Elections in the Time of COVID-19: incumbency effects on non-pharmaceutical interventions in Brazilian cities

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Abstract

The study investigates the role of electoral incentives in shaping policies adopted by mayors during the pandemic in Brazil aiming to reduce the virus circulation during the year 2020. A signalling model was constructed to formulate the hypothesis that the ideology from the mayor as well as the constituents may shape the adoption of Non-Pharmaceutical Interventions during election season. To test it, a dataset was constructed combining public data and datapapers with electoral results, finding that right-wing incumbents running for reelection adopted less stringent measures against COVID-19 when business closures were considered and more social protection policies in the same context. The empirical analysis validated the theoretical predictions, indicating that political ideology and voter beliefs and preferences exert electoral incentives during crises.

Keywords: COVID-19, NPIs, political economy, electoral incentives, Brazil

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1 Introduction

Multiple studies have shown that incumbents running for re-election have incentives to implement policies that increase their chances of winning the contest (Besley and Case, 1992; Lizzeri and Persico, 2001; Franzese-Jr, 2002; Finan and Mazzocco, 2021). Given its particular federate and electoral systems, Brazil presents itself as a relevant case for empirical study in this field (Ferraz and Finan, 2011; DeMagalhaes, 2015; Klašnja and Titiunik, 2017; Schettini and Terra, 2020).

The COVID-19 pandemic posed a significant challenge for governments, requiring policies aimed at reducing human and economic activity, along with limitations on civil freedoms, with clear but potentially unquantifiable trade-offs. Such situation claimed for multidisciplinary decision making (Norheim et al., 2021) whilst also opening avenues for populist responses (Lasco, 2020). Given the novelty of the virus and its correlated disease SARS-COV2, as well as the resulting uncertainty regarding the subject, reasonable levels of scientific disagreement were expected on proposals to allocate resources (Wasserman et al., 2020). Nonetheless, debate concerning COVID-19 related policies started to occupy mainstream avenues in politics and grew stronger as more information was catered to support divergent worldviews (Williams et al., 2020).

In the early stages of the pandemic, during a period of intense political polarization (Justo et al., 2020), Brazil held mayor elections in November 2020. According to its legal and administrative framework, Brazilian cities bear responsibilities regarding public health and had to implement non-pharmaceutical interventions (NPIs) intended to reduce the circulation of the virus, alongside state level government (de Souza Santos et al., 2021). Considering the unwillingness from the federal government in adopting national social distance policies and mask mandates (Ferigato et al., 2020) and its consequences related to the spread of the virus (Castro et al., 2021), mayors and governors became important actors in tackling the pandemics in Brazil (Lancet, 2020).

Mayoral elections in Brazil have two rules: a plurality system for cities with less than

200,000 electors and a two-round majority system for larger cities[1]. In both frameworks, an incumbent running for reelection possesses incentives to adopt policies matching the preferences of the biggest number of voters[2]. Therefore, it is reasonable to suppose incumbents may have aimed to calibrate its policies according to electoral motives.

Several questions arise from this observation. Firstly, considering the trade-off between short-term economic activity and the adoption of NPI, electors might disagree on which policies to adopt, if any. In Brazil, this discussion became ideologically motivated from the start after its right-wing President, Jair Bolsonaro, used an official pronouncement in national television to claim that the disease was a mere flu and daily life should remain as usual (Ajzenman et al., 2020).[3]

Mayors intending to sign ideology or proximity with the federal government could be encouraged not to adopt measures such as social distancing or businesses closures. The opposite could also be expected: local governments adopting NPIs even though no cases were reported in their cities. In any case, an upcoming election and information regarding the voters preferences might have influenced policy making pertaining to the pandemics. On the other hand, mishandling the health crisis may indicate low levels of competence, which can hurt the electoral results of incumbents seeking reelection (Frenkel, 2014). Existing evidence suggests that electoral incentives have impacted COVID-19 policies in other countries (Pulejo and Querubín, 2021), and Giommoni and Loumeau (2020) observed that stricter lockdowns were correlated with higher vote shares for incumbents in the 2020 French municipal elections.

Building on these observations, we present a framework consisting of three components: *i*) ideology, *ii*) policy regarding NPIs, *iii*) and office rent. Following that idea, we build a signaling model to indicate how each component affect optimum strategy for incumbents

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[1]If no candidate wins more than fifty percent of valid ballots in the first round, a runoff between the two most voted candidates occurs.

[2]Winning more than half the votes is a necessary and sufficient condition for reelection in majority rule. Although it is not a necessary condition in plurality frameworks, it is a sufficient one. Following these , it is possible to reason that there are incentives to please the majority of the voters in either case.

[3]The entire official pronouncement, broadcasted nationally on 03/24/2020, can be read in Portuguese at: https://noticias.uol.com.br/politica/ultimas-noticias/2020/03/24/leia-o-pronunciamento-do-presidente-jair-bolsonaro-na-integra.htm

seeking reelection given Brazilian institutional framework, their ideology and the political preferences of the local electors. It states that right-wing pragmatic incumbents may calibrate their policies related to COVID-19 pandemics following electoral incentives, especially in right-leaning cities. On the other hand, left-wing incumbents may not act in the same way, even if the constituents are right-leaning, considering that implementing policies became associated with left-wing ideology.

The model was empirically tested using a regression discontinuity design (RDD), comparing responses adopted by mayors who were elected by a small margin in 2016[4], therefore able to run for reelection, with second term mayor, hence unable to compete for a new term. The data was combined with 2018 election results in each city as a proxy for the ideology of voters, as well as sociodemographic, economic, institutional and social features of cities and personal characteristics of candidates. The results indicate that right-wing incumbents adopted less stringent non-pharmaceutical policies during election year, but only when mandates for business closures are included in the stringency index. Electoral incentives did not modify the policies adopted by center and left-wing incumbents, even in cities with a majority of righ-leaning voters.

These findings, as well as the empirical limitations and ideas for future works, will be later discussed on the basis set by the related literature and the signalling model displayed in the following sections.

The current paper is built as follows. After this introduction, a review of the relevant literature is presented, as the following section introduces the signaling model considering the legal features of Brazilian public health framework and local election rules. An empirical investigation will be presented, based on data from 2016 and 2020 municipal elections combined with datapapers and public databases. Finally, after discussing the implications

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[4]As it will be explained in further details throughout the paper, politicians elected by a large margin of votes may not respond to electoral incentives once they might possess intrinsic characteristics that guarantees the support of the majority of voters, such as political background and/or popular charisma. Restricting the sample based on voting difference is the most used way to avert biases caused by non-observable factors (Lee, 2008; Song, 2018).

of the empirical findings for the theoretical predictions, concluding remarks and ideas for future research will be offered.

2   Literature Review

As mentioned in the introduction, this study is located in the field of political economy and focuses on estimating electoral incentives and incumbency effects. This work builds on microeconomic models such as principal-agent, signaling, and public choice, among others. There has been growing interest in this subject within economic literature, using game theoretic and social choice frameworks.

In the theoretical front, the canonical formal model linking policy decisions and electoral outcomes is the Hotteling-Downs model (Downs et al., 1957). Political competition is assumed to be analogous to firm competition given that each party must maximize its share of voters – in the same sense as each business aim to maximize its consumers. The model assumes a two-party election where each party aims to maximize their probability of winning and policy implementation is credible. If policy is one-dimensional and there is perfect information regarding to the preferences of sincere voters, it leads both parties to implement similar policies close to the median point.

Dewan and Shepsle (2011) presents a review of formal models of voting and elections. The authors show that models depict elections as having multiple roles and provide analytical tools to investigate how they relate to political phenomena. Two of the main tools provided by elections are preferences/information aggregation and incentive mechanisms. The introduction of models considering asymmetric information presents new evidences on incumbency effects, policy signaling and commitment.

Razin (2003) purposes a model of imperfect information where candidates make policy choices considering exogenous factors. Diverging from the initial results, it is shown that signaling motivations can lead to polarization and, given a set of general conditions, equilibria

are inefficient regarding to the implemented policy.

Heidhues and Lagerlöf (2003) argue that, in the face of uncertainty about the true state of the world, candidates have incentives to follow popular beliefs, represented by voters' prior beliefs, rather than information gathered on the subject. This result arises from the fact that politicians must suggest a policy to voters and anticipate that competitors will propose a platform that is aligned with that of the electors. In that sense, each candidate ought to convince the electorate that their policy suggestion is more likely to lead to the intended outcome. The result stresses that even in the face of information suggesting the another policy is expected to produce better outcomes, the candidate commits the the policies preferred *a priori* by the voters, producing a suboptimal result in terms of general welfare.

Another important aspect of elections is the evaluation of incumbent actions. Ferejohn (1986) first proposed that voters have an incentive to base their votes on incumbents actual performance when holding offices. Politicians anticipate that behavior when choosing which policies to implement, resulting in a dynamic framework where the focus is located less in campaign promises and more in actual performance.

Recognizing that citizens might not accurately evaluate implemented policies, the author further developed a model to propose conditions that would induce the agent (the incumbent) to implement accountability mechanisms (Ferejohn, 1999). It concludes, however, that if electorate is sufficiently heterogeneous and policies and performance are judged in multiple dimensions there may not be effective control tools for voters to exert.

The integration of theoretical and empirical investigations has been a common practice, even in early works such as Rattinger (1991) and Besley and Case (1992), when econometric methods were less advanced. As these works indicate, the initial interest was estimating electoral advantages of being in office, as was also the case for the first studies applying methods to access causal inference.

Lee (2008) proposed that the discontinuity observed in close races could be used as a randomized experiment in a regression discontinuity design (RDD). Applying this method

in US congressional elections, the author found that House Representatives first elected in close races experienced a significant electoral advantage from incumbency. Further studies strengthened the results (Erikson et al., 2015) and found similar effect for Senate races (Cattaneo et al., 2015) as well as mayor (deBenedictis Kessner, 2018).

Given the two party system in the United States, the approach could be inappropriate for Brazil and other democracies. At city-level, early studies applying RDD found a big electoral advantage for incumbents barely elected for city council (Boas and Hidalgo, 2011) in Brazil.

Pertaining mayors, Brambor and Ceneviva (2011) estimated a significant incumbency disadvantage, a result later corroborated by Klašnja and Titiunik (2017) using the same method as Lee (2008). However, DeMagalhaes (2015) proposes that, unlike the US, where almost all incumbents run for reelection, in Brazil a significant number of mayors chose not to try a second term. Defining incumbency advantage as the probability of being reelected unconditional on running for a second term, the study finds no significant (dis)advantage in statistical terms for incumbents who won close elections in 1996.

Novaes and Schiumerini (2021) finds that commodity shocks help explain incumbency effects for mayors, while Owen (2019) obtains similar results when investigating the impact of announcements of foreign direct investments on incumbency in Brazilian cities.

Regarding broader effects in public policy, Besley and Case (1995) investigated whether policies implemented by governors who were subject to binding one-term limits differed from those implemented by governors who were eligible to run for reelection. The study found evidence that the presence or absence of term limits affected taxes, spending, and other policy instruments, particularly when the governor was a Democrat. Building on those ideas, several studies applied RDD in close elections to estimate in-office behavior.

Until this point, the literature review highlighted a growing interest in the relationship between electoral incentives and policy decisions. Theoretical models and empirical studies provide evidence of incumbency effects and the influence of electoral incentives on policy

choices. The studies discussed in this review range from formal models of voting and elections, to the evaluation of incumbent actions and the effects of binding one-term limits on public policy.

We now continue by investigating COVID-19 responses, as several recent studies examine the impact of the pandemic on political behavior, government response, and voting preferences. The COVID-19 crisis has generated debates about whether incumbents should prioritize lives, livelihoods, jobs or the general economy, with politicians' decisions potentially affecting their re-election chances. Chmel et al. (2023) conducted two experiments in Russia to examine the trade-off between saving lives and saving the economy for incumbent support. They found that while both healthcare-driven and economy-driven policies encouraged support, the economy-driven policy had a larger effect on voting.

Pulejo and Querubín (2021) investigates how electoral concerns impact the implementation of restrictive measures in response to the COVID-19 outbreak. Their findings reveal that incumbents who can run for re-election implement less stringent restrictions when the election is closer in time. Similarly, Bel et al. (2021) present a theoretical model and empirical strategy to analyze the drivers of policy-response agility during the outbreak, showing that policy responses were delayed due to concerns about healthcare system capacity and economic costs. Shvetsova et al. (2021) examine the policy response of federal and regional governments in federations to the COVID-19 crisis, finding that public health measures are at least as stringent as those in non-federations.

Kavakli (2020) examined the relationship between government ideology and the response to the COVID-19 pandemic in 100 countries. They found that strongly populist governments implemented fewer health measures against COVID-19 in February and fewer mobility restrictions in March of 2020. They also found a weaker but statistically significant relationship between right-wing governments and COVID-19 policies. Ferraresi et al. (2020) identifies the role of political, economic, and institutional factors in explaining the differential timing and intensity of stringency measures undertaken by countries on the same pandemic trajectory.

A key result was that fiscally decentralised economies have been slow to react.

Engler et al. (2021) analyzed the degree to which COVID-19 policies interfered with democratic principles in 34 European countries. They found that the variation in policy responses could not be solely explained by pandemic-related factors, and argued that strong protection of democratic principles in normal (crisis-less) times made governments more reluctant to opt for restrictive policies during the pandemic.

Next, Giommoni and Loumeau (2020) studies the impact of the lockdown policy on voting behavior during the COVID-19 pandemic in France, using a Spatial Regression-Discontinuity-Design model. Their results suggest that lockdown regulations significantly affected electoral outcomes, with incumbents and Green parties gaining more vote shares in localities under a harder lockdown.

Leininger and Schaub (2020) investigated the impact of the COVID-19 pandemics on electoral choice in Germany, specifically in the state of Bavaria. They found that the crisis significantly benefited the dominant regional party, the CSU, and its candidates. The authors attributed this to a strategic-alignment mechanism, whereby voters supported candidates that they deemed most likely to be able to solicit support from higher levels of government.

Pertaining to Brazil, Menezes-Filho and Komatsu (2021) found no incumbency effect on the adoption of non-pharmaceutical interventions (NPIs) by Brazilian municipal governments in response to COVID-19. However, unlike the present study, their work posited that electoral incentives would act in the same direction for both right-wing and left-wing incumbents, which may help explain their results. In a related study, Bruce et al. (2022) investigated mayoral measures to combat the pandemic in Brazil and found evidence that female incumbents performed better in terms of total cases and deaths.

