Who Cares if Candidates are Competent*

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Abstract

Voters evaluate candidates along ideological and non-ideological dimensions, but a median voter's exact ideological position can be hard to predict, even for candidates. Moreover, uncertainty about voter preferences is more pronounced in some electoral districts than others. We develop a novel theory of ideological electoral competition where candidates anticipate their median voter's ideological position using their district's partisan *leaning*, a signal of the median voter's ideological position, and where extreme leanings are more informative than more centrist leanings. We show that this leads to an endogenously determined distinction between "extreme" and "centrist" districts, where platform competition is qualitatively different. We develop a number of theoretical results which we evaluate using data from Brazilian mayoral elections. We find that, pre-COVID-19, platform polarization is higher in more centrist cities. Using a difference-in-differences design we then show that COVID-19 leads to increased political polarization in Brazil, which is concentrated in extreme municipalities.

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In the United States there is little (to no) uncertainty in any election cycle regarding whether Democrat Nancy Pelosi, who currently represents California district 11 comprising about 80% of San Francisco, will defeat her Republican challenger (frequently John Dennis). This is because San Francisco is comprised of voters whose ideological preferences lean heavily and consistently left—and this is a commonly known fact. Indeed, Pelosi secured around 84% of the vote in 2022 (against John Dennis). Not all electoral districts are so predictable. Bury North in Greater Manchester is the most marginal constituency in the United Kingdom, where Conservative James Daly won by 105 votes in 2019. Bury North has consistently switched between Labour and Conservatives since the 1990s. Many constituencies around the world fall somewhere between these two extremes, and every democracy exhibits considerable variation across districts regarding how well candidates know (or can predict) the ideological preferences of their voters.

Electorates whose ideological preferences are well known tend to be more ideologically extreme (like San Francisco), and those exhibiting greater uncertainty over voters' positions tend to be fairly moderate (like Bury North). More specifically, the more *extreme* a district leans, the more *precisely* candidates can forecast the ideological preferences of their median voter. This suggests that a district's ideological *leaning* provides a signal of the median voter's position, and importantly, as that leaning becomes more extreme, the variance of that signal lessens. Despite being simple and intuitive, this feature distinguishing different electoral districts remains unexplored by existing theories of electoral competition, where the magnitude of uncertainty about voter ideological preferences has no relationship to the expected position of the voter (Dewan and Shepsle, 2011; Duggan, 2005).

In this article, we show that the type of uncertainty described above has important implications for the nature of electoral competition, including the polarization of campaign platforms. We do so by first developing a novel theory of electoral competition between two policy-motivated candidates, one whose preferred policy is on the left while the other's is on the right. In our model, candidates choose their policy platforms while unsure about two things. First,

the competence of candidates is subject to a shock during the campaign. Because of this, candidates are unsure who will enjoy a non-ideological advantage come election time (similar to valence). Second, candidates do not know their voters' exact policy preferences. Instead, and novel to our model, candidates only know their district's *leaning*, which serves as a signal of the voter's true ideological position (ideal point), but whose precision varies considerably with the district's leaning. The representative voter in our model cares both about ideology (or policy) as well as the competence of their representative, a quality independent from ideological concerns. We call the weight the voter places on competence (relative to ideology) the *salience of competence*.

We present three theoretical results that focus on the ideological platforms candidates choose. First, we show that districts are divided endogenously into two categories, that we label "extreme" and "centrist," which differ in what motivates campaign competition. We show that electoral competition in relatively extreme districts is primarily driven by uncertainty over a competence gap between candidates. In particular, because the voter's ideal point is relatively well known, candidates rely on a potentially favorable shock to their competence to choose a more extreme ideological policy. By contrast, in relatively centrist districts, electoral competition is primarily driven by uncertainty about the location of the representative voter. In such districts, candidates leverage the likelihood that the voter's true ideal point will be closer to their chosen policy position. Our second result focuses on campaign polarization and shows that when competence has low salience among voters, polarization driven by uncertainty about the location of the voter is lower than that driven by competence.

Our last theoretical result considers how average platform polarization changes with the salience of competence. This is important since polarization measures the extent to which candidates respond to voters' interests (Bernhardt, Duggan, and Squintani, 2009; Graham and Svolik, 2020; Matakos, Troumpounis, and Xefteris, 2016). Because we apply our model's results to data, rather than focusing on the relationship between platform polarization and the salience of competence in a single district, we need to present results that address the *av-*

erage level of polarization across districts. Otherwise, the estimand of our empirical analysis would not be *commensurate* with our model's empirical implications (Bueno de Mesquita and Tyson, 2020).[1] We show that average polarization across districts increases in the salience of competence. By focusing on average polarization, our model identifies how an increase in the salience of competence influences polarization along an intensive and extensive margin. Along the intensive margin, increasing the salience of competence reduces the marginal benefit of moderating, leading to greater polarization in extreme districts. By contrast, the intensive margin is zero in centrist districts because, despite the increase in relative voter demand for competence, uncertainty about the voter's position remains the primary focus of candidates. Along the extensive margin, when voters care more about competence, more districts compete over it, causing an increase in the share of extreme districts. Taken together, increased salience of competence leads the intensive and extensive margins to reinforce each other, thus producing greater polarization.

We take our theoretical results to the data in the context of the mayoral elections of 2012, 2016, and 2020 in the 95 largest Brazilian cities, where elections are run in a two-round (runoff) system. To isolate the effect of a change in the salience of competence, and therefore directly relate to one of our main theoretical results, we use the timing of the COVID-19 pandemic in relation to Brazil's electoral calendar. We argue that the pandemic created a natural experiment: the pre-scheduled 2020 elections happened in November 2020, precisely between the first and second waves of infection. The Supreme Court of Brazil (STF) also ruled that mayors had autonomy to implement their own measures to contain the spread of COVID-19, even at odds with federal and state guidance. In this context, anecdotal evidence from both the press and local experts suggests that the competence of local candidates became highly salient to voters in the election. We also provide evidence to this effect from "ballot names" of local candidates, which are typically used to signal competence to voters (Boas, 2014).

Brazilian municipalities also provide an ideal setting to evaluate our model's implications

[1] Specifically, there would not be a clear connection between the actual empirical quantity that we measure and the corresponding theoretical object in our model.

because public policy implementation is highly decentralized, and mayors—-particularly in large cities—are in charge of spending on services such as health care, education, social assistance, sanitation, transportation, infrastructure, and even (more recently) public security. This diverse portfolio of policy responsibilities creates significant variation in campaign platforms.

What is more, policy positions in Brazilian municipalities can be precisely measured. All candidates for executive office are required to disclose a document with their campaign platforms for different policy areas before the election. Moreover, the *Finanças do Brasil*'s (FINBRA) dataset of local finances allows us to observe which policy areas concentrate most of the actual spending in municipalities. We combine these two data sources to transparently estimate polarization in the platforms of the top two mayoral candidates, in several policy areas, without any assumptions about (i) their personal or party ideologies; (ii) the importance of policy areas; or (iii) the ideological content of the documents themselves. Our main polarization measure is based on a "bag-of-words" approach (described below).[2] In that, we also add to a vast literature on empirical measures of ideological positions and polarization, which has used measures based on a variety of sources such as court decisions (Clark, 2009), roll call voting (Poole and Rosenthal, 2000), campaign contributions (Bonica, 2013), candidate manifestos (Catalinac, 2018), and legislator speeches (Motolinia, 2021).

District leaning is a key ingredient in our theory, and it introduces a novel way in which electoral competition differs across districts. Our empirical proxy for local leaning is based on the past presidential vote shares in each municipality, which is an ideal measure because it is highly polarized on the Left-Right scale; extremely stable across elections within municipalities; and a good predictor of the leaning of voters in mayoral races. There is also significant heterogeneity in the leaning of the decisive voter across cities. Consider, for example, Florianópolis, a state capital of 500,000 people. This is a Right-leaning city where the leftist presidential candidate never obtains the majority of the votes, not even in 2006 when the popular incumbent Lula (of

[2]We check the validity of our findings using two alternative methodologies: *Wordscores* (Laver, Benoit, and Garry, 2003), which relies on party ideologies as opposed to the policy content of the documents; and the seeded-LDA (Watanabe and Zhou, 2022), a semi-supervised method that uses predefined policy categories to classify the documents.

PT) obtained 61% of the national vote. Accordingly, the city only had Right-wing mayors in the past 25 years.[3] In São Paulo, on the other hand, Left and Right-wing parties often alternate winning the majority of votes in both local and national races. Because the electorate is more moderate, the leaning is less informative there.

Our empirical findings are consistent with the theoretical results. We first present a robust empirical regularity: in elections with lower salience of competence (2012/2016), platform polarization is increasing in the municipality's centrism, and stable across elections. We then use the exogenous timing of COVID-19 to estimate the shift in polarization in 2020. Using a differences-in-differences (DD) design, we show that a shock to the salience of competence—as the one brought on by COVID-19—leads to an increase in polarization, but mostly in cities with more extreme electorates. These effects are not restricted to one end of the spectrum, as they apply to *both* Left- and Right-leaning cities. Finally, we show that our estimates are (i) robust to alternative specifications; highly correlated with the actual COVID-19 incidence across cities; and (iii) not driven by the contemporary Rightward-shift in the Brazilian electorate who elected Jair Bolsonaro president in 2018.

