Substituting the End for the Whole: Why Voters Respond Primarily to the Election-Year Economy.” *American Journal of Political Science* 58(1):31–47.
- Healy, Andrew and Neal Malhotra. 2009. “Myopic Voters and Natural Disaster Policy.” *American Political Science Review* 103(3):387–406.
- Healy, Andrew and Neal Malhotra. 2010. “Random Events, Economic Losses, and Retrospective Voting: Implications for Democratic Competence.” *Quarterly Journal of Political Science* 5(2):193–208.
- Healy, Andrew, Neal Malhotra and Cecilia Mo. 2010. “Irrelevant Events Affect Voters’ Evaluations of Government Performance.” *Proceedings of the National Academy of Sciences* 107(29):12804–12809.
- Healy, Andrew and Neil Malhotra. 2013. “Retrospective Voting Reconsidered.” *Annual Review of Political Science* 16:285–306.
- Huber, Gregory, Seth Hill and Gabriel Lenz. 2012. “Sources of bias in retrospective decision making: Experimental evidence on voters’ limitations in controlling incumbents.” *American Political Science Review* 106(04):720–741.
- Imbens, Guido and Karthik Kalyanaraman. 2012. “Optimal bandwidth choice for the regression discontinuity estimator.” *The Review of Economic Studies* 79(3):933–959.
- Klašnja, Marko and Rocio Titiunik. 2014. *The Incumbency Curse: Weak Parties, Term Limits, and Unfulfilled Accountability*. Working Paper, University of Michigan, Ann Arbor.

- Lavareda, Antônio and Helcimara Telles. 2011. *Como o eleitor escolhe seu prefeito*. Rio de Janeiro: FGV.
- Lee, David. 2008. "Randomized Experiments from Non-random Selection in US House Elections." *Journal of Econometrics* 142(2):675–697.
- Limongi, Fernando and Rafael Cortez. 2010. "As eleições de 2010 eo quadro partidário." *Novos Estudos Cebrap* 88:21–37.
- Mainwaring, Scott. 1997. "Multipartism, Robust Federalism, and Presidentialism in Brazil." *Presidentialism and democracy in Latin America* pp. 55–109.
- Mundlak, Yair and Donald F Larson. 1992. "On the transmission of world agricultural prices." *The World bank economic review* 6(3):399–422.
- Novaes, Lucas M. 2014. "Promiscuous Politicians and the Problem of Party Organization. Mayoral Candidates as Party Brokers." Paper Presented at the Annual Meeting of the Political Science Association, Washington D.C.
- Pereira, Carlos and Lúcio Rennó. 2003. "Successful Re-election Strategies in Brazil: The Electoral Impact of Distinct Institutional Incentives." *Electoral Studies* 22(3):425–448.
- Pereira, Carlos and Lúcio Rennó. 2007. "O Que é Que o Reeleito Tem? O Retorno: O Esboço de Uma Teoria da Reeleição no Brasil." *Revista de Economia Política* 27(4):664–683.
- Pereira, Carlos and Marcus Melo. Forthcoming. "Reelecting Corrupt Incumbents in Exchange for Public Goods: "Roua mas Faz" in Brazil." *Latin American Research Review* .
- Pereira, Carlos, Marcus Melo and Carlos Figueiredo. 2009. "The Corruption-enhancing Role of Re-election Incentives? Counterintuitive Evidence from Brazil's Audit Reports." *Political Research Quarterly* 62(4):731–744.
- Pritchett, Lant. 2000. "Understanding patterns of economic growth: Searching for hills among plateaus, mountains, and plains." *The World Bank Economic Review* 14(2):221–250.
- Samuels, David. 1999. "Incentives to Cultivate a Party Vote in Candidate-centric Electoral Systems Evidence from Brazil." *Comparative Political Studies* 32(4):487–518.
- Samuels, David. 2003. *Ambition, federalism, and legislative politics in Brazil*. New York: Cambridge University Press.
- Samuels, David and Cesar Zucco. 2014. "The Power of Partisanship in Brazil: Evidence from Survey Experiments." *American Journal of Political Science* 58(1):212–225.
- Schiumerini, Luis. 2015. Incumbency and Democracy in South America PhD thesis YALE UNIVERSITY.
- Titunik, Rocio. 2008. "Incumbency Advantage in Brazil: Evidence from Municipal Mayor Elections." Working paper. University of Michigan, Ann Arbor.
- Winters, Matthew and Rebecca Weitz-Shapiro. 2013. "Lacking Information or Condoning Corruption: When Do Voters Support Corrupt Politicians?" *Comparative Politics* 45(4):418–436.
- Zucco, Cesar. 2010. "Poor voters vs. poor places: persisting patterns and recent changes in Brazilian electoral patterns." Paper presented at International Seminar Metropolis and Inequalities. São Paulo.