In the context of citizens' evaluation of government measures, Altiparmakis et al. (2021) examined the determinants of the public's evaluations of health and economic measures taken by governments to address the COVID-19 crisis. The study found that the public's approval of the measures depends strongly on their trust in national leaders, an effect augmented for

voters of the opposition. Bol et al. (2021) investigated the political effect of the enforcement of a strict confinement policy in response to the COVID-19 pandemic, revealing that lockdowns have increased vote intentions for the party of the Prime Minister/President, trust in government, and satisfaction with democracy.

Baccini et al. (2021) investigated the effect of the COVID-19 pandemic on the 2020 US presidential election, focusing on the change in county-level voting for Donald Trump between 2016 and 2020. They found that COVID-19 cases negatively affected Trump's vote share, with the effect being strongest in urban counties, states without stay-at-home orders, swing states, and states that Trump won in 2016. A counterfactual analysis suggested that Trump might have won re-election if COVID-19 cases had been 5 percent lower.

Lastly, De Vries et al. (2021) examined how the response to the COVID-19 outbreak in one country affected incumbent support in other countries. Their results indicate a crisis signal effect of Italy's COVID-19 lockdown, as support for the incumbent increased domestically in other European countries. This finding highlights the importance of developments abroad for incumbent approval and the difficulty facing citizens seeking to disentangle performance signals from exogenous shocks.

In conclusion, the related literature indicate that COVID-19 pandemic has had significant effects on political behavior and electoral outcomes. The studies in this literature review provide insights into the complex relationship between the pandemic, political decisions, and the functioning of democracy during times of crisis, including impacts on mayoral responses. This interplay calls for empirical investigations, especially in frameworks that allows for causal inference. Following these findings, this literature review sets the stage for a more in-depth analysis of the relationship between electoral incentives and policy decisions in Brazil, focusing on COVID-19 related non-pharmaceutical interventions during local elections season.

3 Model

3.1 Legal framework

The legal framework in Brazil is characterized by its federate configuration, with three government levels: federal, state, and municipal. The Federal Constitution provides general rules for each level, including their legal and policy competencies, tax system, administrative organization, and other areas.

Elections in Brazil are conducted by Regional Electoral Courts (TRE), which are subordinate bodies of the Superior Electoral Court (TSE) and thus follow national rules. As already stated, mayoral elections in Brazil have two rules: plurality for cities with less than 200,000 electors, and two-round majority[5] for cities with more than 200,000 electors. In both cases, incumbents running for re-election have incentives to adopt policies that align with the preferences of voters.

In terms of public health, the Federal Constitution states that health is a right of all citizens and a duty of the State, and it should be guaranteed through social and economic policies[6]. Even though the three government levels have responsibilities concerning the subject, the roles are complementary and coordinated to constitute an unified and universal health care system (*Sistema Único de Saúde*, SUS). The cities are primarily responsible for basic care, but they can also participate in more complex activities in cooperation with the state and federal governments.

In response to the COVID-19 pandemic, the Brazilian Supreme Court ruled that each government level could adopt stricter rules compared to the upper levels, but could not loosen restrictions. For example, the federal government could determine business closures, which would then be necessarily enforced by the state and local governments. However, if a state

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[5]A second round occurs when the most voted candidate does not obtain more than half of valid votes (excluding blanks and nulls) in the first round.

[6]Article 196. Health is a right of all and a duty of the State and shall be guaranteed by means of social and economic policies aimed at reducing the risk of illness and other hazards and at the universal and equal access to actions and services for its promotion, protection and recovery (Brasil, 1988).

government imposed restrictions, the federal government could not erase these measures, and cities would have to abide by them (Abboud et al., 2020).[7]

This ruling was significant, as then-President Jair Bolsonaro had publicly opposed non-pharmaceutical interventions such as stay-at-home orders and business closures, which created uncertainty around the national stance on pandemic response measures (Peci et al., 2023). Despite the President's public statements, the Brazilian government adopted various policies to combat the virus. It highlighted the contradictions between the President's public stance and some of the government's actions, resulting in the firing of two health ministers during the first months of the health crisis.

Given the novelty of the pandemic, there was a reasonable doubt regarding the most effective course of action, which could have further complicated decision-making processes for local leaders. However, the natural complexity of Brazilian political and governmental landscape gained another component: the polarization between federal government's supporters and critics (Borges and Rennó, 2021).

Bolsonaro's public narratives, while not necessarily reflecting the government's actions, could still have influenced local decision-makers and voters. It may have incentivized mayors to avoid adopting policies against the virus to align with the President public stance and that of his supporters. In such a scenario, local leaders might have felt encouraged to prioritize political alignment with the President over policies to combat the pandemic (Peci et al., 2023). This highlights the potential consequences of political narratives in shaping local policy responses, even when the legal framework prevents the president from directly interfering with state and municipal governments formal decision-making processes.

Disregarding initial differences, every state in Brazil implemented mask-wearing and business closure legislation (Touchton et al., 2021). Cities had limited margins to affect the behavior of their citizens, consequently the introduction of stricter rules would possibly have

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[7]The Supreme Court was asked to rule in the matter after Brazilian President Jair Bolsonaro edited executive orders aiming to erase state government competencies to adopt restrictions and masking mandates. It was ruled unconstitutional: `https://portal.stf.jus.br/noticias/verNoticiaDetalhe.asp?idConteudo=440055&ori=1`

a reduced impact on the spread of the virus. On the other hand, proposing rules to override state-level restrictions did not produce practical effects, as the judiciary would quickly overrule such legislation following the Supreme Court ruling. These features are translated into a signaling model that will be detailed in the following section.

3.2 Basic setting

Let us consider a city where each voter is indexed by $j \in \{l, r\}$. The share $\mu \in (0, 1)$ of voters is r. The incumbent mayor running for re-election has a type $\theta \in \{L, R\}$, which is the incumbent's private information even though the voters possess a prior belief $p \in [0, 1]$ that the mayor is of type R. As can be deduced from the letters denoting the chosen variables, $j = l$ and $\theta = L$ represent left-wing voters and incumbents, respectively, while $j = r$ and $\theta = R$ indicate right-wing ones.

Given the health emergency that was happening during the election season, incumbents had to decide whether to adopt NPIs, denoted by $x_\theta \in \{0, 1\}$, where 1 represents the adoption of such policies. Considering the general awareness around the subject and the widespread fear of contagion in a period when vaccines were not yet available, we suppose that among the voters, a share $\chi \in (0, 1)$ votes for the incumbent if and only if $x_\theta = 1$. The remaining voters (share $1 - \chi$), on the other hand, choose to re-elect the mayor if they believe they share the same ideology. While χ is unknown to the mayor, we assume that it is a random variable with a probability distribution function with cumulative distribution denoted by the function $F(\cdot)$, which is common knowledge.

As highlighted in the previous section, the Supreme Court ruled that cities (or states) could implement stricter COVID-19 regulations than those imposed by state (or federal) guidelines but could not relax these measures. This legal framework created an environment in which mayors faced restrictions due to governor mandates, ultimately leading to the decision to utilize a signaling model to analyze political behavior in this context.

The signaling model can help identifying the incentives mayors faced when introducing

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or refraining from promoting additional COVID-19 measures. For left-leaning mayors in cities where the majority of the population shares their political orientation, adopting more stringent measures than those imposed by the respective governor could signal a commitment to prioritizing public health and addressing the pandemic. This action could potentially resonate with their left-leaning constituents and enhance their electoral appeal.

On the other hand, right-leaning mayors in cities with a predominantly right-leaning electorate may have chosen not to introduce additional mandates, signaling their adherence to right-wing beliefs. By not adopting more stringent measures than those enforced by the state, these mayors could demonstrate their support for a more relaxed approach to pandemic management, which could appeal to their right-leaning constituents. It is important to note that in this scenario, cities would still have to enforce state mandates regardless[8], meaning that the decision not to introduce additional measures was somewhat symbolic.

By employing the following model, we can better understand the political motivations of mayors during the pandemic and how their decisions to implement or not implement additional COVID-19 measures served as signals to their respective constituents, thus influencing their political behavior and electoral outcomes. This framework is represented by a two-period model. In the first period, the incumbent must choose x_θ, while in the second, the constituents decide whether to vote for the incumbent. The extensive form of such game is presented in figure 1.

3.3 Incumbent's problem

Based on the framework previously described, the expected utility of the incumbent is expressed by

$$\mathbb{E}[U_\theta(x_\theta)] = T(1 - x_\theta)A_R + (1 - T)x_\theta A_L + W \Pr(v_\theta \geq 1/2 \mid x_\theta), \tag{1}$$

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[8]Even though the effort to adopt these policies was relegated to state-level officials, their decisions were centralized in what became known as "Council of Health Secretaries," which helps explain the similar level of stringency observed by Petherick et al. (2020)
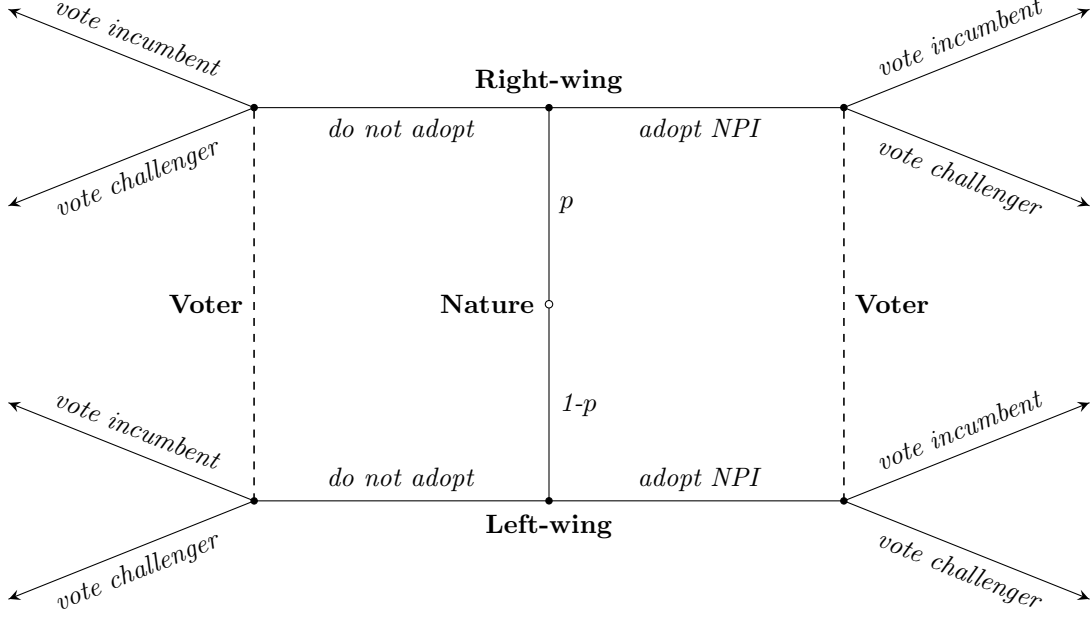
Figure 1: Signaling game in extensive form.

where: T is an indicator variable such that $T = 1$ if $\theta = R$, $T = 0$ otherwise; $A_R > 0$ represents the (ideology) benefit for a right-wing incumbent from not adopting NPIs and $A_L > 0$ is the (ideology) benefit that a left-wing mayor exerts from implementing NPIs; W denotes the net benefit obtained from being in office, representing the product of wages, ego-rents, policy setting, among other general political gains; finally, v_θ is the share of votes[9] for incumbent θ given her choice of x_θ.

The proposed utility assumes that a right-wing incumbent experiments utility gains when fails to adopt NPIs, following the political discourse against these measures produced by Brazilian President at the time. In contrast, left-wing mayors increase their utility by introducing such policies, once mask wearing and business closures became linked with left-leaning policies.

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[9]As stated in section 3.1, mayoral elections follow plurality rule for cities with less than 200k voters, which is the case for the vast majority ($\approx$ 98%) of cities in Brazil. However, we chose to represent the odds of reelection as if the incumbent must win the majority of votes, a sufficient condition, although not a necessary one. It is intended to greatly simplify the analyses while also considering that most municipal elections present only two viable candidates. Election results showed that the two most voted candidates in 2020 elections accounted for more than 92% of valid ballots on average, which indicates that the simplification is close enough to reality.

In short, the expected utility of the incumbent is expressed in equation 1. The problem of the incumbent is to maximize the expected utility, modelling the trade-off between ideology costs or benefits of implementing NPIs and the expected probability of winning the election given the choice of x_θ. The utility function takes into account the type of the incumbent (right-wing or left-wing), the cost or benefit of implementing NPIs, and the general political gains from being in office. The next step is to examine how voters behave.

3.4 Voters' behavior

As indicated in the previous section, it will be assumed that voters care only about two factors whilst deciding whether or not to support the incumbent. A proportion χ of constituents will vote to reelect the incumbent if and only if she implements NPIs ($x_\theta = 1$). The remaining $1 - \chi$ voters will vote for the incumbent if they believe the incumbent shares their ideology.

In mathematical terms, this means that the voting share can be expressed as $v_\theta = (1 - \chi)(\mu p + (1 - \mu)(1 - p)) + \chi x_\theta$. Therefore, the actual total voting will depend on which equilibria the voters believe they are in and the adopted policy.

For an incumbent $\theta = R$, the expected voting shares are:

$$v_R = \begin{cases} \mu(1 - \chi) & \text{for } (x_l^*, x_r^*) = (1, 0) \\ \mu(1 - \chi) + \chi & \text{for } (x_l^*, x_r^*) = (0, 1) \\ (1 - \chi)(\mu p + (1 - \mu)(1 - p)) + \chi & \text{for } (x_l^*, x_r^*) = (1, 1) \\ (1 - \chi)(\mu p + (1 - \mu)(1 - p)) & \text{for } (x_l^*, x_r^*) = (0, 0), \end{cases} \tag{2}$$

while a $\theta = L$ incumbent expects to obtain voting as follows:

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v_L = \begin{cases}
\mu \left(1 - \chi\right) + \chi & \text{for } (x_l^*, x_r^*) = (1, 0) \\[2mm]
\mu \left(1 - \chi\right) & \text{for } (x_l^*, x_r^*) = (0, 1) \\[2mm]
\left(1 - \chi\right) \left(\mu p + \left(1 - \mu\right) \left(1 - p\right)\right) + \chi & \text{for } (x_l^*, x_r^*) = (1, 1) \\[2mm]
\left(1 - \chi\right) \left(\mu p + \left(1 - \mu\right) \left(1 - p\right)\right) & \text{for } (x_l^*, x_r^*) = (0, 0).
\end{cases}
\tag{3}
$$

The voting behavior of constituents indicates that the expected votes for both types of incumbents are the same in pooling equilibria. That is expected once voters are unable to differentiate the candidates based on their choice of public policy and the result is mostly affected by their prior belief about the incumbent's ideology and the share of constituents who want the adoption of NPIs. The next section will investigate the conditions and consequent feasibility regarding each equilibrium.