Related Literature

We build on models of policy-motivated candidates with aggregate uncertainty (Calvert, 1985; Roemer, 1997; Wittman, 1983), a setting where one *expects* platform polarization.[4] Contrary to spatial models of electoral competition with probabilistic voting that exclusively incorporate electoral uncertainty as either purely about the location of the decisive voter (Buisseret and Van Weelden, 2021; Sasso and Judd, 2022) or as a valence shock (Desai, 2022; Invernizzi, 2021), our model includes both. The substantive importance of modeling uncertainty about voters in these two different ways has been highlighted by Ashworth and Bueno de Mesquita

[3] With a 1.5mn+ population, Recife—a Northeastern state capital—provides a similar example of an extreme but Left-leaning electorate.

[4] Other ways to ensure platform polarization is to assume that candidates possess platform-motivated preferences (Callander and Wilkie, 2007; Kartik and McAfee, 2007), or that office-motivated candidates have asymmetric information regarding voter preferences (Bernhardt, Duggan, and Squintani, 2007).

(2009), who show how results can change markedly depending on the modeling choice. Our contribution stems from introducing district leaning, which provides a signal of voters' ideological preferences whose variance shifts with the position of the leaning.

The theoretical literature on polarization in political platforms has established that while beneficial in moderation, extreme polarization drives voter welfare down (Bernhardt, Duggan, and Squintani, 2009). Others have identified mechanisms influencing platform polarization, such as economic development (Desai, 2022), electoral rule disproportionality (Matakos, Troumpounis, and Xefteris, 2016), foreign manipulation (Antràs and i Miquel, 2011), and motivated reasoning in a dynamic setting (Callander and Carbajal, 2022). Closest to our model, Desai and Tyson (2022) show that an increase in the salience of competence can drive polarization up, but they do not have the kind of uncertainty associated with district leaning, which is a core feature here. Consequently, they cannot identify which districts are more prone to higher polarization, nor how such variation influences what is observed in the data.

Finally, our findings also contribute to an empirical literature on the relationship between polarization and the COVID-19 pandemic. This work primarily focuses on the impact of pre-existing levels of polarization, or electoral incentives, on pandemic-related policies, both in Brazil (Ajzenman, Cavalcanti, and Da Mata, 2022; Bruce et al., 2022; Chauvin and Tricaud, 2022) and abroad (Milosh et al., 2021; Pulejo and Querubín, 2021). Our analysis departs from this literature in two significant ways. We are interested in polarization as an *outcome* of the COVID-19 crisis, and not as the *moderator* of government responses. Also, both our empirical and theoretical results apply to polarization that affects policy dimensions other than COVID-19 responses, such as spending in education, public security, and environmental policy.

The Model

We develop a model where electoral competition within a district (municipality, etc.) depends on the skill or competence of candidates as well as their ideological positions. In each

district, j, there is an election between two candidates, indexed by $i \in \{L, R\}$, whose ideological policy preferences are represented by party ideal points, y_i.[5] In the first stage of the game, each candidate chooses an ideological platform, denoted by π_i^j. Candidates i's payoff from policy π is given by $-|y_i - \pi|$, and we can write i's expected payoff as

$$-P(L^j \text{ wins} \mid \pi_L^j, \pi_R^j) \cdot |y_i - \pi_L^j| - (1 - P(L^j \text{ wins} \mid \pi_L^j, \pi_R^j)) \cdot |y_i - \pi_R^j|. \tag{1}$$

Candidates are also evaluated by their performance on non-ideological issues, which is captured by *political competence*, and denoted by c_i^j. Denote the *competence gap* in district j by $\gamma^j \equiv c_L^j - c_R^j$, which is drawn from

$$\gamma^j \sim U[-\psi, \psi].$$

To ensure that neither party, L or R, enjoys a competence advantage on average, we focus on an expected competence gap across districts that is equal to zero.

The electorate of each district is represented by a single representative voter (e.g., the district median voter). Specifically, district j's ideological preferences are characterized by an ideal point z^j. In the second stage of our game, the district's representative voter sees both candidates' platforms, (π_L^j, π_R^j), her ideal point, z^j, and the competence gap, γ^j, and chooses between candidates. The importance of competence (relative to ideology) is captured by $\alpha \in [0, 1]$, which we refer to as the *salience of competence*. The voter's payoff in district j, when candidate i is elected, is

$$-(1 - \alpha)|z^j - \pi_i^j| + \alpha\, c_i^j. \tag{2}$$

The first term represents the voter's ideological payoff, which is the distance between her ideal point, z^j, and the policy platform of candidate i, π_i^j. The second term represents the competence of candidate i, c_i^j, weighed by the salience of competence, α.

[5] That candidates across districts have the same ideal points is not consequential in our analysis.

What matters for candidates' platform choice is what they know about their districts decisive voter at the time they must choose their platform. Novel to our model, uncertainty about the voter's ideal point is not the same across districts. Each district is characterized by its *leaning*, $\zeta^j \in [-1,1]$, which can be thought of as where candidates "expect" the voter to be (ideologically). There is a unit mass of districts, with leanings distributed uniformly on the $[-1,1]$ interval. Within each district, there is uncertainty about the ideal point of the district's representative voter, and district leaning acts as a signal of the voter's true position. Specifically, for $\delta > 0$, when the district's leaning is ζ^j, its representative voter's ideal point, z^j, is drawn from a uniform distribution

$$z^j \sim U[\zeta^j - (1-|\zeta^j|)\delta, \zeta^j + (1-|\zeta^j|)\delta].$$

In centrist districts, i.e., those where $\zeta^j \approx 0$, candidates face the most uncertainty about the ideological preferences of their district, and in extreme partisan districts, i.e., those with $\zeta^j \approx -1$ or 1, candidates face the least uncertainty about the ideological preferences of their district.[6]

To summarize, the timing is as follows: (i) candidates in district j select their policy proposals π_L^j and π_R^j; (ii) the location of the decisive voter, z^j, and the competence gap, γ^j, are realized; (iii) the voter votes and the winning candidate's platform is implemented. We restrict attention to party ideological preferences that are more extreme than those of representative voters, i.e., where $y_L < -1-\delta$ and $y_R > 1+\delta$, which precludes corner solutions and simplifies the analysis. Moreover, we restrict to cases where uncertainty about the competence gap (for candidates) is not so large that it swamps out concerns about the location of the representative voter in some districts, which corresponds formally to $\delta > \psi$.

[6] It is straightforward to setup leaning as following from a signal in a location experiment.

Comments on the Model

District leanings are an important component of our model because they lead to uncertainty about the ideological preferences of voters, which differ across districts. This feature captures a key substantive feature of political competition. Specifically, the leaning of the representative voter, ζ^j, determines both her ideological preferences as well as how uncertain candidates are about the voter's true ideological position, i.e., the precision of the signal leaning provides about the representative voter's ideal point, z^j.

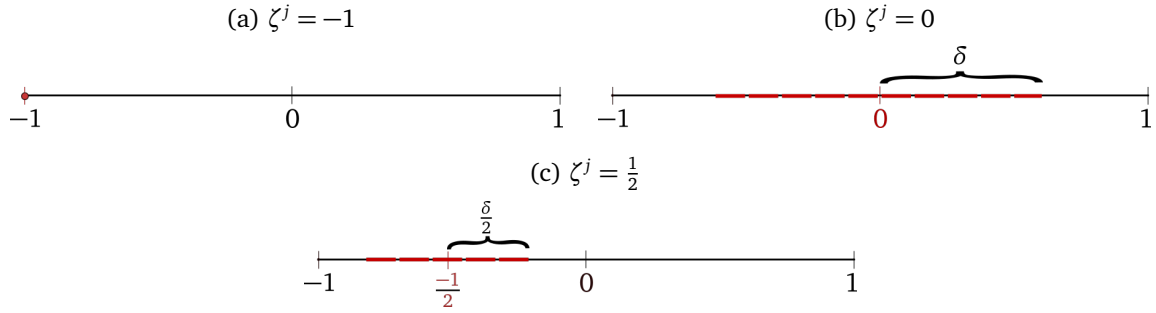
The role of partisan leanings is illustrated in Figure 1. In a district that leans extremely to the left (right), i.e., $\zeta^j = -1$ ($\zeta^j = 1$), the representative voter's ideal point is perfectly known, i.e., the variance of the voter's ideal point is 0. This case is illustrated in Figure 1a. By contrast, Figure 1b illustrates how in a district with a perfectly centrist leaning, where $\zeta^j = 0$, both candidates face a high level of uncertainty about the location of the representative voter, since her ideal point is uniformly distributed on $[-\delta, \delta]$ and its variance is $\frac{\delta^2}{3}$. Figure 1c illustrates an intermediate leaning, e.g., when $\zeta^j = -\frac{1}{2}$, where the location of the representative voter is uniformly distributed on $\left[\frac{-1-\delta}{2}, \frac{-1+\delta}{2}\right]$ with variance $\frac{\delta^2}{12}$. More generally, the variance of the signal leaning provides of the voter's ideal point in district j is

$$Var(z^j) = \frac{((1-|\zeta^j|)\delta)^2}{3}.$$

This form of electoral uncertainty represents uncertainty that politicians face in a district that varies across districts. There is relatively less uncertainty in a district where most voters are expected to be extreme on one end, compared to a district where voters could be on either end of the ideological spectrum with equal probability.

In addition to uncertainty about a voter's ideological position, voters evaluate candidates' competence *independent* of their ideological affiliation. Our formulation of competence uncertainty reflects the idea that a voter's perception of the competence gap between the two candidates could fluctuate over the course of the campaign. As an example, John Fetterman,

Figure 1: Support of z^j for different leanings



senatorial candidate for Pennsylvania, suffered a stroke during his 2022 campaign in the United States. At the time platforms were set, he was a firm favorite, but due to this unforeseen development, Fetterman's competence was called into question and is widely believed to have adversely affected his chances of winning (at the time).