3.5 Equilibria

The solutions of the proposed signaling game constitute Perfect Bayesian Equilibria (PBE). In these frameworks, an equilibrium is represented by a pair of optimal strategies (x_R^*, x_L^*) and beliefs $Pr(\theta = R \mid x_\theta) = p \in [0, 1], \theta \in \{L, R\}, x_\theta \in \{0, 1\}$ that voters share regarding the ideology of the incumbent given the chosen policy.

The first solution to be explored is the separating equilibrium where the right-wing incumbent does not implement the policies while the left-wing does: $(x_R^* = 0, x_L^* = 1)$ with $Pr(\theta = R \mid x_\theta = 0) = p = 1$, and $Pr(\theta = L \mid x_\theta = 1) = 1 - (p - 1) = 1$. Let us first observe what it represents for a right-wing incumbent. In accordance to (2), she is expected to receive $\mu \left(1 - \chi\right)$ share of the votes and is thus reelected if $\mu \left(1 - \chi\right) \geq 1/2$. As χ is the only random variable in the setting and its cumulative distribution is denoted by $F(\cdot)$,

isolating χ results in

$$Pr(v_R \geq 1/2 \mid x_R = 0) = Pr\left(\chi \leq \frac{2\mu - 1}{2\mu}\right) = F\left(\frac{2\mu - 1}{2\mu}\right). \tag{4}$$

Nonetheless, in order for a right-wing incumbent not to defect, it is necessary that $\mathbb{E}[U_R(x_R = 0)] \geq \mathbb{E}[U_R(x_R = 1)]$. Given the set of beliefs for this equilibrium, an incumbent who implements NPIs is expected to be left-wing ($p = 0$), resulting in a vote share of $\mu(1-\chi)+\chi$ following (3) and a probability of being elected of

$$Pr(v_R \geq 1/2 \mid x_R = 1) = 1 - F\left(\frac{2\mu - 1}{2\mu}\right), \tag{5}$$

which is the complement of (4).

Substituting (4) and (5) in (1) and applying to the necessary condition expressed above yields

$$
\begin{aligned}
A_R + WF\left(\frac{2\mu - 1}{2\mu}\right) &\geq W\left(1 - F\left(\frac{2\mu - 1}{2\mu}\right)\right), \\
\frac{A_R}{W} &\geq \left(1 - 2F\left(\frac{2\mu - 1}{2\mu}\right)\right).
\end{aligned}
\tag{6}
$$

Regarding a left-wing incumbent and following the same steps, the condition for the equilibrium to hold, which relies on $\mathbb{E}[U_L(x_L = 1)] \geq \mathbb{E}[U_L(x_L = 0)]$, is represented by

$$\frac{A_L}{W} \geq \left(2F\left(\frac{2\mu - 1}{2\mu}\right) - 1\right). \tag{7}$$

At a first glance, both equations (6) and (7) state that the equilibrium will hold if and only if the rate between ideology (A_θ) and office rent (W) is greater than a function of the probability of being elected dependent on the proportion of right-leaning constituents in the city (μ). Aiming to allow for more insightful interpretations of the results, it is useful to propose the following definitions: Theorem[chapter] [theorem]Corollary [theorem]Proposition

Definition 1. $A_\theta/W \in [1,0)$ *represents 'pragmatic' incumbents, and* $A_\theta/W > 1$ *denotes 'ideo-*

logical' incumbents.

The definition is designed to be straightforward. If $A_\theta > W$, the incumbent values ideology more highly than the utility gained from being in office. Such a politician is commonly labeled *ideological*. On the other hand, whenever a mayor does not favor ideology in comparison to political gains $(A_\theta \leq W)$, they are often referred to as *pragmatic*.

In order to analyze whether (6) and/or (7) are feasible in a plausible environment, we will define χ as a random variable with distribution $F(\cdot)$ that satisfies certain conditions. A basic condition is that $F(\cdot)$ is continuous, strictly increasing, and defined on the interval $[0, 1]$ in order for it to be a cumulative distribution function. Apart from that, one desired condition is that $\mathbb{E}(\chi > 0.5) \approx 0$. This condition ensures that the incumbent does not expect to be reelected simply by adopting NPIs $(x_\theta = 1)$.[10] One way to guarantee this result is restricting the support of $F(\cdot)$ to the in the interval $[0, 0.5)$.[11] Consequently, it also means that the median of the distribution, $F(1/2)$, is less than 0.5.

Considering this distribution and the fact that $\mu \in (0, 1)$, from (6) and (7) we can see that

$$F\left(\frac{2\mu - 1}{2\mu}\right) = \begin{cases} 0, & \text{if } \mu \leq 1/2, \\ \in (0, 0.5), & \text{if } \mu > 1/2. \end{cases} \tag{8}$$

This result shows that if $\mu \leq 1/2$, representing a city where the majority of voters are left-leaning, the expected χ share of the population that votes for the incumbent if and only if she implements NPIs is not relevant. That is the case because the left-leaning voters also choose to reelected the incumbent if and only if she chooses $x_\theta = 1$, given that it would make them believe that the incumbent is left-wing $(1 - p = 1)$ with certainty. On the other hand, if $\mu > 1/2$, the majority of the constituents is right-leaning, therefore the positive $F(\cdot)$ highlights the effect of the parameter μ (the share of right-wing voters) on the political

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[10]It implies that if the incumbent implements NPIs $(x_\theta = 1)$, their expected chance of winning re-election is not significantly greater than 50%. If it were, the analysis would not be entirely believable and could produce unrealistic results based on the fact that implementing NPIs alone would guarantee W.

[11]In formal terms, we let $\text{supp}(F) \subseteq [0, 0.5)$.

calculation heuristically executed by the incumbent when deciding whether to implement NPIs or not.

Noticing the right hand-side of both conditions, it can be observed that one equals the negative of the other. Therefore, we can conclude that one of conditions will automatically be satisfied. Appendix A.1 shows that the condition that holds is (7), hence the left-wing incumbent will not defect. It is based on the definitions of $F(\cdot)$, once it is limited to the interval $(0, 0.5)$ for all values of $\mu \in (0, 1)$. It therefore represents a sufficient condition for (7) to hold regardless of the relation between A_L and W.

Considering a right-wing incumbent, a sufficient but not necessary condition for (6) to be true and the equilibrium to hold is $A_R > W$, which happens whenever the right-wing incumbent is ideological. Appendix A.1 also presents the demonstration, which is expected given the definition of the support of $F(\cdot)$.

The combination of these results constitute the first proposition:

Proposition 1. *A sufficient condition for a separating equilibrium where the right-wing incumbent does not adopt NPIs ($x_R = 0$) and the left-leaning does ($x_L = 1$) to happen is $A_R > W$, which is the case if the former is ideological.*

The logic behind the result is elementary. Whenever the incumbents favor ideology over office rent, the equilibrium is expected to hold once the types are adopting the policies that each prefers. However, once the $1 - \chi$ share of constituents decide their votes based on the expected ideology of the incumbent and believe that it determines the chosen policy, pragmatic mayors may calibrate their response based on the constituents' preferred policies.

Next, let us evaluate the possibility of a separating equilibrium where the right-wing mayor implements NPIs, but the left-wing does not: $(x_R^* = 1, x_L^* = 0)$, where $Pr(\theta = R \mid x_\theta = 0) = p = 0, Pr(\theta = L \mid x_\theta = 1) = 1 - p = 1$. For this arrangement to exist, the following conditions must be met:

$$\frac{A_R}{W} \leq 1 - 2F\left(\frac{1 - 2\mu}{2(1 - \mu)}\right),$$

(9)

$$\frac{A_L}{W} \leq 2F\left(\frac{1-2\mu}{2(1-\mu)}\right) - 1. \tag{10}$$

The opposite of equation (8) is observed. Now, whenever $\mu > 0.5$, $F(\cdot) = 0$ as right-leaning voters support the incumbent if and only if she adopts NPIs, once they would believe she is also right-wing. Therefore, they act in the same way as the χ share of voters, making the $F(\cdot)$ distribution and $\mathbb{E}(\chi)$ irrelevant. However, if $\mu < 0.5$, $F(\cdot) > 0$ and the electoral trade-offs are present.

Nonetheless, given that $F(\cdot)$ is defined in the interval $[0, 0.5)$, it implies that condition (10) can not be met, once the right hand-side of the equation is negative and both A_L and W are positive.[12] The intuition regarding this result is clear: even if a pragmatic right-wing incumbent chooses to adopt NPIs in a left-leaning city, the left-wing incumbent in a similar situation would deviate. By enacting the policy, it would match the probability of reelection of the right-wing candidate, while also obtaining A_L. It allows for the second proposition:

Proposition 2. *There does not exist an equilibrium where a right-wing incumbent adopts NPI while a left-wing incumbent does not.*

This is because any left-wing incumbent will possess incentives to defect when a right-wing expects sufficient electoral gains from adopting the policy, as it would match the probability of winning the election while also experimenting utility gains from implementing NPIs.

A separating equilibrium where a left-wing incumbent adopts NPIs and a right-wing incumbent chooses not to implement the policies has been demonstrated to be feasible under certain conditions. A sufficient one is that both types are ideological ($A_\theta > W$ for $\theta = \{L, R\}$). However, the opposite scenario, where a right-wing incumbent adopts NPIs while a left-wing incumbent does not implement the measures has been shown not to be feasible even when both types are pragmatic ($A_\theta \leq W$ for $\theta = \{L, R\}$). We now investigate the possible pooling equilibria.

First, let us focus on the equilibrium where both implement the policy: ($x_R^* = 1, x_L^* =$

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[12]See Appendix A.2

1), $(Pr(\theta = R \mid x_\theta = 1) = p, (Pr(\theta = R \mid x_\theta = 0) = q)$. As both types choose the same policy, the voters' posteriors are equal to their priors. Let us define $p \in (0, 1)$ as the probability that the incumbent is right-wing given that she acted according to the equilibrium, $1 - p$ that she is left-wing given the same conditions. Additionally, $q \in (0, 1)$ refers to the probability that the incumbent is right-wing when she defects, $1 - q$ that she is left-wing.

Once again, in order for the equilibrium to hold, it is necessary that $\mathbb{E}[U_R(x_R = 1)] \geq \mathbb{E}[U_R(x_R = 0)]$ and $\mathbb{E}[U_R(x_L = 1)] \geq \mathbb{E}[U_L(x_R = 0)]$ hold simultaneously. Isolating χ in equation (2) shows that

$$Pr(v_R \geq {}^1\!/_2 \mid x_R = 1) = 1 - F\left(\frac{{}^1\!/_2 - (p\mu + (1-p)(1-\mu))}{1 - (p\mu + (1-p)(1-\mu))}\right) \equiv 1 - F(\psi_p), \qquad (11)$$

$$Pr(v_R \geq {}^1\!/_2 \mid x_R = 0) = F\left(\frac{2(q\mu + (1-q)(1-\mu)) - 1}{2(q\mu + (1-q)(1-\mu))}\right) \equiv F(\psi_q). \qquad (12)$$

Applying this logic to $\theta = L$ yields the same share of votes, once the constituents are not able to differentiate both types. Substituting (11), (12) in equation (1) results in the conditions for the equilibrium to hold:

$$\frac{A_R}{W} \leq 1 - F(\psi_p) - F(\psi_q), \qquad (13)$$

$$\frac{A_L}{W} \geq F(\psi_p) + F(\psi_q) - 1. \qquad (14)$$

It can be show that condition (13) will not hold for right-wing ideological incumbents (for a formal demonstration, see Appendix A.3). As both $F(\cdot)$ are equal or greater than zero, the right hand-side of the inequality will not be greater than 1. Therefore, if $A_R > W$, the condition can not be met and the right-wing incumbent always defect. It is expected since she favors ideology gains and this pooling equilibrium means that she would have to adopt an undesired policy. From this result follows the next proposition. It implies that there can exist a pooling equilibrium where both types of incumbents adopt NPIs if and only if $A_R < W$, i.e. if the right-wing mayor is not ideological.

Regarding left-wing incumbents, the fact that $F(\cdot)$ is defined in the interval $[0, 0.5)$ implies that condition (14) always holds (see Appendix A.3). It also makes sense once $x_L = 1$ produces utility gains regardless of the electoral results. As voters can not differentiate the types based on their choice of policy in pooling equilibrium, there are no incentives for the left-wing incumbent to act strategic.

Combining the previous observations brings us the next proposition:[13]

Proposition 3. *There exists a pooling equilibrium where both types of incumbents implement NPIs. Left-wing incumbents will always adopt the policy. Pragmatic right-wing incumbents will calibrate their response based on voters' ideology and beliefs.*

Considering that right-wing pragmatic incumbents will rely on the combinations of μ, p and q to make their policy decisions, it will be easier if we visually evaluate the results. If there exists a distribution $F(\cdot)$ that fulfills the conditions mentioned earlier, the insights derived from the model would hold for the general case as well. The Beta(a, b) is an example of a distribution that may serve as a suitable choice for analyzing the equilibrium conditions in the signaling game.

The results obtained using the distribution can be considered general if $F(\cdot)$ represents the real proportion χ and satisfies the desired conditions. To show that it might be the case, we can further discuss its properties. With parameters $(2, 8)$, the expected value of χ is 0.2, which means that an incumbent can expect 20% of the population to vote for her if she adopts NPIs. Moreover, the probability of $\chi \geq 0.5$ is approximately 0, avoiding the unrealistic situation where adopting NPIs would guarantee reelection. As its cumulative distribution function matches the general conditions, the following results will assume $F(\cdot) \sim \text{Beta}(2, 8)$ without loss of generality.

Aiming to show how different values of q affect the feasible areas, figure 2 presents two dimensional contour plots where $q = 0.8, 0.6, 0.4, 0.2$. Plot (A) shows that when the proportion of right-wing voters (μ) is high, the prior belief that the incumbent is right-wing

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[13]For the mathematical proof, see appendix A.3

(p) is low, and the belief that a mayor who does not adopt NPIs is right-wing (q) is high, pragmatic incumbents ($A_R \leq W$) may defect.

Pragmatic right-wing mayors choose $x_R = 0$ when p and q are both high and μ is low. It states that, if the probability of being reelected is already low, once most voters believe that the incumbent is right-wing (high p and q) whilst the electors are left-leaning (low values of μ), the mayor will defect following her ideology regardless of electoral incentives even though she may be pragmatic.

Finally, right-wing pragmatics also defect when p is low while μ is high and $q > 0.5$, as can be seen in the top plots in figure 2. If the majority of the population is right-wing and believes the incumbent is left-wing if she adopts NPIs, the pragmatic incumbent will opt for $x_R = 0$ following electoral incentives only if the majority of population regards the defector as right-wing. The next proposition summarizes these findings.

Proposition 4. *Pragmatic right-wing incumbents may defect in two scenarios: (i) when the voters believe that an incumbent who does not adopt NPIs is right-wing ($q > 0.5$), she defects ($x_R = 0$) if the vast majority of voters are right-leaning ($\mu > 0.5 + \epsilon$, where $\epsilon > 0$) and believe that the incumbent is left-wing ($p < 0.5 - \epsilon$); or (ii) when $q < 0.5$, if $\mu < 0.5 - \epsilon$ and $p > 0.5 + \epsilon$).*

The proposition states that the pragmatic right-wing incumbent may deviate from the equilibrium whenever she expects significant electoral gains from choosing $x_R = 0$ or she expects to loose the election regardless of her actions. Considering that office rent can produce a higher utility than ideology ($W \geq A_R$) for this politician, she calibrates her policy depending on the preferences of the constituents. It is formally demonstrated in appendix A.4

The final pooling equilibrium considers $(x_R^* = 0, x_L^* = 0), (Pr(\theta = R \mid x_\theta = 0) = p, (Pr(\theta = R \mid x_\theta = 1) = z)$. The expected share of votes are the opposite as what was presented in the following equilibrium. In order for $\mathbb{E}[U_R(x_R = 0)] \geq \mathbb{E}[U_R(x_R = 1)]$ and
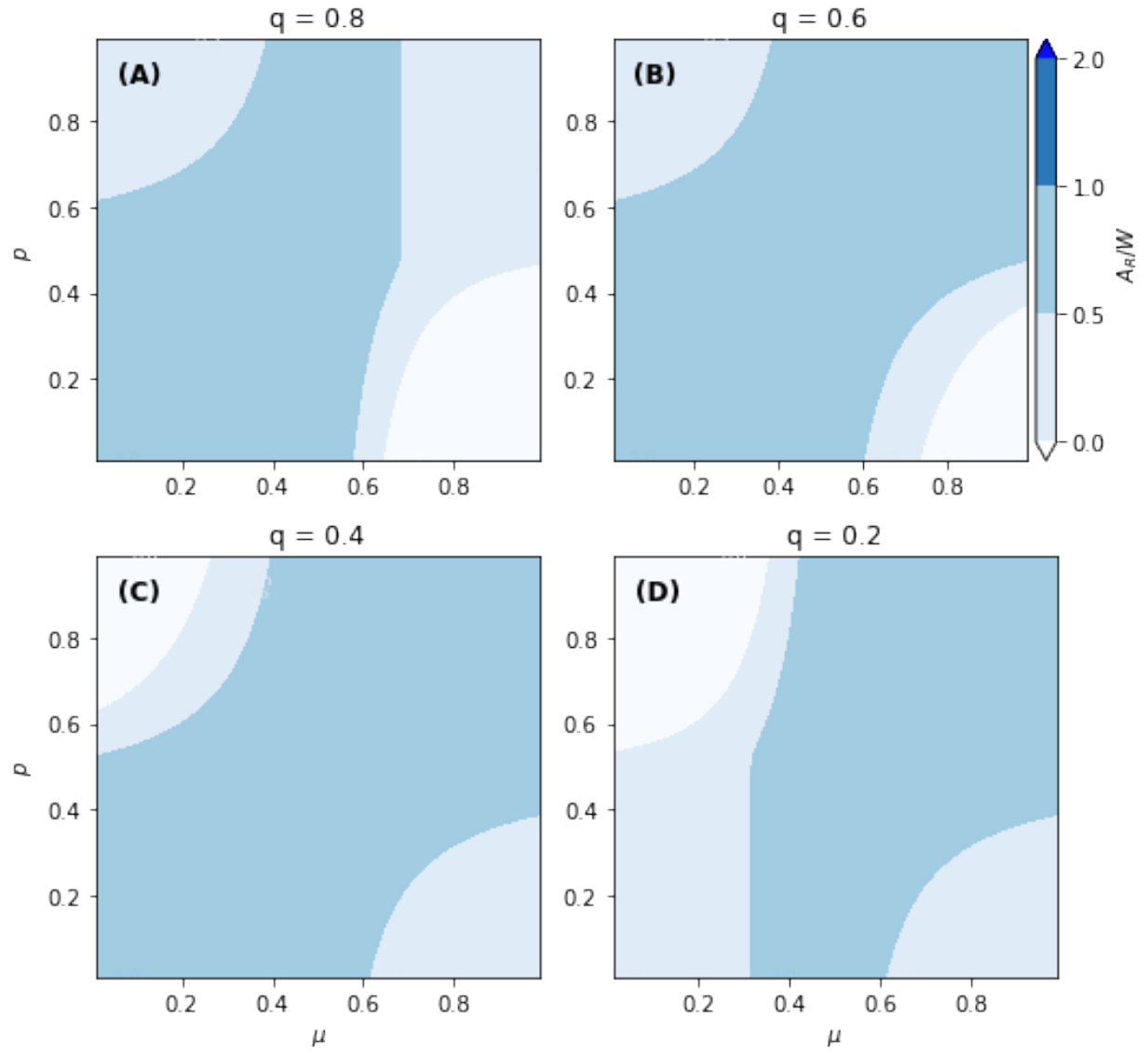
Figure 2: Pooling equilibrium $(x_R^* = 1, x_L^* = 1)$ - feasible area

$\mathbb{E}[U_R(x_L = 0)] \geq \mathbb{E}[U_L(x_R = 1)]$ to hold, the next conditions[14] are necessary:

$$\frac{A_R}{W} \geq 1 - F(\omega_p) - F(\omega_z), \tag{15}$$

$$\frac{A_L}{W} \leq F(\omega_p) + F(\omega_q) - 1. \tag{16}$$

Condition (16) states that A_L/W must be less than a negative number for the equilibrium to be feasible. It results from the properties of both $F(\omega_p)$ and $F(\omega_q)$, once they possess support in the interval $[0, 0.5)$, therefore their sum will never surpass 1. As both A_L and W are positive, there is no combination of the parameters that allows the condition to hold, implying that the equilibrium in not possible.[15]

Proposition 5. *There does not exist a pooling equilibrium where left-wing and right-wing incumbents choose not to adopt NPIs.*

The reason for this result is similar to the one applied for ideological right-wing incumbents regarding proposition 3, once a left-wing mayor will always have incentives to defect regardless of the values of other parameters. If voters can not differentiate both types by their policies, left-wing incumbents will be better off deviating and guaranteeing utility gains (A_L) from adopting her desired policy ($x_L = 1$) than betting on possible electoral gains based on a choice of policy ($x_L = 0$) that does not meet their ideology. Also, by doing so she would gain the χ share of votes.

In conclusion, the analysis of the political equilibria shows that the adoption of NPIs by incumbents depends on various factors, including the beliefs of voters and the type of incumbent. In practical terms, it is expected that left-wing mayors will adopt NPIs, while right-wing non-ideological incumbents may have incentives to remain in a separating equilibrium where they choose $x_R = 0$ or a pooling equilibrium with $x_R = 1$. The beliefs (p, q) and ideology (μ) of voters play a relevant part in the right-wing politician decision regarding

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[14]Where $\omega_p \equiv F\left(\frac{2(p\mu + (1-p)(1-\mu)) - 1}{2(p\mu + (1-p)(1-\mu))}\right)$ and $\omega_z \equiv 1 - F\left(\frac{1/2 - (z\mu + (1-z)(1-\mu))}{1 - (z\mu + (1-z)(1-\mu))}\right)$.

[15]For a formal demonstration, see Appendix A.5.

the adoption of NPIs. Therefore, the results suggest that implementing such measures is more likely when the proportion of left-wing voters is high, and when the incumbent is not a right-wing ideological politician.

The next section will evaluate whether this insights are supported by the data, using real-world results from the 2020 mayoral elections that occurred in Brazil as laboratory.

4   Empirical Strategy

4.1   Data Description

The study was performed using public data from Brazil and information from publicly available scientific data paper (de Souza Santos et al., 2021). The data on the adoption of NPIs was complemented with election results, information on cadidates, and a set of socioeconomic and demographic variables.

In the country, mayors serve a four-year term and they can be reelected once for another same-length term. In cities where a run off happened, solely second round results were considered. Data on election final results were collected from Superior Electoral Court (TSE) database. Information on whether the candidate was running for reelection were presented in the candidates profiles and was combined with 2016 and 2020 results. Further data about the candidates – i.e. education level, former profession, skin color, age – were gathered from the same source. Additionally, the results of the 2018 presidential elections at city level were also collected and used as a proxy of the constituents' ideology. We utilized the final valid share of votes received in the second round run-off by right-wing and eventual President Jair Bolsonaro and subtracted the share of ballots for left-wing opponent Fernando Haddad.

Pertaining to municipal measures against COVID-19, data surveyed and arranged by de Souza Santos et al. (2021) was utilized as well as information collected by Brazilian Bureau of Geography and Statistics (IBGE). Both relate to surveys comprising prohibition of social gatherings and mandatory use of face masks, while only the first possesses a dummy

indicating the closure of non-essential services. The IBGE database also indicates social protection measures enacted by local governments against health risks and economic downturns related to the pandemics, such as distributing masks and personal hygiene products, as well as the creation of cash transfer programs and food banks.

With these information, we created three main variables of interest which will constitute the target of the empirical evaluation: (i) $NPI\_index \in \{0, 1, 2, 3\}$, representing the sum of dummy variables that indicate whether the city implemented mask mandates, social distancing and/or non-essential business closures according to de Souza Santos et al. (2021); (ii) $NPI\_IBGE \in \{0, 1, \cdots, 5\}$, denoting the adoption of mask mandates, social distancing, stay-at-home orders, and/or fines against private citizens or business that did not follow the rules; and (iii) $social\_protection \in \{0, 1, \cdots, 22\}$ indicating the sum of 22 dummies[16] where each represents social protection policy to alleviate the health and economic burden exerted by the pandemics.[17]

The ideological classification of political parties followed the survey executed by Tarouco and Madeira (2015). One possible concern in identifying political ideology in Brazil is that its multiparty system favors heterogeneity among parties and politicians (Scheeffer, 2018a) and make it difficult for governments to execute policies related to their core ideas (Carey, 2007). This problem will be further presented in the discussion section.

The descriptive statistics of the target variables is presented in Table 1. The data displays separate statistics for cities where the incumbent is center, right- or left-wing, according to

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[16]The measures consisted of maintaining school cafeterias opened while schools were closed (Mcov0511); the distribution of: personal hygiene kits (Mcov061), general hygiene kits (Mcov062), masks (Mcov063), basic-needs groceries for "Bolsa Família" recipients (Mcov064), basic-need groceries for other families in need (Mcov066); the creation of: shelters for homeless population (Mcov066), hygiene locations for homeless population (Mcov067), general host spaces for homeless population (Mcov068), and food banks (Mcov069); registration of: families to receive "Bolsa Família" (Mcov0610), individuals to receive the federal government financial aid (Mcov0611), individuals in a local cash transfer program (Mcov0612); enlarged (Mcov0613) and enabled (Mcov0614) specific benefits regarding the COVID-19 pandemics; hept open: social assistance centers (Mcov0615), previously existing shelters (Mcov0616), elderly facilities (Mcov0617), health facilities focused on cronic diseases (Mcov0618); monitored domestic violence (Mcov0619); kept psicosocial facilities open (Mcov0620); and adopted other policies (Mcov0621). The codes in parentheses indicate the variable name in IBGE database.

[17]For complete details, the full python code to collect, clean, wrangle the data, and create the variables is available at `https://github.com/hssitja/PhD-Dissertation/blob/Chapter-1/Chapter3.ipynb`.

Table 1: Descriptive statistics

	Observations	Mean	St. Dev.	Min	Max
Incumbent: left-wing					
Social distancing	924	0.979	0.142	0.0	1.0
Business closures	923	0.775	0.418	0.0	1.0
Mask mandates	920	0.964	0.186	0.0	1.0
NPI index	920	2.718	0.505	0.0	3.0
Mask mandates (IBGE)	1309	0.945	0.228	0.0	1.0
Social distancing (IBGE)	1309	1.785	0.448	0.0	2.0
Sanctions (IBGE)	1308	1.153	0.848	0.0	2.0
NPI IBGE	1308	3.883	1.071	0.0	5.0
Incumbent: right-wing					
Social distancing	1583	0.978	0.147	0.0	1.0
Business closures	1579	0.782	0.413	0.0	1.0
Mask mandates	1582	0.958	0.200	0.0	1.0
NPI index	1578	2.718	0.498	1.0	3.0
Mask mandates (IBGE)	2142	0.940	0.237	0.0	1.0
Social distancing (IBGE)	2143	1.787	0.443	0.0	2.0
Sanctions (IBGE)	2141	1.171	0.844	0.0	2.0
NPI IBGE	2141	3.898	1.041	0.0	5.0
Incumbent: center					
Social distancing	1407	0.979	0.142	0.0	1.0
Business closures	1408	0.766	0.424	0.0	1.0
Mask mandates	1402	0.956	0.204	0.0	1.0
NPI index	1401	2.702	0.507	0.0	3.0
Mask mandates (IBGE)	1941	0.949	0.220	0.0	1.0
Social distancing (IBGE)	1941	1.790	0.437	0.0	2.0
Sanctions (IBGE)	1939	1.163	0.854	0.0	2.0
NPI IBGE	1939	3.903	1.045	0.0	5.0
City: left-leaning					
Social distancing	1612	0.987	0.113	0.0	1.0
Business closures	1612	0.803	0.398	0.0	1.0
Mask mandates	1606	0.968	0.177	0.0	1.0
NPI index	1606	2.758	0.463	0.0	3.0
Mask mandates (IBGE)	2700	0.937	0.242	0.0	1.0
Social distancing (IBGE)	2701	1.797	0.435	0.0	2.0
Sanctions (IBGE)	2698	1.102	0.854	0.0	2.0
NPI IBGE	2698	3.837	1.060	0.0	5.0
City: right-leaning					
Social distancing	2302	0.973	0.162	0.0	1.0
Business closures	2298	0.754	0.431	0.0	1.0
Mask mandates	2298	0.953	0.212	0.0	1.0
NPI index	2293	2.680	0.526	0.0	3.0
Mask mandates (IBGE)	2692	0.952	0.214	0.0	1.0
Social distancing (IBGE)	2692	1.778	0.448	0.0	2.0
Sanctions (IBGE)	2690	1.226	0.838	0.0	2.0
NPI IBGE	2690	3.955	1.036	0.0	5.0

Notes: (i) Social distancing (IBGE) $\in \{0, 1, 2\}$, where 1 denotes prohibition of social gatherings and 2, stay-at-home orders. (ii) Sanctions (IBGE) $\in \{0, 1, 2\}$, where sanctions for individuals and/or business from breaking isolation orders are added to form the variable. Ideology of the mayor is defined by their political party. (iii) Mayors' ideology according to their parties. (iv) Ideology of the city is determined by the results of the 2018 presidential election's run-off (cities where Jair Bolsonaro got more than 50% of the votes were labeled as right-leaning.

his party's ideology. It also presents the data sorted by left- and right-leaning cities, based on the 2018 presidential run-off results.