We model uncertainty about the competence gap as independent from district leaning. We do this to capture the idea that the magnitude of uncertainty about the location of the decisive voter is more likely to be correlated with the district's leaning rather than uncertainty about the competence gap. We assume that neither L nor R enjoy a competence advantage on average to ensure that our results come from the interaction of uncertainty about competence advantages, which resemble valence, and uncertainty about local ideological preferences that vary across districts, which is novel to our setup. An average competence advantage is straightforward to include in the model and would lead to polarization as the party with the average advantage could have a more extreme ideological platform.[7]

Finally, our model presents a stylized election where candidates are evaluated by a single representative voter along two dimensions, ideology and competence. When candidates choose their platforms they face two dimensions of uncertainty: one that encapsulates shocks to candidates' relative capability to perform well in office, and a second reflecting candidates' imperfect knowledge of voters' ideological preferences. The latter differs by district and constitutes our main theoretical contribution. Our model isolates the role of the district's leaning

[7]We consider the case when one party enjoys an aggregate competence advantage over the other in the Appendix. The results are qualitatively similar.

as a signal of the voter's ideological preferences, which varies by district. We intentionally omit a number of other features of elections that, although important, are not critical to the mechanism here. We do this to focus on the role of district leaning in isolation, as though we are holding such other factors fixed, as one might do in an experiment (Paine and Tyson, 2020).

Platforms and Polarization

We suppress district index, j, whenever possible to simplify exposition. We start with the representative voter (in the second stage) who knows her ideal point, z, the competence gap, γ, and the candidates' platforms, (π_L, π_R). From (2), the voter chooses L if and only if,

$$-(1-\alpha)|z-\pi_L| + \alpha\, c_L \geq -(1-\alpha)|z-\pi_R| + \alpha\, c_R,$$

and chooses R otherwise. Rearranging, the voter's decision rule is a cutoff,

$$\gamma^*(\pi_L, \pi_R; z) = \frac{1-\alpha}{\alpha}(|z-\pi_L| - |z-\pi_R|),$$

where the representative voter votes for L if and only if $\gamma \geq \gamma^*(\pi_L, \pi_R; z)$ and votes for R otherwise. The cutoff rule, $\gamma^*(\pi_L, \pi_R; z)$, determines the level of the competence gap, γ, for which the voter prefers L to R, and its value depends on candidates' platform choices, π_L and π_R, as well as the voter's true ideal point, z^j.

Moving backward to the candidates, when they choose their ideological platforms, they do not know the voter's ideal point, z, nor the competence gap, γ. Consequently, candidates are not certain about the voter's decision rule, $\gamma^*(\pi_L, \pi_R; z)$. The probability that L wins the election is $P(\gamma \geq \gamma^*(\pi_L, \pi_R; z))$, and the probability R wins is $P(\gamma < \gamma^*(\pi_L, \pi_R; z))$, and the problem for candidate $i \in \{L, R\}$ is

$$\max_{\pi_i} -P(\gamma \geq \gamma^*(\pi_L, \pi_R; z) \mid \zeta)|y_i - \pi_L| - (1 - P(\gamma \geq \gamma^*(\pi_L, \pi_R; z) \mid \zeta))|y_i - \pi_R|. \qquad (3)$$

A pair of ideological platforms (π_L, π_R) that simultaneously solve (3) for L and R, along with $\gamma^*(\pi_L, \pi_R; z)$ from above, together constitute a subgame perfect Nash equilibrium to our game.

Proposition 1. *There exists a unique symmetric subgame perfect Nash equilibrium where for an extreme-left (extreme-right) district, i.e., for all $\zeta < \bar{\zeta}_L$ ($\zeta > \bar{\zeta}_R$),*

$$\begin{aligned} \pi_L^* &= \zeta - \frac{\alpha\psi}{2(1-\alpha)} \\ \pi_R^* &= \zeta + \frac{\alpha\psi}{2(1-\alpha)}; \end{aligned} \tag{4}$$

for all centrist districts, i.e., $\bar{\zeta}_L \leq \zeta \leq \bar{\zeta}_R$,

$$\begin{aligned} \pi_L^\dagger &= \zeta - (1-|\zeta|)\delta \\ \pi_R^\dagger &= \zeta + (1-|\zeta|)\delta; \end{aligned} \tag{5}$$

and where

$$\bar{\zeta}_L = \min\left\{\frac{\alpha\psi}{2(1-\alpha)\delta} - 1, 0\right\} \quad \textit{and} \quad \bar{\zeta}_R = \max\left\{1 - \frac{\alpha\psi}{2(1-\alpha)\delta}, 0\right\}. \tag{6}$$

The characterization follows by noting that the first-order conditions associated with (3) for L and R can be combined, and any pair (π_L, π_R) that satisfies

$$\frac{\frac{dP(\gamma \geq \gamma^*(\pi_L, \pi_R; z)|\zeta)}{d\pi_L}}{P(\gamma \geq \gamma^*(\pi_L, \pi_R; z) \mid \zeta)} = \frac{1}{\pi_R - \pi_L} = \frac{\frac{dP(\gamma \geq \gamma^*(\pi_L, \pi_R; z)|\zeta)}{d\pi_R}}{1 - P(\gamma \geq \gamma^*(\pi_L, \pi_R; z) \mid \zeta)}, \tag{7}$$

is an equilibrium (details in the Appendix). This expression highlights the two considerations that motivate L and R's platform choices. First, in the center of (7) is the reciprocal of polarization, which is endogenously determined by candidates' choices. This measures the marginal benefit for candidate i from being in office, and implementing her ideological platform, relative to her opponent's platform. Second, each candidate is concerned with how changing her ideological platform, π_i, affects her probability of winning the election. This is represented

formally by the reverse hazard rate of L's win probability with respect to π_L, on the left-hand side of (7). Similarly, R's win probability hazard rate with respect to π_R is on the right-hand side of (7). The reverse hazard rate measures the sensitivity of i's probability of defeating her opponent to her actual platform choice. An equilibrium is a point where these hazard rates (for L and R) equal the reciprocal level of polarization.

Proposition 1 shows that there are two qualitatively different kinds of equilibria, depending on a district's leaning. At the time candidates choose platforms, their choices are motivated by two different kinds of uncertainty. First is uncertainty about the ideal point of the representative voter, z, the magnitude of which depends on the district's leaning, $|\zeta|$. Second is uncertainty about the competence gap, γ, which is substantively more important in districts that have more extreme leanings because the voter's ideal point is relatively certain. Whichever kind of uncertainty is most salient determines the platform choices of candidates, and consequently, the equilibrium level of polarization.

To illustrate, notice that as a district leans further left, for example, taking $\zeta \to -1$, there is no uncertainty about the ideal point of the representative voter, and in this case, from (4), the equilibrium platforms are

$$\pi_L^* = -1 - \frac{\alpha\psi}{2(1-\alpha)} \quad \text{and} \quad \pi_R^* = -1 + \frac{\alpha\psi}{2(1-\alpha)}.$$

In this case, L and R's platforms are equidistant from the voter at -1. What drives differences in platforms between L and R, when they are competing in a district with an extreme leaning, is uncertainty about the competence gap.[8] For such districts, polarization is

$$\pi_R^* - \pi_L^* = \frac{\alpha\psi}{1-\alpha}, \tag{8}$$

which is strictly increasing in the salience of competence, α.

[8]Note if $\alpha \to 0$, removing the importance of competence to the voter, then platforms converge to each other when $\zeta = -1$, in line with median voter theorem style results.

As a district becomes more centrist-leaning, i.e., as $-|\zeta|$ increases, then uncertainty about the voter's ideal point becomes more important, and eventually drives candidate platform choices. In centrist districts, from (5), polarization is

$$\pi_R^\dagger - \pi_L^\dagger = 2(1-|\zeta|)\delta, \tag{9}$$

which is independent of the salience of competence, α.

To stress the importance of uncertainty emanating from district leaning, note that as uncertainty over the competence gap disappears (i.e., as $\psi \to 0$), two things happen. First, in extreme districts both candidates' platforms approach each other and converge to the district leaning. This reflects a "median voter theorem" style logic. Second, the cutoffs $\bar{\zeta}_L$ and $\bar{\zeta}_R$ approach the endpoints of the ideological policy space, -1 and 1 respectively, and as a consequence, removing uncertainty about the competence gap makes all districts centrist districts.

We now focus on two aspects: First, the relationship between polarization and district leaning, $-|\zeta|$, and, second, the channels through which increases in the salience of competence, α, affect average polarization.

Proposition 2. *Platform polarization in centrist districts is strictly increasing in the ideological leaning of the district, i.e., $-|\zeta|$, whereas there is no relationship between platform polarization and district leaning in extreme districts.*

This result establishes that there is a positive relationship between district leaning and platform polarization, but only in centrist districts, where uncertainty stemming from district leaning is politically more relevant. However, in extreme districts, where information regarding the ideological preferences of the voter is precise enough, there is no relationship between polarization and leaning, because electoral competition is driven by concerns about voter perception about competence, rather than the location of the decisive voter.

Our empirical results exploit a shock to the salience of competence, α, brought about by crises to governance resulting from the spread of COVID-19. To assess how our model speaks

to the data, it is important that we understand how changes in the salience of competence, α, influence polarization, $\pi_R - \pi_L$, when averaged across all districts. We focus on the *average level of polarization* across districts,

$$P(\zeta < \bar{\zeta}_L \text{ or } \zeta > \bar{\zeta}_R)(\pi_R^* - \pi_L^*) + P(\bar{\zeta}_L \leq \zeta \leq \bar{\zeta}_R)(\pi_R^\dagger - \pi_L^\dagger), \tag{10}$$

because this is the quantity any empirical estimand will estimate. The first term is the level of polarization in extreme districts, weighted by their prevalence in the population, and the second term is the level of polarization in centrist districts, weighted by their prevalence in the population.

Proposition 3. *The average level of polarization across districts is strictly increasing in the salience of competence, α. In particular, the level of polarization in extreme districts, $\pi_R^* - \pi_L^*$ is strictly increasing in α, whereas the level of polarization in centrist districts, $\pi_R^\dagger - \pi_L^\dagger$, is constant in α. Moreover, the share of centrist districts decreases in α.*

In centrist districts, an increase in α has no effect on candidate platforms, from (9), and hence, no direct effect on polarization. In extreme districts, uncertainty about the competence gap influences the level of polarization, which from (8), is strictly increasing in the salience of competence, α. These two effects, which differ depending on a district's leaning, capture the *intensive margin* by which the salience of competence influences the average level of polarization. The magnitude of this intensive margin is

$$\left| \frac{d\pi_R^* - \pi_L^*}{d\alpha} \right| = \frac{\psi}{2(1-\alpha)^2} > 0, \tag{11}$$

in extreme districts and

$$\left| \frac{d\pi_R^\dagger - \pi_L^\dagger}{d\alpha} \right| = 0, \tag{12}$$

in centrist districts. Combining (11) with (12) shows that polarization due to a change in the salience of competence is driven by extreme districts.

Since a shock to the salience of competence influences polarization only in extreme districts, and because whether a district is extreme is endogenous, we must also consider what determines whether a district is centrist. This amounts to analyzing, from Proposition 1, the cutoffs $\bar{\zeta}_L$ and $\bar{\zeta}_R$ which determine the share of extreme districts, and are themselves dependent on the salience of competence, α. In particular, using that district leanings are uniformly distributed, we can rewrite (10) as

$$\left(\frac{2+\bar{\zeta}_L-\bar{\zeta}_R}{2}\right)\cdot\left(\frac{\alpha\psi}{1-\alpha}\right)+(\bar{\zeta}_R-\bar{\zeta}_L)(1+\zeta^j)\delta.$$

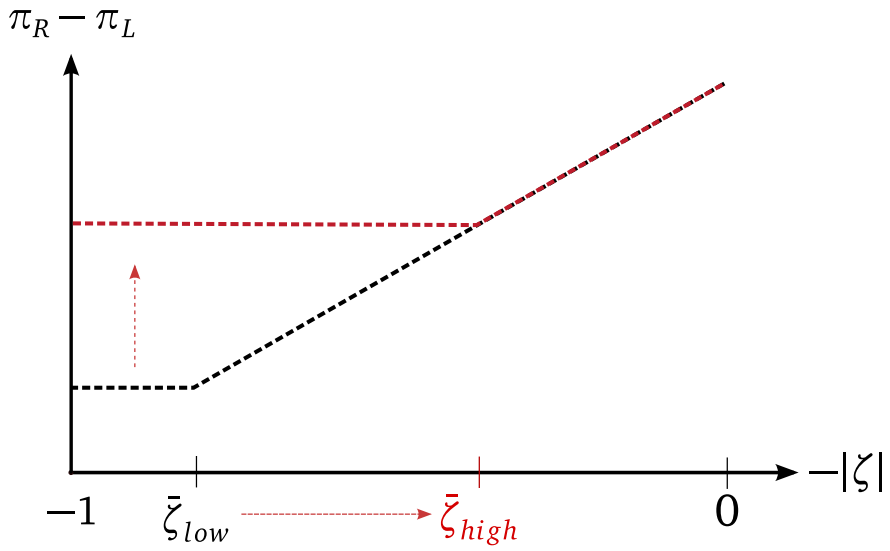
This expression highlights that the salience of competence, α, also influences the share of districts where polarization depends on the salience of competence, identifying the *extensive margin* by which the salience of competence influences polarization. In particular, $\bar{\zeta}_L$ is strictly increasing in α, while $\bar{\zeta}_R$ is strictly decreasing in α, establishing that an increase in the salience of competence reduces the number of centrist districts, by a magnitude of

$$\left|\frac{d\bar{\zeta}_i}{d\alpha}\right|=\frac{\psi}{2(1-\alpha)^2\delta}>0.$$

This latter effect further increases the observed level of polarization (when averaging over districts). Specifically, an increase in α implies that more districts are extreme. The overall effect of the salience of competence, α, on the average level of polarization can be decomposed into two mutually reinforcing channels, characterized by intensive and extensive margins, which together increase polarization with increases in the salience of competence.

That the intensive and extensive margins reinforce each other, i.e., they both serve to increase the average level of polarization, is important for the empirical analysis which follows. Specifically, if these two margins had conflicting effects on the average level of polarization, then the average level of polarization would not serve as a reliable indicator of the effect of a shock to the salience of competence. It would become necessary to separately identify the cutoffs $\bar{\zeta}_L$ and $\bar{\zeta}_R$ in the data, which is likely impossible. However, because the salience of com-

Figure 2: District centrism and equilibrium polarization



This figure illustrates the two theoretical implications we take to the data. $\bar{\zeta}_{low}$ and $\bar{\zeta}_{high}$ denote the cutoffs that determine whether a district is extreme or centrist when α is low or high respectively. When α is low, there is a strong positive relationship between the centrism of the district, $-|\zeta|$, and polarization. As α becomes high, the share of extreme districts increases, the positive relationship between polarization and $-|\zeta|$ attenuates, and average polarization increases, with the increase concentrated in extreme districts.

petence influences the average level of polarization in a qualitatively similar way along both the intensive and extensive margins, we can evaluate the impact of a shock to the salience of competence on the observed average level of polarization.

A Case Study in Brazilian Municipalities

Our theory elucidates the relationship between platform polarization and district leaning with at least two clear implications for the empirical application. Figure 2 illustrates these implications.

1. Proposition 2 shows that if the salience of competence (α) is low enough, polarization is always **increasing in *centrism*** across districts (municipalities). As seen in Figure 2, when α is low enough, there is a strong positive relationship between polarization and centrism, measured by $-|\zeta|$.

2. Proposition 3 establishes that an increase in the salience of competence **attenuates the leaning-polarization relationship** across municipalities. As evident in Figure 2, when α increases, so does the number of districts where competence drives electoral competition and for which polarization is increasing in α. The increase in average polarization therefore stems from districts that are extreme.

We first provide details on how we measure—in Brazilian cities—-the following empirical quantities that are pertinent to our theory: platform polarization, district leaning, and the shock to the salience of competence in mayoral elections. We then proceed to the empirical estimation and discussion of the results.

Measuring Platform Polarization

We use data on the policy proposals of mayoral candidates in the 95 largest Brazilian cities—those that have a runoff system in mayoral elections—in 2012, 2016 and 2020.[9] In Brazil, since 2009, all candidates for executive offices are required by the federal electoral court (TSE) to disclose a document with their campaign platforms and priorities. These documents typically have extended discussions on the candidates' proposals for different areas of the municipal administration, and are published in the TSE's website around a month before the election. They are also extensively scrutinized by the local press.[10]

These mayoral races constitute the ideal group for our analysis, for two reasons. First, voters are more exposed to the platforms of the top candidates in large Brazilian municipalities, both in time and intensity. Not only does the potential runoff often extend campaign times for the top two candidates, but these candidates also have subsidized, mandatory, prime-time TV campaigns on all the over-the-air channels.[11] Second, given the highly decentralized structure

[9]The runoff round happens unless the lead candidate in the first round achieves more than 50% of the votes. By law, the group of eligible cities consists of all municipalities with more than 200,000 voters. The 95 cities that met this condition in 2020 are our potential sample for the entire period of analysis.

[10]Examples of press reports in Portuguese: https://bit.ly/45Ky35n and https://bit.ly/3OYUmOL.

[11]TSE's resolution 23457 from Dec, 2015. The top two candidates receive the exact same TV time in the second round. In the first round, time is given to parties according based on their share of seats in the national congress. In 2012-2016, the top two candidates received on average 3/4 of all votes in the first round.

of public spending, mayors of large cities spend the budget on a broad portfolio of policy areas such as health care, education, social assistance, transportation, and even public security, which is also reflected in their campaign proposals.[12]

We use the TSE documents to identify and measure the policy priorities, in 6 different areas, of the two top contenders in each election. The relevance of policy areas is based on the classification of the actual budget expenses of Brazilian cities, obtained from the FINBRA database maintained by the National Treasury. Figure 3 shows the main spending categories in these 95 cities, according to this classification. Note that, although these 10 categories account for 99% of all policy-related expenditures,[13] only 6 of them—health care, education, transportation & urbanization, sanitation & the environment, social assistance, and public security—individually account for more than 1% of local budgets. Nevertheless, we show in the appendix (Table C.2) that our results are highly robust to the inclusion of the other 4 minor categories in the analysis.

Our primary measure of polarization is built using the frequency of words that are uniquely and directly related to each policy area. More precisely, among the 200 most frequent words in the sample, we count the ones that are connected to these categories. We then calculate local polarization for each city-year as the n-dimensional Euclidean distance between the platforms of the top two mayoral candidates. These policy-related terms are shown in Table 1, and the full list of the most frequent terms in the sample is shown in Table B.1 (appendix). Figure 3 shows the relative frequencies of these categories in the candidates' platforms (dark gray columns), and how they are largely consistent with the actual budget implementation. In the appendix (Table C.3) we show that the results are robust to selecting policy-related terms from a larger pool, i.e., the 300 most frequent words in the documents.