In addition to the core data, we collected a set of geographic, demographic and socioeconomic data at municipal level, as well as candidates and mayors characteristics. IBGE is also responsible for the latter, while TSE once again is the source for the former. Final dataset, including information collection and data cleaning and wrangling steps, as well as full analyses and results, are available on GitHub. [18]

4.2 Data Analysis

The study investigated whether Brazilian mayors running for reelection in 2020 elections responded differently to the COVID-19 pandemics considering their ideology and the expected policy preference of local voters. The outcome variables includes NPIs at city-level and it was evaluated whether the response to the COVID-19 pandemics was influenced by electoral incentives and whether different strategies considering political preferences were observed.

The central hypothesis is that incumbent mayors fighting for reelection will adopt looser – or stricter – measures in comparison to lame duck mayors inside the same political spectrum observing whether the majority of electors favor such measures. In order to perform such investigation, the two last Brazilian local election – 2016 and 2020 – will be analyzed in combination with de Souza Santos et al. (2021), official government datasets concerning NPIs at city-level and results from the 2018 federal election.

As NPI measures were heavily politicized at the time of local elections in Brazil, an incumbent mayor in a city where the majority of the population voted for then-Brazilian President Jair Bolsonaro in the 2018 general election could adopt looser policies in order to please the majority of electors. Conversely, if Fernando Haddad, the runner up in '18 elections, received the most votes in a given city, its mayor would have incentives to impose more stringent measures. As the formal model proposes, such policy strategies can be regarded as

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[18]https://github.com/hssitja/PhD-Dissertation/tree/Chapter-1

signaling efforts, once severe state-levels restrictions were already being adopted.

The main issue pertaining empirical analyses of incumbent effects is the fact that second term mayors may not be comparable to first term ones. Once reelected officials might possess intrinsically different characteristics that lead to their political and electoral advantages, the main empirical strategy currently applied to infer causality between reelection status and public policy is utilizing regression discontinuity design (RDD) (Erikson et al., 2015; Song, 2018).

Not without its critiques (DelaCuesta and Imai, 2016; Hyytinen et al., 2018) but with increasing evidence on its validity (Eggers et al., 2015), the strategy specified by Lee (2008) relies on comparing policies implemented by incumbents who were reelected by a small margin with those implemented by second term mayors[19]. The logic states that second term mayors elected in close contests are comparable to first time mayors in all characteristics except for the fact that, as they are in a second term and, they are not able to run for reelection.

Using the common terminology applied in these contexts, it will be assumed that a treatment status $\tau \in \{0, 1\}$ is assigned to a city i if the share of votes that the incumbent received v_i was above the cutoff c, which represents the voting margin in relation to the runner up in the election. That means that τ is a deterministic function where $\tau = 1$ if $v_i - c \geq 0$, $\tau = 0$ otherwise. Therefore, it represents a sharp RDD and the local average treatment effect ($LATE$) can be estimated through the following regression:

$$\Delta Y_i = \alpha + LATE(\tau_i) + f(v_i - c) + \gamma_s + \epsilon_i, \tag{17}$$

where $F(\cdot)$ is a polynomial function of the interactions between the margin of victory and the treatment status, γ_s is a vector of state fixed effects[20], and ϵ_i is an error term. As the

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[19]Which implies that they cannot run for another term according to Brazilian electoral rules.

[20]As state-level policies applied for the cities, this step is central to the empirical validity of the findings. But these dummies also intend to capture regional and cultural differences that could cause endogeinity problems.

causal effect identified by this method only refers to close elections, optimal bandwidth were selected following Calonico et al. (2020).

Considering the hypothesis extracted from the model presented in section **??**, the equation (17) will be estimated separately for incumbents according to their ideology – center, left or right. The idea is that the electoral incentives would exert different effects across the political spectrum. Next section summarizes the main results, while descriptive statistics, balance, and robustness checks are found in the appendix A. Full regression results can be visualized online.[21]

4.3   Theoretical Predictions

Considering the signaling model and the available data, the following predictions will be tested:

1. Adoption of NPIs by left-wing incumbents: the model predicts that left-wing incumbents are more likely to adopt NPIs, regardless of the values of the parameters. It is expected no incumbent effect on this group.

2. Adoption of NPIs by right-wing incumbents: the model predicts that the adoption of NPIs by right-wing incumbents depends on the values of p, q, μ, and the type of incumbent. Non-ideological right-wing incumbents may have incentives to adopt NPIs in a pooling equilibrium or remain in a separating equilibrium where they choose not to adopt. It is expected statistical significant incumbent effect indicating that right-wing incumbents adopt looser policies.

3. The role of voters' beliefs: the model predicts that the beliefs (p, q) and ideology (μ) of voters play a role in the adoption of NPIs by right-wing incumbents. The adoption is more likely when the proportion of left-wing voters is high.

The following sections display the main empirical findings.

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[21]https://github.com/hssitja/PhD-Dissertation/blob/Chapter-1/Chapter3_empirical.ipynb
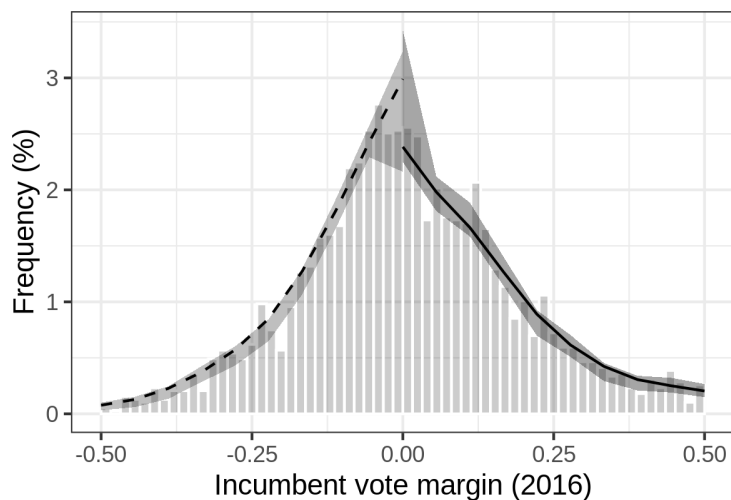
Figure 3: Mass of observations around the cutoff point

5 Results

Initially, it is important to verify if the running variable runs smoothly around the cutoff point. It is essential that the assignment of the treatment status is similarly distributed for values just below and above the cutoff, otherwise it could indicate that the main assumption behind the regression discontinuity design would not be met. In the current study, if the mass of observation around zero was not continuous, it could mean, for instance, that incumbents may influence close elections or election official could purposely harm their odds of reelection. As figure 3 indicates, it is not the case for the collected dataset.

Another indication on the validity of the RDD is the graphical representation of the variable of interest around the cutoff point. In this study, the first variable is the adoption on non-pharmaceutical interventions, which consisted of an index regarding whether the city adopted mask mandates, business closures and social distancing regulations. The variable can assume values from 0 to 3, where each of the policies counts as a dummy variable and the final index results from their sum. The visual representation in figure 4 indicates that right-wing incumbents, when facing reelection, adopt stricter policies than second term mayors. Pertaining left-wing and center mayors, no impact was observed.
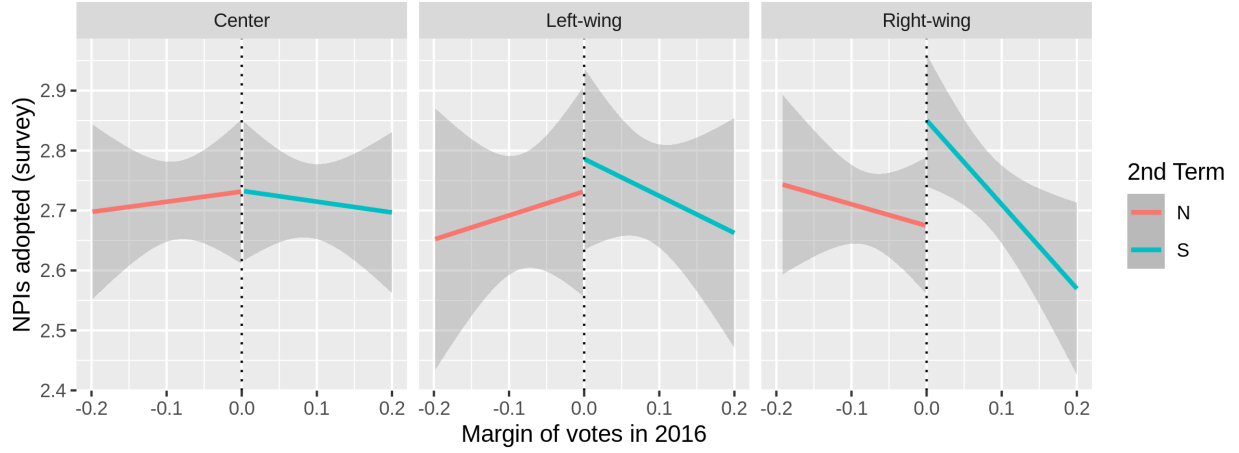
Figure 4: NPI index around discontinuity for different incumbent ideologies.
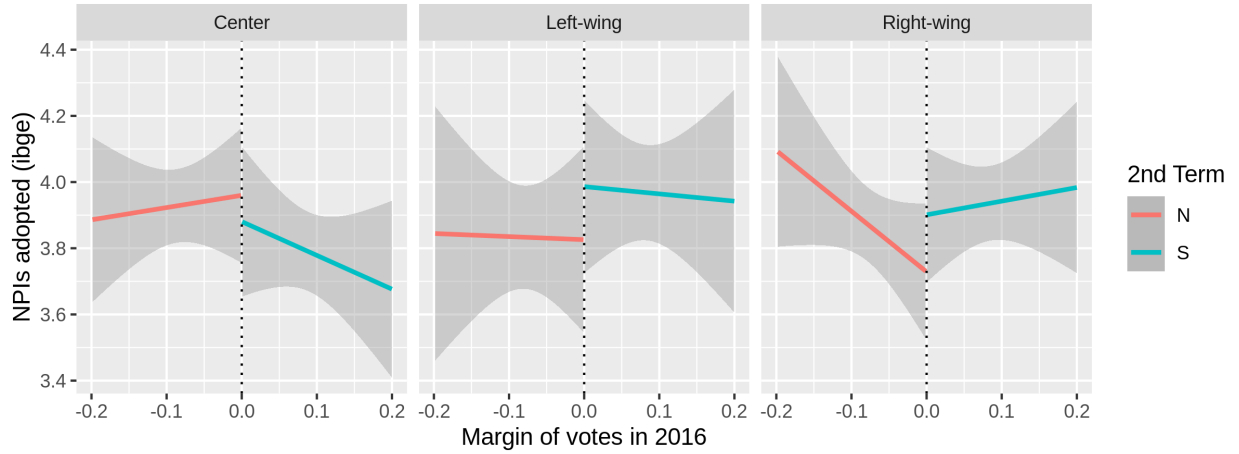
Figure 5: NPI IBGE index (no business closure mandates) around discontinuity.

Figure 5, on its turn, show the discontinuity around the cut-off point pertaining NPIs measured by IBGE, among which there are no business closure mandates. No impact was observed. Finally, Figure 6 indicates that incumbency status does not appear to have impacted the adoption of social relief measures when the full sample is evaluated.

A final validation test consists in comparing the distribution of other variables among the treated (second term mayors) and control groups (first term incumbents). It also serves as descriptive statistics for possible covariates. Table 2 shows that all variables related to the city or the incumbent are well balanced at five percent significance, meaning that there is no need to include covariates in the models.