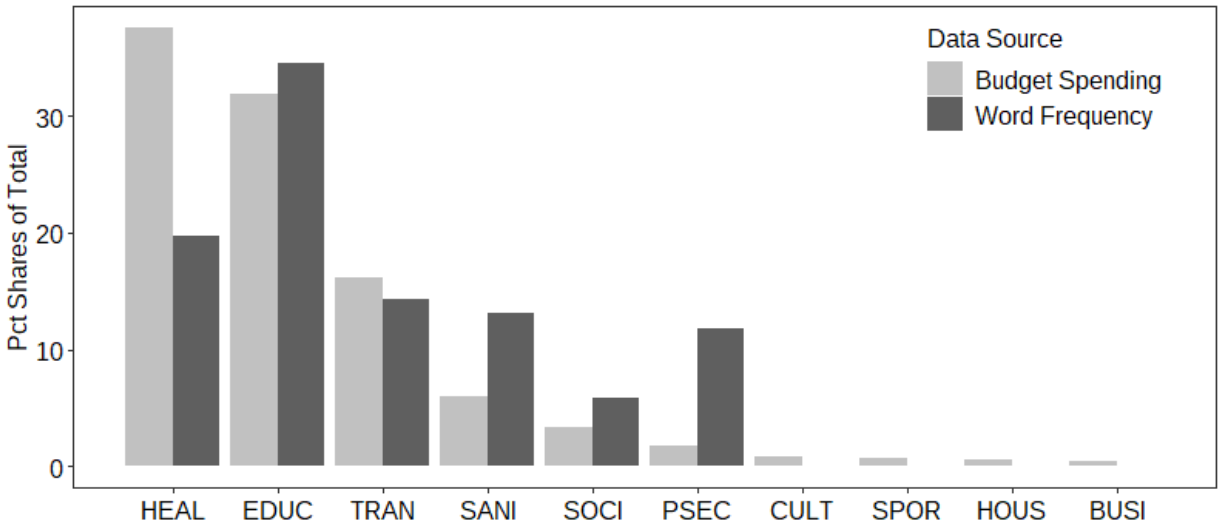
As an illustration, consider the city of Cariacica (ES), where the 2020 race was a runoff between candidates from DEM (Right-wing) and PT (Left-wing). DEM's candidate emphasized his proposals for public security, highlighting that the area would be "one of the priorities of this

[12]The spending portfolio of mayors in small towns is less diversified, as many invest little to nothing in areas such as public security, transportation, and even sanitation.

[13]Policy-related spending excludes expenditures with the local council, local courts, overhead (administrative spending), retirement benefits, debt service, and energy.

administration."[14] The document explains in detail the several action points for this area such as arming the municipal guard, hiring officers, and increasing neighborhood patrols. Overall, the share of policy terms in the document that were dedicated to security measures was 29%. The same share for the proposal of PT's candidate was only 9%. Not only did the Left-wing's document fail to single out security as a priority, but it also had a shorter discussion on the topic that was primarily focused on investing in education and leisure for youth populations.

Figure 3: Spending Categories in Large Brazilian Cities



Spending is from 2017-2020. For correspondence, the word frequency data shown here only includes the proposals in the same electoral cycle (2016). The light gray columns show the average share of each category (99% of total expenses). The dark gray columns show the share of policy-related words in candidates' platforms that belong to each of the 6 main categories – using the words shown in Table 1.
HEAL: Health care; EDUC: Education; TRAN: Transportation & Urbanization; SANI: Sanitation & the Environment; SOCI: Social Assistance; PSEC: Public Security; CULT: Culture; SPOR: Sports & Leisure; HOUS: Housing; and BUSI: Businesses and Tourism.

Our metric has a number of advantages for our empirical exercise. First, simple metrics are desirable because they are highly intuitive (Eggers and Spirling, 2018), and also have the virtue of ensuring "transparency and replicability" (Wilkerson and Casas, 2017). Another important advantage is that simple metrics can be explicitly linked to theoretical objects or out-of-sample topic categorizations such as the structure of local budgets in Brazil that we use here.

[14] In Portuguese: "segurança pública estará dentro das prioridades do nosso governo" (page 12).

Table 1: Main Words in Each Budget Category

Category	Words counted
Health	Health (*saude*)
Education	Education (*educacao* or *ensino*), school (*escolas, escolar, escola*), students (*alunos*)
Transportation and Urbanization	Transportation (*transporte*), mobility (*mobilidade*), traffic (*transito*)
Public Security	Security (*seguranca*), Violence (*violencia*)
Social Assistance	Social assistance (*assistencia social*), Disability (*deficiencia*)
Saniation and the Environment	Natural Environment (*meio ambiente* or *ambiental*), Water (*Agua*), Sanitation* (*saneamento*)

These words come from the list of 200 most frequent words in the sample, shown in Table B.1 (appendix). *The only exception is the word sanitation (*saneamento*), which is the 216th most frequent word. It was included because it refers directly to the name of one of the most common spending categories.

What is more, in Brazil's multiparty democracy, parties do not always campaign locally in line with their national programmatic brands (Boas, Hidalgo, and Melo, 2019; Desai and Frey, 2021). Consequently, measuring polarization based on party labels in local elections can be challenging. A key advantage of our approach is that our metric does not rely on the party affiliation of candidates, and therefore does not require any assumptions about their ideological *brands*. In fact, this approach is also free from assumptions on the ideological content of the proposals themselves. In the example above, our measure simply captures the distance between the two candidates in terms of their emphasis in public security, and it does not depend on any assumption whether public security is a Right-wing priority.

Nevertheless, one might still be concerned that our findings are contingent on our chosen method of measuring polarization. To alleviate such concerns, we replicate our analysis using two alternative measures. The first uses the well-known scaling approach based on Wordscores (Laver, Benoit, and Garry, 2003), which has been previously used to study the Brazilian proposals data (Pennec, 2022; Pereira, 2021). Here, we follow Desai and Frey (2021) and cat-

egorize the largest parties in 2012 as either Left- or Right-wing. We then use the proposals of their 2012 mayoral candidates to train the algorithm that classifies the whole set of documents on a Left-Right scale.[15] Although this alternative metric uses assumptions on the ideological leaning of parties, it does not makes assumptions about the relevance of policy categories in local budgets, which makes it particularly useful as a sanity check on our results.

Alternatively, we also use a seeded topic-model (Watanabe and Zhou, 2022). This is a semi-supervised approach that has the computational advantages of traditional topic models, with the use of seed words as a weak form of supervision on the definition of topics. For consistency, we fit 6 topics on the data using the words shown in Table 1 as seed. In Appendix B we provide additional details on the construction of these databases, which also include details on the standard pre-processing steps.

A Proxy for Ideological Leaning at the Municipal Level

Our empirical proxy for local ideological leaning is based (without loss of generality) on the share of the municipal vote for the Left in the final round of the last pre-treatment presidential election in Brazil (2010), which we denote by L_j in municipality j. Precisely, in municipality j leaning is given by: $lng_j = 1/2 - |L_j - 1/2|$. This implies that the variable is defined in the interval $[0, 1/2]$, and that more extreme cities—either to the Left or Right—have lower values.

The rationale behind our choice is threefold. First, Brazilian presidential races are historically highly polarized in the Left-Right dimension: all elections since democratization were dominated by one Left- and one Right-wing party.[16] Second, the share of Left-wing presidential votes in each municipality is persistent across elections, and highly heterogeneous across

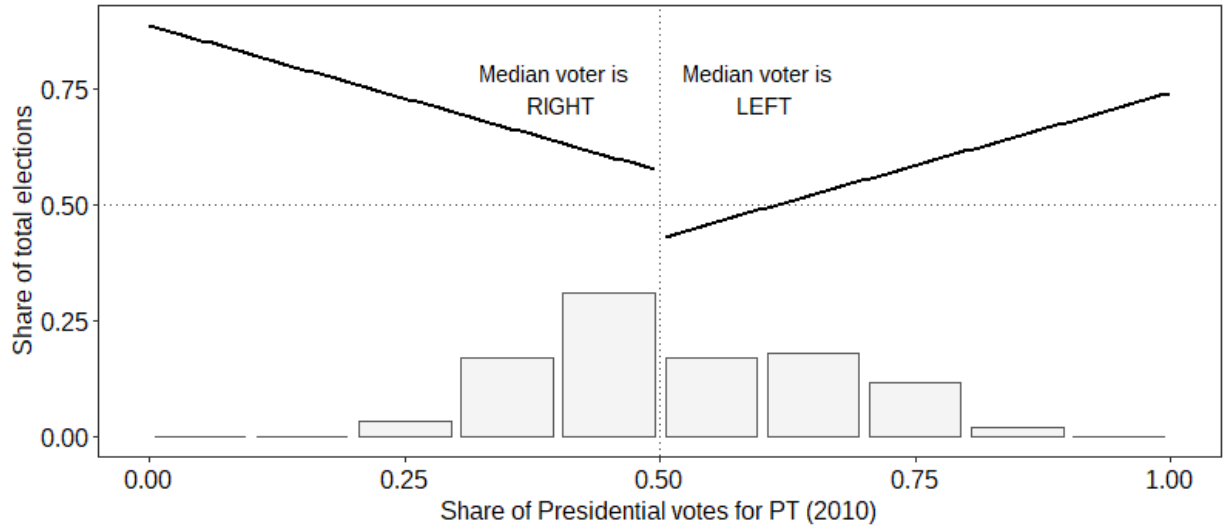
[15] Brazil has a multiparty system where sometimes subtle programmatic differences between parties are not salient, particularly among the center-right group. We prefer a conservative binary categorization, as "there is a widely accepted consensus by experts, voters, and candidates alike on what constitutes the broader Left-Right divide in Brazil" (Desai and Frey, 2021). The Left-wing parties in 2012 are: PT, PSB, PDT, PCdoB, and PPS. The Right-wing are: PMDB, PSDB, PTB, PL, PP, PSD, and DEM. In the appendix we show that the results are robust to the exclusion of the most centrist parties from each group (PMDB, PSDB, PPS, and PDT).