Figure 6: Social protection policies around discontinuity.
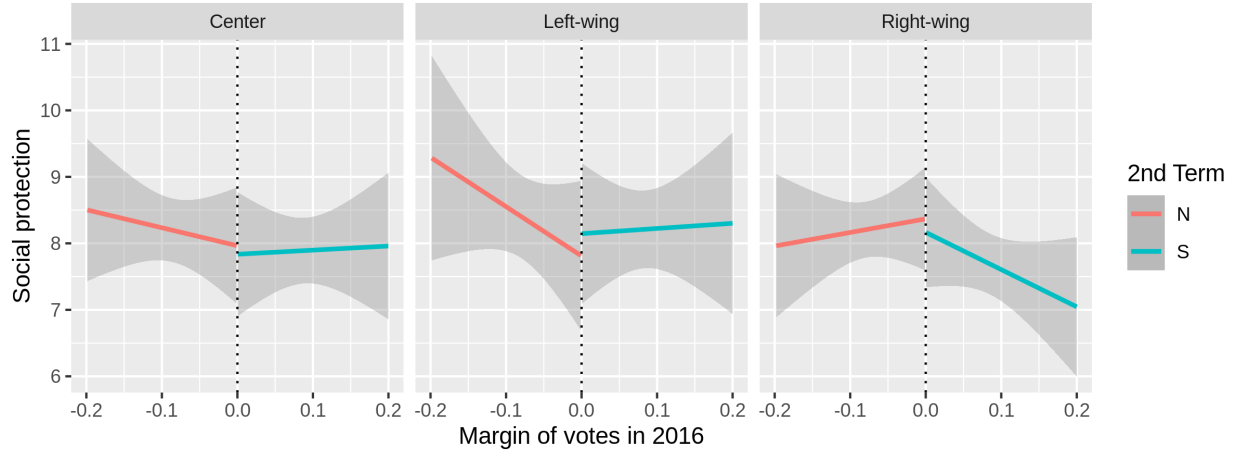
Table 2: Balance Table

		Control			Treated		
Variable	N	Mean	SD	N	Mean	SD	Test
Bolsonaro_share	1176	0.436	0.218	1223	0.462	0.226	F= 7.939***
Ideology	1176			1223			$\chi^2 = 10.847$***
center	445	37.8%		435	35.6%		
right-wing	474	40.3%		450	36.8%		
left-wing	257	21.9%		338	27.6%		
Age	1176	49.389	11.076	1223	49.164	9.811	F= 0.278
Sex	1176			1223			$\chi^2 = 0.533$
Female	141	12%		134	11%		
Male	1035	88%		1089	89%		
Race	1176			1223			$\chi^2 = 1.288$
Yellow	9	0.8%		6	0.5%		
White	832	70.7%		851	69.6%		
Native	2	0.2%		2	0.2%		
Brown	319	27.1%		348	28.5%		
Black	14	1.2%		16	1.3%		
Instruction	1176			1223			$\chi^2 = 8.312$
Elementary	80	6.8%		73	6%		
Elementary incompl	76	6.5%		63	5.2%		
High School	303	25.8%		320	26.2%		
Incomplete HS	33	2.8%		31	2.5%		
Write and read	16	1.4%		7	0.6%		
Superior	595	50.6%		661	54%		
Superior incompl	73	6.2%		68	5.6%		
GDP	1176	1470.865	22547.5	1223	1321.438	5524.774	F= 0.051
Net taxes	1176	213.625	3916.126	1223	185.461	930.929	F= 0.06
Agriculture	1176	57.763	101.75	1223	51.388	86.861	F= 2.731*
Industry	1176	218.017	1883.191	1223	280.778	1394.116	F= 0.865
Services	1176	813.947	15551.9	1223	608.423	2843.169	F= 0.206
Population	1176	38381.76	363917.9	1223	42500.586	170247	F= 0.128

Significance markers: *p<0.1; **p<0.05; ***p<0.01.

It is worth noting that even though there appears to be statically significant differences in the share of right-wing voters and ideology of incumbents, the discrepancies in means and standard deviations are not large. Also, as different specifications of the model separating the dataset according to ideology will be analysed, these facts are not supposed to interfere with the results.

Finally, Table 3 presents the results fo the NPI index obtained with the data collected by de Souza Santos et al. (2021). The RDD estimation indicates that second term mayors adopted stricter policies in comparison to incumbents that could run for reelection. This result becomes clearer when the analysis is performed considering the ideology of the mayor. It then shows that the result was driven only by right-wing mayors, once left-wing and centrist incumbents adopted the same level of NPIs regardless of their ability to run for another term. These results corroborate the hypothesis extracted from the model, showing that right-wing incumbents would possess the strongest electoral incentives to modulate their responses to the pandemics in order following their preferred policy.

The results were obtained using a local linear estimator for discontinuity, a triangular kernel to weight observations around the cutoff and the coefficient was estimated with robust bias-corrected confidence intervals, while optimal bandwidth was selected using minimum squared errors (Calonico et al., 2014, 2019, 2020). The results were the same for other kernels and bandwidths as displayed in Table 8. Table 7 shows placebo tests with different cut-off points, which resulted in non-significant coefficients for all estimations, further strengthening the findings as show in the Appendix A.8.

Next, Table 4 presents the finding for NPI and social protection indices built from the official IBGE survey on measures to contain the pandemics during 2020. It shows that the incumbency effect was not observed in relation to NPIs. However, right-wing incumbents adopted a higher level of social relief measures when running for re-election. Once again, no electoral impact was estimated concerning the policies adopted by left-wing and centrist mayors.

Table 3: Results – y = NPI index

	All ideologies	Right-wing	Left-wing	Centrist
Robust	0.142**	0.259**	0.183	0.026
SD	(0.069)	(0.118)	(0.146)	(0.116)
p-value	(0.041)	(0.028)	(0.210)	(0.823)
Obs. left	494	187	78	165
Obs. right	464	150	95	147

i) Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *iii)* optimal bandwith mserd, local linear estimator, triangular kernel. (*iv*) Mayors' ideology according to their parties.

Table 4: Results – IBGE variables

	y = NPI IBGE			y = social protection		
	Rightwing	Leftwing	Centrist	Rightwing	Leftwing	Centrist
Robust	-0.133	-0.119	-0.075	-2.783***	-0.801	-0.698
SD	(0.234)	(0.308)	(0.204)	(1.017)	(1.087)	(0.896)
p-value	(0.570)	(0.700)	(0.713)	(0.006)	(0.461)	(0.436)
Obs. left	243	146	241	187	153	263
Obs. right	191	154	200	141	169	227

i) Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *iii)* optimal bandwith mserd, local linear estimator, triangular kernel. (*iv*) Mayors' ideology according to their parties.

The next table presents the local average treatment effect for cities where the majority voted for right-wing candidate Jair Bolsonaro ($\mu > 0.5$) or left-wing Fernando Haddad ($\mu leq 0.5$) in the 2018 general elections. It also divides the sample according to the ideology of the incumbent. The results further corroborate the theoretical model. Table 6 shows that right-wing mayors implemented less stringent NPIs only in cities where the majority of voters are right-leaning. Nonetheless, they also implemented a higher level of social protection measures regardless of the municipality's voting profile. Considering the theoretical model and its predictions, the following section will discuss their implications and how they relate to the empirical findings given the available data and the econometrics strategy employed.

Table 5: Results - Ideology of incumbents and voters

y =	Right-leaning cities			Left-leaning cities		
	NPI index	NPI IBGE	social protection	NPI index	NPI IBGE	social protection
Incumbent: right-wing						
Robust	0.498**	0.073	-3.615**	-0.005	-0.400	-2.519**
SD	(0.207)	(0.316)	(1.658)	(0.147)	(0.274)	(1.131)
p-value	(0.016)	(0.817)	(0.029)	(0.972)	(0.145)	(0.026)
Obs. left	82	129	83	59	123	118
Obs. right	66	103	66	40	93	84
Incumbent: left-wing						
Robust	0.381	0.098	-0.985	-0.180	-0.350	-0.552
SD	(0.237)	(0.526)	(1.595)	(0.208)	(0.428)	(1.503)
p-value	(0.107)	(0.852)	(0.537)	(0.386)	(0.413)	(0.713)
Obs. left	24	43	47	51	84	96
Obs. right	32	50	56	64	86	98

i) Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *iii)* optimal bandwith mserd, local linear estimator, triangular kernel. (*iv*) Mayors' ideology according to their parties. (*v*) Ideology of the city is determined by the results of the 2018 presidential election's run-off (cities where Jair Bolsonaro got more than 50% of the votes were labeled as right-leaning.

6 Discussions

Before commenting on results, it is important to discuss a possible caveat that could arise from the complexities of party ideology and its impact on political actors' behavior in Brazil.

Previous studies have highlighted competing pressures that politicians face due to institutional factors and how it influences the commitments with their party's preferred policies. Suggesting that a right-wing politician would follow then-President Bolsonaro's stance on COVID-19 may be a strong assumption.

However, relevant studies suggest that our decision is valid. Hicken and Stoll (2011) argue that presidential elections exert influence especially as they shape the incentives of candidates to coordinate across electoral districts under a common party banner. Additionally, Borges and Lloyd (2016) empirically test a similar hypothesis for Brazil: whether concurrent presidential and gubernatorial elections affect electoral coordination and coattails voting between national and subnational levels of government. Using individual-level survey data and time-series cross-sectional electoral data, they find congruence between national and subnational elections occur when the effective number of presidential candidates is low. The political polarization observed in Brazil before and during the pandemic years ultimately reduced the relevant candidates in the past two elections, indicating that the conditions may hold for such congruence to happen.

Finally and also using data from Brazil, Scheeffer (2018b) demonstrates that ideology still plays a significant role shaping parliamentary behavior, particularly when there is a clear ideological content in the issues being debated. Following these studies and in the context of the current work, we can argue that the ideological difference or proximity between the mayor and the voters might affect municipal policy considering electoral incentives.

However, it should also be stressed that the terminology of right- and left-wing in this study does not imply specific ideas or beliefs associated with each political spectrum. The study does not assume that conservative or liberal ideologies necessarily determine voters' preferences for stricter or looser COVID-19 related policies. Rather, we posit that each political group was invested in a particular stance during the health crisis. That means that incumbent politicians with incentives to signal their ideology must adjust their policies to align with the prevailing position within their political spectrum.

In light of these acknowledgments, our study aimed to analyze the role of mayors' and voters' ideology in shaping COVID policy responses in relation to electoral incentives in Brazil. We argue that the interplay between political ideology, institutional factors, and national and subnational political dynamics could have had implications for policy-making during the pandemic. Even taking into account the limitations and nuances presented in the literature, we propose that our analysis of political ideology is valid.

We now turn our focus back to the predictions and their empirical evaluation. The results show the impact of electoral incentives on the adoption of non-pharmaceutical interventions (NPIs) by incumbent mayors during the COVID-19 pandemic. The theoretical model predicted that left-wing incumbents would adopt NPIs regardless of the electoral context, while right-wing incumbents would be influenced by the beliefs and ideology of voters and their own type of incumbency. The empirical results confirmed these predictions, showing that right-wing incumbents running for reelection adopted less stringent NPIs when business closures are considered. It suggests that they may have followed then-President Bolsonaro's focus on aiming to reduce economic losses resulting from mandates.

However, when only mask mandates and social distancing measures are considered, no electoral impact is observed. This suggests that even if the model indicates that the level of ideology must be higher for the separating equilibrium to be feasible, it applied more to pragmatic matters such as the local economy than to discussions regarding civil liberties. More importantly, the estimations indicated that right-wing incumbents shaped their policies depending on the voter profile. Once again, these results were significant only when the NPIs analyzed included restrictions to non-essential businesses. Two findings base this proposition. First, the local average treatment effect on NPIs measured through the dataset produced by de Souza Santos et al. (2021) showed statistical significance only for cities where the majority of the voters supported the right-wing candidate in the last presidential election. Right-wing incumbents also followed electoral incentives when implementing social protection policies regarding the economic impacts of COVID-19. Nonetheless, in this case, the results presented

statistical significance regardless of the voters' preferences.

The findings suggest that the adoption of NPIs by incumbent mayors was shaped through two channels: i) their own political ideology; and ii) the beliefs and preferences of voters. Right-wing incumbents were found to be sensitive to the beliefs and ideology of voters, who tended to focus more on the negative impacts of NPIs on the local economy. This result can be highlighted by the lack of significant effect when the NPI measure did not include business closures. However, the social protection policies adopted by right-wing mayors seeking reelection were also affected by electoral incentives. Therefore, the results can be regarded as corroborating the second theoretical prediction. The empirical results indicate the importance of considering the incumbent's ideology as well as their preferences between office rent (W) or public policy (A_θ) in analyzing political incentives. The finding that right-wing incumbents running for reelection adopted less stringent NPIs supports the hypothesis that incumbents may act pragmatically while responding to electoral incentives to increase their chances of re-election. It adds another factor to consider, which is not explicitly expressed in previous studies designed to assess the impact of re-election status on public policy.

On the other hand, left-wing and centrist incumbents were similarly likely to adopt NPIs or social assistance policies, notwithstanding their candidacy status. It arguably reflects a broader commitment to public health measures and empirically validates the first prediction. It can also serve as a statement on the polarization around the President's position, given that centrist incumbents reacted in the same way as leftists. It strengthens our choice not to include only two types of incumbents in the theoretical models. The right-wing incumbent reflects, ultimately, those who supported then-President Jair Bolsonaro, while left-wing represents the opposition in a broader sense.

It is important to acknowledge the limitations of the research design and available data. The study used a regression discontinuity design to assess the impact of incumbency on the adoption of NPIs, which provides strong internal validity for the results but only applies

to close elections. Another point to highlight is that the analyses did not directly measure the incumbency effects or the related policies on the spread of the virus. Our decision not to perform regressions evaluating infections and casualties related to COVID-19 was based on the realization that the main contagious wave hit the country just in 2021. Therefore, the results of empirical investigations concerning the impacts of the health crisis based in the first months of the pandemic would be strongly influenced by omitted or non-quantified factors, lending reduced explanatory power to statistical inferences.

Finally, we must emphasize that the target variables were build following surveys performed by academics and by the Bureau of Geography and Statistics. The fact that both datasets present similar descriptive statistics is one step towards strengthening the findings. However, surveys are always subject to several potential biases, such as non-response[22] or desirability[23] bias (Santesso et al., 2020). Further data collection would be needed to confirm and expand the findings of this study and to better understand the impact of political incentives on public health policy during an emergency.

7   Conclusion

This study offers evidence that electoral incentives influenced the policies adopted by incumbent mayors during the COVID-19 pandemic. The theoretical model and empirical analysis demonstrate that right-wing incumbents running for re-election tended to adopt less stringent NPIs in response to voter beliefs and ideology, while left-wing and centrist incumbents implemented NPIs regardless of their re-election prospects. In essence, our research enriches the understanding of the interaction between ideology and policy-making during the COVID pandemic. By recognizing the potential impact of institutional factors, national and subnational political dynamics, and ideological differences on policy responses and electoral

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[22]It was basically null in the IBGE survey, but it was higher in the dataset produced by de Souza Santos et al. (2021).

[23]When respondents answer the questions based on what they think should be the correct answer, not how they actually acted. If that was the case, the NPIs indices would reflect, at least in part, the preferred policy of each incumbent, not necessarily which measures were adopted by the city.

incentives in Brazil, our analysis of political ideology proves to be valid.

These findings emphasize the importance of considering political ideology as well as voter beliefs and preferences when examining political incentives during a crisis. The results contribute to the literature on the impact of incumbency on public policy and offer valuable insights for future investigations in this area. However, subsequent research should strive to address the limitations of the current study and explore additional factors that may influence the relationship between electoral incentives and public health policy. One possible avenue is introducing social media political discourse as a proxy to indicate if the politician is ideological or pragmatic.