[16] PT for the Left in all elections. For the Right: PRN (1989), PSDB (1994, 1998, 2002, 2006, 2010, and 2014), PSL (2018), and PL (2022).

municipalities. The average PT vote share in 2010 was 53%, with values ranging from 24% to 84%. Figure D.1 (appendix) also shows that the 2010 vote shares are highly correlated—across municipalities—with the shares in the subsequent presidential races of 2014 and 2018.

Third, the pre-treatment voting data in national elections is, in fact, a good predictor for the uncertainty about the representative voter in municipal races, as shown in Figure 4. While the x-axis shows the percentage of votes for the PT in 2010 (L_j), the y-axis has a measure of the median voter position in the mayoral races of 2012, 2016, and 2020. More precisely, the line on the left-side of the plot ($L_j < 50\%$) shows the expected share of mayoral races where Right-wing parties have more than 50% of the vote. In the same way, the right-side ($L_j > 50\%$) shows the expected share of races where the Left captures the median voter.[17]

Figure 4: Presidential elections are a good predictor of mayoral election outcomes



The columns show the distribution of the sample along the x-axis. For every municipality, the x-variable is L_j as defined in the text. The y-variable is a dummy that assumes one when Right-wing (Left-wing) parties had more than 50% of the vote, for all $L_j < 0.5$ ($L_j > 0.5$). The lines show the predicted value of the y-variable after regressing it on L_j. We also control for the average income and literacy levels in the municipality in 2010, the party of the mayor elected in 2008, and election fixed effects.

[17] The lines show the predicted values of the y-variable based on a regression where the dependent variable assumes one when Right-wing parties had more than 50% of the vote, and zero otherwise, and the regressor is L_j. The regression also controls for the following: a proxy for the poverty level of the municipality in 2010 (given by average household income and literacy rate), the party of the mayor elected in 2008, and election fixed effects. The analysis includes all 95 cities in our sample. The list of Left-wing parties in Brazil is CIDADANIA (old PPS), PCB, PCdoB, PCO, PDT, PMN, PSB, PSOL, PSTU, PT, and UP.

Overall, in places where the national share of Left votes is more extreme—e.g., L_j is very low or very high—the median voter for mayor is also more likely to be extreme. On the other hand, where L_j is close to 0.5, the share of cases where the local median voter is consistently on one side also approaches 50%. In other words, in more center-leaning cities, the outcome of mayoral races was much less predictable in 2012-2020—in this dimension—than in the more extreme ones. This result is important as it directly connects to the role of district leaning in our theoretical model. For robustness, in the appendix (Figure D.2) we repeat the same exercise with different measures of leaning in mayoral elections, such as (i) the actual vote share of Right (or Left) parties; and (ii) the share of the top 2 candidates that come from the Right (or the Left). The patterns are nearly identical.

COVID-19: A SHOCK TO THE SALIENCE OF COMPETENCE

In a context where voters value both ideology and competence, we are interested in the impact of the "shock" introduced by the unprecedented and quick spread of COVID-19 in 2020. We argue that one of the most prominent impacts of the pandemic is that it altered the importance voters place on non-ideological aspects of politicians, especially competence. In our model, the parameter α captures the salience to voters of such a shock. In the data, the (pre-scheduled) timing of the 2020 local elections in Brazil, combined with the country's decentralized system of public health spending, created an ideal context that helps us to understand the role of the salience of competence in determining political platforms.

The country-wide mayoral elections happened nearly 8 months into the pandemic, between the first and second waves of infection. This event increased the salience of the mayor's managerial ability, not only due to its timing, but because municipal administrations in Brazil bear the bulk of the responsibilities in delivering health care services through the universal system (SUS). Health care services are the largest budget category in municipalities, and also the highest priority for voters: in a 2020 survey, 87% of the 2,002 respondents considered health care as a top priority for the elected mayor in 2020, the highest among all choices (CNT, 2020).

In 2020, mayors were also granted autonomy by the Supreme Court to decide whether or not to implement measures to contain the spread of the virus, even at odds with federal or state governments (Bruce et al., 2022; Chauvin and Tricaud, 2022). Not surprisingly, a survey with 3,235 municipal administrations showed that 97% of these mayors implemented measures to restrict population movements, 52% created blockades to limit inter-municipality movements, and 73% formally approved state of emergency in the municipality (Albert et al., 2020). Accordingly, both members of the press as well as local experts anticipated that the pandemic would play a significant role in the 2020 election by increasing the salience of the mayor's managerial ability.[18]

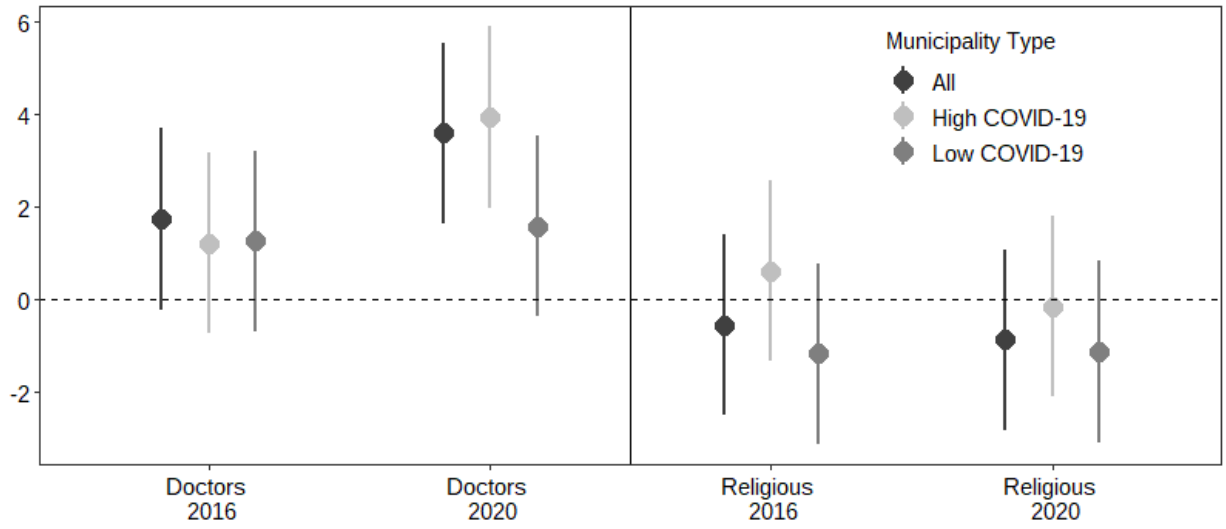
We also rely on Boas (2014) to provide suggestive evidence of a COVID-related increase in the salience of competence for local candidates in 2020. Brazilian candidates are allowed to use "electoral" names on the official ballot, instead of their birth names. As a consequence, they often use their ballot names to convey positive signals to voters. Common choices are names that refer to their occupation, such as "Dr. Maria," or religious affiliation, such as "Pastor Pedro." Boas (2014) uses an original survey to examine the effect of religious and occupational heuristics conveyed via such titles—specifically the commonly used "pastor" and "doctor". He finds that title of doctor has "a positive effect on vote intention that appears to be mediated by the positive stereotypes, such as intelligence and competence." The same result is not observed for the religious title.

In this context, we examine the use of these occupational heuristics by candidates in 2012, 2016, and 2020 in our sample of 95 cities. In these three elections, 1,627 doctors and 561 religious leaders ran for either mayor or local councilor. Figure 5 shows how their use of a title in the ballot name changes over time. For both groups, there are no changes in this heuristic between 2012 and 2016. However, during the 2020 COVID-19 crisis, doctor-candidates became significantly more likely to use the title, particularly in the cities that were more severely affected by the first wave. The same effects are not observed for religious leaders (the estimates

[18]For example: https://bit.ly/37mjlo3 and https://glo.bo/3rVR3dy, in Portuguese.

are negative in magnitude, and statistically indistinguishable from zero).

Figure 5: The Salience of COVID-19 in 2020 Local Campaigns



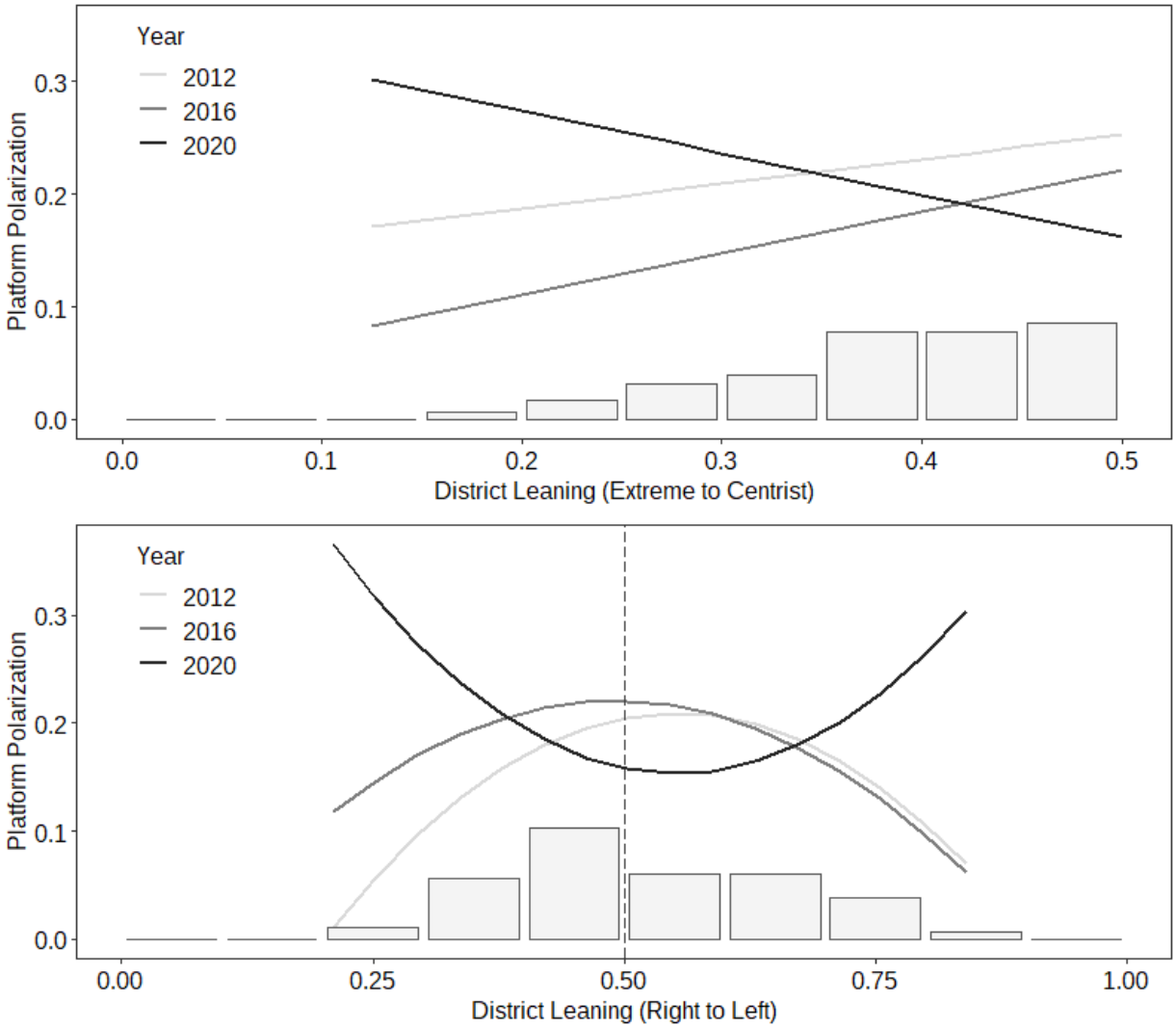
95% confidence intervals for errors clustered by municipality. The x-axis has the normalized effects in units of standard deviation. Coefficients are the effect in relation to the 2012 baseline, and come from the following regressions: (1) $H_{cjt} = YEAR_t + \lambda_j + \epsilon_{cjt}$, used for all municipalities; and (2) $H_{cjt} = YEAR_t * Covid_j + \lambda_j + \epsilon_{cjt}$, used for the separate effects by COVID incidence. For candidate c, in municipality j, and election t, H_{cjt} is a binary variable that indicates whether or not the candidate used a ballot name with the occupational heuristic. $YEAR_t$ are year fixed-effects, λ_j are municipality fixed-effects, and $Covid_j$ is a dummy that indicates whether municipality j was more affected than the median by the first wave of COVID-19 cases in 2020 (pre-election).

Empirical Strategy and Results

We use the data above to illustrate two key implications of the model. For this, we take advantage of the pandemic's timing, which makes it an unexpected, idiosyncratic, and highly salient competence shock for mayoral races. We start by showing the relationship between platform polarization and leaning for each election in Figure 6.

The first plot shows how polarization changes with the local values of leaning on our scale that moves from more extreme (0), either very Left or very Right, to more centrist (0.5). The second plot shows how polarization changes along the district leaning on a Right (0) to Left (1) scale. Accordingly, here we fit a quadratic function on polarization to more explicitly show the symmetry in polarization as we move towards more extreme districts.

Figure 6: Platform Polarization and Ideological Leaning in Brazil



All variables are described in the text. The columns represent the sample distribution along the x-axis. The outcome was regressed on the total number of words in both documents, and normalized to values between zero and one for visualization. The lines represent the linear or quadratic fits of the outcome for each year.

Our theory suggests that, in the absence of a competence shock, polarization should be positively correlated with centrism (Proposition 2). The first plot of Figure 6 shows that this is the case in our sample in both 2012 and 2016, when the relationship between these two variables is positive and highly consistent across elections (pre-pandemic). The quadratic fit in the second plot provides further evidence that the relationship is consistently observed for both sides of the ideological scale.

However, the most important implication of our model is a comparative static regarding a shock to the salience of competence—such as the one generated by COVID-19—which shows that increased campaign polarization should arise in areas of more extreme partisan leanings (Proposition 3). Consequently, a shock to the salience of competence should dampen the relationship between polarization and centrism. Although this pattern is already visible in Figure 6,[19] we further examine it using a differences-in-differences (DiD) design. Accordingly, for municipality j in period t, we estimate the following equation:

$$pol_{jt} = \beta_0 + \beta_1 tre_t + \beta_2 lng_j + \beta_3 tre_t \cdot lng_j + \theta_{jt} + \epsilon_{jt} \tag{13}$$

where pol_{jt} is our measure of polarization. The cross-section variation in leaning (lng_j), on a scale of extreme to centrist, is measured in 2010 (pre-treatment) according to the methodology described on page 22, and it is fixed in time.[20] Finally, tre_t is the treatment dummy that assumes value one when the election happens during the pandemic (i.e., 2020), and 0 otherwise, for all municipalities.

Under the usual assumptions, the coefficient β_3 identifies how the COVID-19 pandemic changes the slope of the polarization-leaning relationship. Following Proposition 2, we expect $\beta_3 < 0$. In Table 2 we show the estimates of β_3 for different specifications that include time-

[19] We emphasize that the slope of the polarization-leaning relationship in 2020 (the dark line in the plot) is statistically indistinguishable from zero, as shown by the sum of $\beta_2 + \beta_3$ in Table 2.

[20] The second plot of Figure D.1 (appendix) shows that the municipal Left-wing vote is stable across elections in 2010-2018.

variant covariates θ_{it},[21] and fixed effects by municipality and election year.[22]

The estimate of β_3 is negative, statistically significant, and stable across specifications. We also show (in the appendix) that this empirical exercise remains robust to (i) changes in the number of policy categories or policy words used in the analysis (Table C.2 and Table C.3; respectively); and (ii) the use of both the Wordscores scaling methodology or a seeded topic model to measure polarization (Table C.4 and Table C.5; respectively).

Table 2: Polarization of Mayoral Campaigns During the Pandemic

DV: Platform Polarization	(1)	(2)	(3)	(4)
β_1	0.239*	0.246*	0.262*	
	(0.100)	(0.103)	(0.104)	
β_2	0.295*	0.299*		
	(0.150)	(0.150)		
β_3	-0.611*	-0.622*	-0.669*	-0.633*
	(0.237)	(0.239)	(0.244)	(0.238)
$\beta_2 + \beta_3$	-0.316	-0.323		
	(0.214)	(0.218)		
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 257 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the documents. The covariates are defined in the text. The estimates of β_1 and β_2 become redundant as we include fixed-effects for election year (β_2), and municipality (β_1).

The identification of effects in the context of this empirical design relies on two main assumptions. First, that the timing of the COVID-19 pandemic was exogenous. In practice, this

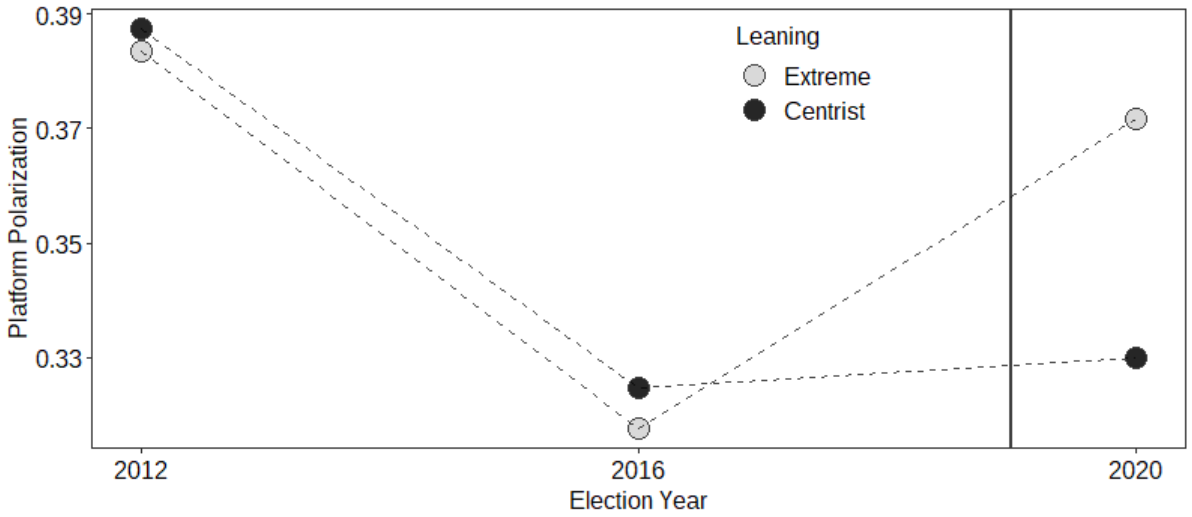
[21] All regressions control for the total number of words in the two documents. The election covariates are (i) two binary variables that indicate whether each one of the parties is Left-wing (value=1); and (ii) a dummy that indicates whether or not the incumbent party in the municipality was among the top 2 parties in the election. Left-wing parties in our sample are: PT, PSOL, PCdoB, PDT, PSB, PMN, and CID.