In conclusion, this study sheds new lights on the politics of pandemics and highlights the tendency for policymakers to account for electoral incentives when making decisions related to public policy during unexpected circumstances. The findings can guide and inspire future research and policy discussions at the intersection of public health, politics, and health economics to ultimately promote better policy outcomes in the face of public health crisis and other imminent challenges.

References

Abboud, Georges, Maira Scavuzzi, and Ricardo Yamin Fernandes, "Atuação do STF na pandemia da COVID-19. Fine line entre aplicação da Constituição Federal e ativismo judicial," *Revista dos Tribunais— vol*, 2020, *1020* (2020), 77–97.

Ajzenman, Nicolás, Tiago Cavalcanti, and Daniel Da Mata, "More than words: Leaders' speech and risky behavior during a pandemic," *Available at SSRN 3582908*, 2020.

Altiparmakis, Argyrios, Abel Bojar, Sylvain Brouard, Martial Foucault, Hanspeter Kriesi, and Richard Nadeau, "Pandemic politics: policy evaluations of government responses to COVID-19," *West European Politics*, 2021, *44* (5-6), 1159–1179.

Baccini, Leonardo, Abel Brodeur, and Stephen Weymouth, "The COVID-19 pandemic and the 2020 US presidential election," *Journal of population economics*, 2021, *34*, 739–767.

Bel, Germà, Óscar Gasulla, and Ferran A Mazaira-Font, "The effect of health and economic costs on governments' policy responses to COVID-19 crisis under Incomplete Information," *Public Administration Review*, 2021, *81* (6), 1131–1146.

Besley, Timothy and Anne Case, "Incumbent behavior: Vote seeking, tax setting and yardstick competition," 1992.

_ **and** _ , "Does electoral accountability affect economic policy choices? Evidence from gubernatorial term limits," *The Quarterly Journal of Economics*, 1995, *110* (3), 769–798.

Boas, Taylor C and F Daniel Hidalgo, "Controlling the airwaves: Incumbency advantage and community radio in Brazil," *American Journal of Political Science*, 2011, *55* (4), 869–885.

Bol, Damien, Marco Giani, André Blais, and Peter John Loewen, "The effect of COVID-19 lockdowns on political support: Some good news for democracy?," *European journal of political research*, 2021, *60* (2), 497–505.

Borges, André and Lucio Rennó, "Brazilian response to COVID-19: polarization and conflict," *COVID-19's political challenges in Latin America*, 2021, pp. 9–22.

_ **and Ryan Lloyd**, "Presidential coattails and electoral coordination in multilevel elections: comparative lessons from Brazil," *Electoral Studies*, 2016, *43*, 104–114.

Brambor, Thomas and Ricardo Ceneviva, "Incumbency advantage in Brazilian mayoral elections," in "APSA 2011 Annual Meeting Paper" 2011.

Brasil, *Constituição da República Federativa*, Congresso Nacional, Brasília, DF, 1988.

Bruce, Raphael, Alexsandros Cavgias, Luis Meloni, and Mário Remígio, "Under pressure: Women's leadership during the COVID-19 crisis," *Journal of development economics*, 2022, *154*, 102761.

Calonico, Sebastian, Matias D Cattaneo, and Max H Farrell, "Optimal bandwidth choice for robust bias-corrected inference in regression discontinuity designs," *The Econometrics Journal*, 2020, *23* (2), 192–210.

_ , _ , **and Rocio Titiunik**, "Robust nonparametric confidence intervals for regression-discontinuity designs," *Econometrica*, 2014, *82* (6), 2295–2326.

_ , _ , **Max H Farrell, and Rocio Titiunik**, "Regression discontinuity designs using covariates," *Review of Economics and Statistics*, 2019, *101* (3), 442–451.

Carey, John M, "Competing principals, political institutions, and party unity in legislative voting," *American Journal of Political Science*, 2007, *51* (1), 92–107.

Castro, Marcia C, Sun Kim, Lorena Barberia, Ana Freitas Ribeiro, Susie Gurzenda, Karina Braga Ribeiro, Erin Abbott, Jeffrey Blossom, Beatriz Rache, and Burton H Singer, "Spatiotemporal pattern of COVID-19 spread in Brazil," *Science*, 2021, *372* (6544), 821–826.

Cattaneo, Matias D., Brigham R. Frandsen, and Rocío Titiunik, "Randomization Inference in the Regression Discontinuity Design: An Application to Party Advantages in the U.S. Senate," *Journal of Causal Inference*, 2015, *3* (1), 1–24.

Chmel, Kirill, Aigul Klimova, and Nikita Savin, "Saving lives or saving the economy? Support for the incumbent during the COVID-19 pandemic in Russia," *Post-Soviet Affairs*, 2023, pp. 1–17.

da Silva Tarouco, Gabriela and Rafael Machado Madeira, "Os partidos brasileiros segundo seus estudiosos: análise de um expert survey," *Civitas-Revista de Ciências Sociais*, 2015, *15*, e24–e39.

de Souza Santos, Andreza Aruska, Darlan da Silva Candido, William Marciel de Souza, Lewis Buss, Sabrina L Li, Rafael HM Pereira, Chieh-Hsi Wu, Ester C Sabino, and Nuno R Faria, "Dataset on SARS-CoV-2 non-pharmaceutical interventions in Brazilian municipalities," *Scientific data*, 2021, *8* (1), 1–6.

deBenedictis Kessner, Justin, "Off-cycle and out of office: Election timing and the

incumbency advantage," *The Journal of Politics*, 2018, *80* (1), 119–132.

DelaCuesta, Brandon and Kosuke Imai, "Misunderstandings about the regression discontinuity design in the study of close elections," *Annual Review of Political Science*, 2016, *19*, 375–396.

DeMagalhaes, Leandro, "Incumbency Effects in a Comparative Perspective: Evidence from Brazilian Mayoral Elections," *Political Analysis*, 2015, *23* (1), 113–126.

Dewan, Torun and Kenneth A Shepsle, "Political economy models of elections," *Annual Review of Political Science*, 2011, *14*, 311–330.

Downs, Anthony et al., "An economic theory of democracy," 1957.

Eggers, Andrew C, Anthony Fowler, Jens Hainmueller, Andrew B Hall, and James M Snyder Jr, "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*, 2015, *59* (1), 259–274.

Engler, Sarah, Palmo Brunner, Romane Loviat, Tarik Abou-Chadi, Lucas Leemann, Andreas Glaser, and Daniel Kübler, "Democracy in times of the pandemic: explaining the variation of COVID-19 policies across European democracies," *West European Politics*, 2021, *44* (5-6), 1077–1102.

Erikson, Robert S, Rocío Titiunik et al., "Using regression discontinuity to uncover the personal incumbency advantage," *Quarterly Journal of Political Science*, 2015, *10* (1), 101–119.

Ferejohn, John, "Incumbent performance and electoral control," *Public choice*, 1986, pp. 5–25.

_ , "Theory of Political Accountability," *Democracy, accountability, and representation*, 1999, *2*, 131.

Ferigato, Sabrina, Michelle Fernandez, Melania Amorim, Ilana Ambrogi, Luísa MM Fernandes, and Rafaela Pacheco, "The Brazilian Government's mistakes in responding to the COVID-19 pandemic," *The Lancet*, 2020, *396* (10263), 1636.

Ferraresi, Massimiliano, Christos Kotsogiannis, Leonzio Rizzo, and Riccardo Secomandi, "The 'Great Lockdown'and its determinants," *Economics letters*, 2020, *197*, 109628.

Ferraz, Claudio and Frederico Finan, "Electoral accountability and corruption: Evidence from the audits of local governments," *American Economic Review*, 2011, *101* (4), 1274–1311.

Finan, Frederico and Maurizio Mazzocco, "Electoral incentives and the allocation of public funds," *Journal of the European Economic Association*, 2021, *19* (5), 2467–2512.

Franzese-Jr, Robert J, "Electoral and partisan cycles in economic policies and outcomes," *Annual review of political science*, 2002, *5* (1), 369–421.

Frenkel, Sivan, "Competence and ambiguity in electoral competition," *Public Choice*, 2014, *159* (1), 219–234.

Giommoni, Tommaso and Gabriel Loumeau, "Lockdown and voting behaviour: A natural experiment on postponed elections during the COVID-19 pandemic," *Covid Economics*, 2020, p. 69.

Heidhues, Paul and Johan Lagerlöf, "Hiding information in electoral competition," *Games and Economic Behavior*, 2003, *42* (1), 48–74.

Hicken, Allen and Heather Stoll, "Presidents and parties: How presidential elections

shape coordination in legislative elections," *Comparative Political Studies*, 2011, *44* (7), 854–883.

Hyytinen, Ari, Jaakko Meriläinen, Tuukka Saarimaa, Otto Toivanen, and Janne Tukiainen, "When does regression discontinuity design work? Evidence from random election outcomes," *Quantitative Economics*, 2018, *9* (2), 1019–1051.

Justo, Ana Maria, Andréa Barbará da Silva Bousfield, Andréia Isabel Giacomozzi, and Brigido Vizeu Camargo, "Communication, social representations and prevention-information polarization on COVID-19 in Brazil," *Papers on Social Representations*, 2020, *29* (2), 4–1.

Kavakli, Kerim Can, "Did populist leaders respond to the COVID-19 pandemic more slowly? Evidence from a global sample," *Unpublished manuscript, Covid crisis Lab, Bocconi University, Milano*, 2020.

Klašnja, Marko and Rocío Titiunik, "The incumbency curse: Weak parties, term limits, and unfulfilled accountability," *American Political Science Review*, 2017, *111* (1), 129–148.

Lancet, The, "COVID-19 in Brazil:"So what?"," *Lancet (London, England)*, 2020, *395* (10235), 1461.

Lasco, Gideon, "Medical populism and the COVID-19 pandemic," *Global Public Health*, 2020, *15* (10), 1417–1429.

Lee, David S, "Randomized experiments from non-random selection in US House elections," *Journal of Econometrics*, 2008, *142* (2), 675–697.

Leininger, Arndt and Max Schaub, "Voting at the dawn of a global pandemic," 2020.

Lizzeri, Alessandro and Nicola Persico, "The provision of public goods under alternative electoral incentives," *American Economic Review*, 2001, *91* (1), 225–239.

Menezes-Filho, Naercio and Bruno Kawaoka Komatsu, "Mayoral Incumbency Effects on Municipal Policies against COVID-19," *Centro de Gestão e Políticas Públicas*, 2021.

Norheim, Ole F, Joelle M Abi-Rached, Liam Kofi Bright, Kristine Bærøe, Octávio LM Ferraz, Siri Gloppen, and Alex Voorhoeve, "Difficult trade-offs in response to COVID-19: the case for open and inclusive decision making," *Nature Medicine*, 2021, *27* (1), 10–13.

Novaes, Lucas M and Luis Schiumerini, "Commodity Shocks and Incumbency Effects," *British Journal of Political Science*, 2021, pp. 1–20.

Owen, Erica, "Foreign direct investment and elections: the impact of greenfield FDI on incumbent party reelection in Brazil," *Comparative Political Studies*, 2019, *52* (4), 613–645.

Peci, Alketa, Camilo Ignacio González, and Mauricio I Dussauge-Laguna, "Presidential policy narratives and the (mis) use of scientific expertise: COVID-19 policy responses in Brazil, Colombia, and Mexico," *Policy Studies*, 2023, *44* (1), 68–89.

Petherick, Anna, Rafael Goldszmidt, Beatriz Kira, and Lorena Barberia, "Do Brazil's COVID-19 government response measures meet the WHO's criteria for policy easing?," 2020.

Pulejo, Massimo and Pablo Querubín, "Electoral concerns reduce restrictive measures during the COVID-19 pandemic," *Journal of Public Economics*, 2021, *198*, 104387.

Rattinger, Hans, "Unemployment and elections in West Germany," *Economics and politics: the calculus of support*, 1991, pp. 49–62.

Razin, Ronny, "Signaling and election motivations in a voting model with common values

and responsive candidates," *Econometrica*, 2003, *71* (4), 1083–1119.

Santesso, Nancy, Angela M Barbara, Rakhshan Kamran, Sita Akkinepally, John Cairney, Elie A Akl, and Holger J Schünemann, "Conclusions from surveys may not consider important biases: a systematic survey of surveys," *Journal of Clinical Epidemiology*, 2020, *122*, 108–114.

Scheeffer, Fernando, *Esquerda e direita hoje: uma análise das votações na Câmara dos Deputados*, Appris Editora e Livraria Eireli-ME, 2018.

_ , "Ideologia e comportamento parlamentar na Câmara dos Deputados," *Teoria & Pesquisa: Revista de Ciência Política*, 2018, *27* (2).

Schettini, Bernardo P and Rafael Terra, "Electoral incentives and Public Employees' Retirement Systems in Brazilian municipalities," *Public Choice*, 2020, *184* (1), 79–103.

Shvetsova, Olga, Julie VanDusky-Allen, Andrei Zhirnov, Abdul Basit Adeel, Michael Catalano, Olivia Catalano, Frank Giannelli, Ezgi Muftuoglu, Dina Rosenberg, Mehmet Halit Sezgin et al., "Federal institutions and strategic policy responses to COVID-19 pandemic," *Frontiers in Political Science*, 2021, *3*, 631363.

Song, BK, "Estimating incumbency effects using regression discontinuity design," *Research & Politics*, 2018, *5* (4), 2053168018813446.

Touchton, Michael, Felicia Marie Knaul, Héctor Arreola-Ornelas, Thalia Porteny, Mariano Sánchez, Oscar Méndez, Marco Faganello, Vaugh Edelson, Benjamin Gygi, Calla Hummel et al., "A partisan pandemic: state government public health policies to combat COVID-19 in Brazil," *BMJ global health*, 2021, *6* (6), e005223.

Vries, Catherine E De, Bert N Bakker, Sara B Hobolt, and Kevin Arceneaux, "Crisis signaling: how Italy's coronavirus lockdown affected incumbent support in other European countries," *Political Science Research and Methods*, 2021, *9* (3), 451–467.

Wasserman, David, Govind Persad, and Joseph Millum, "Setting priorities fairly in response to COVID-19: identifying overlapping consensus and reasonable disagreement," *Journal of Law and the Biosciences*, 2020, *7* (1), lsaa044.

Williams, Caitlin R, Jocelyn Getgen Kestenbaum, and Benjamin Mason Meier, "Populist nationalism threatens health and human rights in the COVID-19 response," 2020.

A   Appendix

In this appendix, we offer proof of the results stated in sections 3.5

A.1   Proof of proposition 1

In order to proof proposition 1, let us state the first lemma.

Lemma 2. *Condition* (7) *holds for left-wing incumbents where A_L and W are positive, $F(\cdot)$ has support on the interval $[0, 0.5)$, and $\mu \in (0, 1)$.*

Proof. First, let's analyze the function $g(\mu) = \frac{2\mu-1}{2\mu}$. As μ varies in $(0, 1)$, the range of $g(\mu)$ will be:

$$\lim_{\mu \to 0^+} g(\mu) = -\infty, \quad \lim_{\mu \to 1^-} g(\mu) = 1. \tag{18}$$

Now, let's find the maximum value of the function inside the inequality (7). We have the function:

$$h(\mu) = 2F\left(g(\mu)\right) - 1. \tag{19}$$

The maximum value of $h(\mu)$ occurs when $F(g(\mu))$ is at its maximum, i.e., $F(g(\mu)) = 0.5$. This gives us:

$$\max_{\mu \in (0,1)} h(\mu) = 2(0.5) - 1 = 0. \tag{20}$$

Now, given that A_L and W are positive, we have:

$$\frac{A_L}{W} > 0 \geq \max_{\mu \in (0,1)} h(\mu). \tag{21}$$

Thus, the inequality (7) holds for all $\mu \in (0, 1)$, given that A_L and W are positive, and $F(\cdot)$ has support on the interval $[0, 0.5)$. ∎

Continuing, we demonstrate that condition (6) holds for ideological right-wing incumbents.

Lemma 3. *A sufficient but not necessary condition for the inequality* (6) *to hold is $A_R > W$.*

Proof. Recall the function $g(\mu) = \frac{2\mu-1}{2\mu}$ analyzed in the previous proof. As μ varies in $(0, 1)$, the range of $g(\mu)$ will be $(-\infty, 1]$ according to (18).

Now, consider the function inside the inequality (6):

$$k(\mu) = 1 - 2F\left(g(\mu)\right). \tag{22}$$

We can see that the maximum value of $k(\mu)$ occurs when $F(g(\mu))$ is at its minimum, i.e., $F(g(\mu)) = 0$. This gives us:

$$\max_{\mu \in (0,1)} k(\mu) = 1 - 2(0) = 1. \tag{23}$$

We have shown that the maximum value of the function $k(\mu)$ is 1. If $A_R > W$, then we have:

$$\frac{A_R}{W} > 1 \geq \max_{\mu \in (0,1)} k(\mu). \tag{24}$$

Thus, if $A_R > W$, the inequality (6) holds for all $\mu \in (0, 1)$, given that $F(\cdot)$ has support on the interval $[0, 0.5)$. This proves that a sufficient but not necessary condition for (6) to be true is $A_R > W$. ■

Therefore, we have formally demonstrated the validity of proposition 1.

A.2 Proof of proposition 2

To proof proposition 2, we must show that either conditions (9) or (10) will not hold. It is the case for the latter.

Theorem 4. *The condition* (10) *does not hold.*

Proof. First, let us restate that $F(\cdot)$ has support on the interval $[0, 0.5)$, A_L and W are positive, and $\mu \in (0, 1)$. Then, we can analyze the right-hand side of condition (10):

$$2F\left(\frac{1 - 2\mu}{2(1 - \mu)}\right) - 1. \tag{25}$$

Note that the function $F(\cdot)$ is defined on the interval $[0, 0.5)$. Given that its maximum value is 0.5, it implies that the maximum value of the right-hand side of condition (10) is $2(0.5) - 1 = 0$.

Considering that both A_L and W are positive, we have:

$$\frac{A_L}{W} > 0. \tag{26}$$

As the maximum value of the right-hand side of condition (10) is zero and the left-hand side is strictly positive, the condition (10) can not hold. ■

A.3 Proof of proposition 3

To show that proposition 3 is valid, the following conditions must be demonstrated to hold:

$$\frac{A_R}{W} \leq 1 - F(\psi_p) - F(\psi_q), \frac{A_L}{W} \geq F(\psi_p) + F(\psi_q) - 1.$$

First we analyze the condition for the left-wing incumbent to maintaing the equilibrium.

Lemma 5. *Condition* (14) *always holds for left-wing incumbents.*

Proof. Given that $F(\cdot)$ is defined in the interval $[0, 0.5)$, it implies that:

$$0 \leq (F(\psi_p), F(\psi_q)) < 0.5. \tag{27}$$

Considering the extreme case where both $F(\psi_p)$ and $F(\psi_q)$ are at their maximum value (which is still less than 0.5), we have:

$$F(\psi_p) + F(\psi_q) - 1 < 0.5 + 0.5 - 1 = 0. \tag{28}$$

As both A_L and W are positive:

$$\frac{A_L}{W} > 0. \tag{29}$$

Thus, we have:

$$\frac{A_L}{W} > 0 > F(\psi_p) + F(\psi_q) - 1, \tag{30}$$

showing that condition (14) always holds for left-wing incumbents. $\blacksquare$

Lemma 6. *Condition* (13) *does not hold for ideological right-wing incumbents.*

Proof. Given that $F(\cdot)$ is defined in the interval $[0, 0.5)$, it implies that inequality (27) is true.

Considering the extreme case where both $F(\psi_p)$ and $F(\psi_q)$ are at their minimum value (0), we have:

$$1 - F(\psi_p) - F(\psi_q) = 1 - 0 - 0 = 1, \tag{31}$$

which represents the maximum value the right hand-side of condition (13) can achieve.

For ideological right-wing incumbents, $A_R > W$. In this case, the left-hand side of condition (13) is always greater than 1:

$$\frac{A_R}{W} > 1. \tag{32}$$

It was shown that the maximum value of the right-hand side of condition (13) is 1, thus condition (13) never holds for ideological right-wing incumbents. $\blacksquare$

Lemma 7. *Condition* (13) *can hold for pragmatic right-wing incumbents.*

Proof. Once again, the result is based on (27). For pragmatic right-wing incumbents, $A_R \leq W$. In this case, the left-hand side of condition (13) can be less than or equal to 1:

$$0 < \frac{A_R}{W} \leq 1. \tag{33}$$

As the maximum value of the right-hand side of condition (13) is 1, there exists a range of A_R and W values such that the inequality holds for pragmatic right-wing incumbents. Furthermore, there are combinations of parameters $(\mu, p, q) \in (0, 1)$ such that result in $F(\psi_p)$ and $F(\psi_q)$ satisfy condition (13) if equation (33) is valid. $\blacksquare$

Combining these lemmas implies that proposition 3 is true.

A.4   Proof of proposition 4

Scenario (i): Let's assume $q > 0.5$, $\mu > 0.5 + \epsilon$, and $p < 0.5 - \epsilon$ for some $\epsilon > 0$. Recall that:

$$\psi_p = \frac{1/2 - (p\mu + (1-p)(1-\mu))}{1 - (p\mu + (1-p)(1-\mu))}, \psi_q = \frac{2(q\mu + (1-q)(1-\mu)) - 1}{2(q\mu + (1-q)(1-\mu))}. \tag{34}$$

We need to show that under these conditions it exists situations where the inequality in condition (13) can hold. It means that there are situations where the pragmatic right-wing incumbent does not defect.

Proof. Suppose $q > \frac{1}{2}$. Without loss of generality, let $q = \frac{1}{2} + \epsilon$ for some $\epsilon > 0$. We define $\mu = \frac{1}{2} + \epsilon$ and $p = \frac{1}{2} - \epsilon$, and assume $q, \mu \in (0.5, 1)$ and $p \in (0, 0.5)$ such that $\epsilon \in (0, 0.5)$. Next, substituting the values of q, μ and p into ψ_p and ψ_q results in:

$$\psi_p = \frac{^1\!/_2 - ((\frac{1}{2} - \epsilon)(\frac{1}{2} + \epsilon) + (\frac{1}{2} + \epsilon)(\frac{1}{2} - \epsilon))}{1 - ((\frac{1}{2} - \epsilon)(\frac{1}{2} + \epsilon) + (\frac{1}{2} + \epsilon)(\frac{1}{2} - \epsilon))} = \frac{-2\epsilon}{1 - 2\epsilon},$$

and:

$$\psi_q = \frac{2((\frac{1}{2} + \epsilon)(\frac{1}{2} + \epsilon) + (\frac{1}{2} - \epsilon)(\frac{1}{2} - \epsilon)) - 1}{2((\frac{1}{2} + \epsilon)(\frac{1}{2} + \epsilon) + (\frac{1}{2} - \epsilon)(\frac{1}{2} - \epsilon))} = \frac{2\epsilon}{1 + 2\epsilon}.$$

Substituting these values into the inequality, we have:

$$\frac{A_R}{W} \leq 1 - F(\psi_p) - F(\psi_q)$$
$$= 1 - F\left(\frac{-2\epsilon}{1 - 2\epsilon}\right) - F\left(\frac{2\epsilon}{1 + 2\epsilon}\right)$$

If we denote $F\left(\frac{2\epsilon}{1+2\epsilon}\right) \equiv F(x)$ it would imply that $F\left(\frac{-2\epsilon}{1-2\epsilon}\right) = -F(x)$. We can then use the fact that $F(\cdot)$ is continuously defined on $[0, 0.5)$, to get:

$$\frac{A_R}{W} \leq 1 + F\left(\frac{-2\epsilon}{1 - 2\epsilon}\right) - F\left(\frac{2\epsilon}{1 + 2\epsilon}\right) \leq 1,$$

which proofs that the condition holds for some $\epsilon \in (0, 0.5)$ if $A_R \leq W$. Therefore, pragmatic right-wing incumbents can maintain the equilibrium in those situations if $\mu \geq 0.5 + \epsilon$ and $p \leq 0.5 - \epsilon$. ∎

The same result can be obtained for $q = \frac{1}{2} - \epsilon$, $\mu = \frac{1}{2} + \epsilon$, and $p = \frac{1}{2} - \epsilon$, assuming $q, \mu \in (0, 0.5)$ and $p \in (0.5, 1)$, $\epsilon \in (0, 0.5)$ if $\mu \leq 0.5 - \epsilon$ and $p \geq 0.5 + \epsilon$. As it portrays the scenario (*ii*) in Proposition 4, it completes the proof of its validity when combined with Lemma 5.

A.5 Proof of proposition 5

In order to proof proposition 5, it suffices to show that of the following conditions does not hold:

$$\frac{A_R}{W} \geq 1 - F(\omega_p) - F(\omega_z), \frac{A_L}{W} \leq F(\omega_p) + F(\omega_q) - 1.$$

The next theorem demonstrates that the left-wing incumbent always defects.

Theorem 8. *Condition* (16) *does not hold.*

Proof. Given that $F(\cdot)$ is defined in the interval $[0, 0.5)$, it implies that:

$$0 \leq (F(\omega_p), F(\omega_q)) < 0.5. \tag{35}$$

Considering the extreme case where both $F(\omega_p)$ and $F(\omega_q)$ are at their maximum value

(0.5), we have:

$$F(\omega_p) + F(\omega_q) - 1 < 0.5 + 0.5 - 1 = 0. \tag{36}$$

As both A_L and W are positive:

$$\frac{A_L}{W} > 0. \tag{37}$$

Thus, we have:

$$\frac{A_L}{W} < F(\psi_p) + F(\psi_q) - 1 < 0, \tag{38}$$

which directly contradicts (37). This shows that condition (16) never holds for left-wing incumbents, thus completing this proof. ∎

A.6   Results - Centrist incumbent

Table 6: Results - Ideology of incumbents and voters

y =	*Right-leaning cities*			*Left-leaning cities*		
	NPI index	NPI IBGE	social protection	NPI index	NPI IBGE	social protection
Incumbent: centrist						
Robust	0.169	-0.166	-1.534	-0.313	0.059	-0.495
SD	(0.130)	(0.255)	(1.360)	(0.263)	(0.304)	(1.732)
p-value	(0.192)	(0.515)	(0.259)	(0.234)	(0.847)	(0.775)
Obs. left	108	133	123	42	83	100
Obs. right	114	139	119	33	55	63

i) Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *iii)* optimal bandwith mserd, local linear estimator, triangular kernel. (*iv*) Mayors' ideology according to their parties. (*v*) Ideology of the city is determined by the results of the 2018 presidential election's run-off (cities where Jair Bolsonaro got more than 50% of the votes were labeled as right-leaning.

A.7   Placebo Tests

Table 7: Placebo tests

	y = NPI index, sample = rightwing incumbent			
	c = -0.15	c = 0.15	c = -0.1	c = 0.1
Robust	-0.345	-0.040	-0.309*	-0.083
SD	(0.248)	(0.177)	(0.176)	(0.099)
p-value	(0.165)	(0.820)	(0.079)	(0.401)
Obs. left	34	127	48	113
Obs. right	86	66	97	60

i) Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *iii)* optimal bandwith mserd, local linear estimator, triangular kernel.

A.8   Robustness checks

Table 8: Robustness checks

	y = NPI index, sample = rightwing incumbent			
	kernel = uniform	kernel = epanechnikov	bw = cerrd	bw = 0.2
Robust	0.302**	0.267**	0.282**	0.205**
SD	(0.121)	(0.118)	(0.125)	(0.087)
p-value	(0.013)	(0.024)	(0.024)	(0.019)
Obs. left	150	177	150	332
Obs. right	108	140	111	286
kernel	Uniform	Epanechnikov	Triangular	Triangular
bwselect	mserd	mserd	cerrd	Manual

Notes: *i)* Significance markers: *p<0.1; **p<0.05; ***p<0.01; *ii)* covariates representing state fixed-effects; *(iii)* Mayors' ideology according to their parties.

A.9 Optimum Bandwidth Selection Algorithms

Table 9: Estimated Bandwidths

	BW est. (h)		BW bias (b)	
mserd	0.176	0.176	0.329	0.329
msetwo	0.183	0.189	0.311	0.394
msesum	0.188	0.188	0.348	0.348
msecomb1	0.176	0.176	0.329	0.329
msecomb2	0.183	0.188	0.329	0.348
cerrd	0.122	0.122	0.329	0.329
certwo	0.126	0.130	0.311	0.394
cersum	0.130	0.130	0.348	0.348
cercomb1	0.122	0.122	0.329	0.329
cercomb2	0.126	0.130	0.329	0.348

Notes: triangular kernel.