[22] The inclusion of these additional terms is not a necessary condition for the identification of treatment effects in the DiD design, it is typically used to reduce the variance in the estimation.

means that the pandemic was not itself caused by other idiosyncratic factors that could have had an impact on the Brazilian electoral cycle—this is a very benign assumption in our context.

Second, on the assumption that the relationship between polarization and leaning would have remained positive and unaltered in 2020, in the absence of COVID-19. Researchers often rely on the existence of parallel pre-treatment trends on the outcome to provide evidence for this assumption. In the case of our data, these trends are clearly identifiable in Figure 6, and further illustrated in Figure 7, which shows the average polarization in 2012-2020 for two groups of municipalities, with centrist leaning above or below the sample median. The plot shows that the ratio of the polarization between the two groups remains constant between 2012 and 2016, shifting only in 2020.

Figure 7: Polarization Trends for Different Levels of Leaning



All variables are described in the text. The outcome was regressed on the total number of words in both documents and on year-specific trends, and normalized to values between zero and one for better visualization. The dots represent the average normalized outcome for both groups.

Our model also suggests that the shifts in the content of campaign platforms should not be confined to the proposals that are directly and uniquely related to the administration's response to COVID-19. On the contrary, our theory predicts that candidates would also polarize in policy areas that are seemingly unrelated to the pandemic. In Table C.1 (appendix) we show

that this is indeed the case: when we re-estimate the main results excluding the mentions to health-care from the proposals, the findings remain very similar to our main estimates. This result stresses that increased polarization in 2020 was more than just health policy, ruling out that such shifts were a direct consequence of the increased salience of a health-related issue (COVID-19), rather than a more general political phenomenon.

Local incidence of COVID-19 and the polarization shift. As further evidence of our argument, we show that the change in the relationship between leaning and polarization is correlated with the incidence of COVID-19 cases across Brazilian municipalities in 2020. In other words, we show that our effects are concentrated in municipalities that were more affected by the pandemic in the period preceding the electoral campaigns.

For this, we now re-estimate equation (13) using a continuous variable tre_{jt} instead of the binary tre_t. As before, tre_{jt} is zero for all municipalities in both 2012 and 2016. However, in 2020, it takes the value of the per capita COVID-19 cases in each municipality before the campaign platforms were released. This means that $\beta_3 < 0$ only if the municipalities more affected by the pandemic were also the ones driving the change in the slope of the polarization-leaning relationship.[23] The left-side plot of Figure 8 shows that the estimates of β_3 are negative, and robust to different specifications.

We are aware that, although the timing of the pandemic was exogenous, its incidence across municipalities was not. The number of COVID-19 cases in each location is likely correlated with other pre-existing characteristics, which could ultimately be the factors responsible for this heterogeneity. Accordingly, we conduct two additional exercises to alleviate this concern.

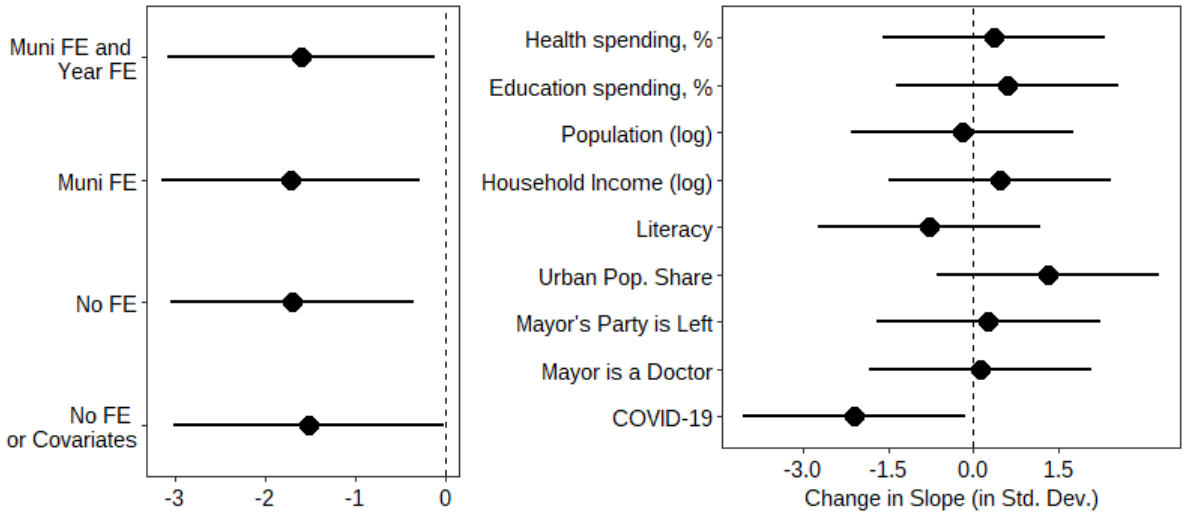
First, we re-estimate β_3 using only the residual variation in cases for tre_{jt}, i.e., we control by a series of (pre-2020) observed traits of the municipalities that were likely correlated with the incidence of COVID-19.[24] The right-side plot of Figure 8 shows that the estimate of β_3

[23] It is straightforward to see that β_3 will be positive if polarization mostly increases in the least affected municipalities.

[24] The variables are: population, share of urban population, literacy rate, and household income (all from the 2010 Census); share of the local budget spent in health care and education in the 4 years preceding each election; partisanship and previous career of the mayor preceding the 2020 election (i.e., whether or not mayor is a medical doctor, and whether the mayor is from a leftist party); and region dummies.

remains significant and negative after this adjustment (label COVID-19 in the last row).

Figure 8: COVID-19 Drives the Change in the Polarization-Leaning Relationship



These are the estimates of β_3 from equation 13 with 95% confidence intervals for errors clustered at the municipality level. The right-side plot uses each of the variables as tre_{jt}, and controls for the remaining ones, with the exception of the actual COVID-19 incidence.

Second, we run a placebo test using these municipal characteristics. We estimate equation (13), now using each of these variables as tre_{jt}, and controlling for the remaining ones. This is in the spirit of "continuity" or "balance" tests commonly used in Regression discontinuity or experimental designs. The intuition is that, if the heterogeneity in the results is driven by one of these factors that are potentially correlated with the pandemic, we should observe a statistically significant β_3. Figure 8 (right-side) shows that this is not the case.

Alternative Explanation: The Rise of the Extreme-Right? One potential explanation for the patterns observed in the data is that the level of political polarization in Brazil might have increased after (and with) the victory of extreme-right Presidential candidate Jair Bolsonaro in 2018, which marked the end of the longstanding polarization between leftist PT and center-right PSDB in national politics. Fortunately, our data allows us to rule out the impact of this narrative on our findings. We create a variable that measures the change in the presidential Right-wing vote between 2014 and 2018 for each city, and use it as a precise municipality-

level proxy for this Right-shift in Brazilian politics. Accordingly, we first show in Figure D.3 (appendix) that this variable is uncorrelated with the changes in polarization between 2020 and 2016 across our cities. Second, we estimate equation (13) including this variable as a control,[25] and show that β_3 remains negative and statistically significant (Table C.6, appendix).

Conclusion

We develop a model of electoral competition where candidates choose their ideological platforms while uncertain about voters' preferences. Candidates are distinguished both in terms of their ideological platforms and their non-ideological competence, which itself is subject to a shock prior to the election. We focus our theoretical and empirical analysis on understanding the relationship between the salience of competence and platform polarization. Specifically, we show that increasing the salience of competence leads to increased polarization through two different, but mutually reinforcing, channels. First, we show that increasing the salience of competence leads to greater polarization, but only in extreme districts. Second, we show that increasing the salience of competence also increases the share of electoral districts that are extreme where competence, and not district leaning, drives polarization.

We take these theoretical results to the data in the context of the mayoral elections of 2012, 2016, and 2020 in the 95 largest Brazilian cities. We first present a robust empirical regularity: in elections with lower salience of competence (e.g., 2012, 2016), platform polarization is increasing in the municipality's centrism, and stable across elections. We then take advantage of the exogenous timing of COVID-19 to estimate the shift in polarization between 2020 and the previous races to show that a shock to the salience of competence leads to increased polarization, but mostly in cities with more extreme electorates.

The mechanism we study emerges when the ideological leaning of an electoral district provides a signal of its voters' ideological preferences, and moreover, the precision of that signal

[25] The variable assumes the value of zero for 2012 and 2016.

depends on ideological extremism. Although our empirical application is focused on elections in Brazil, we expect that similar findings would arise in other countries where ideological polarization is an important aspect of democratic competition. Put differently, we expect our mechanism has external validity and would produce similar results (Slough and Tyson, 2023), provided one looks at similar comparisons across the salience of competence and measured polarization similarly, i.e., using the text of campaign platforms.

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Who Cares if Candidates are Competent

Supplemental Materials

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A Model Appendix

Without loss of generality, we focus on the cases where $\zeta \leq 0$. The following analysis is mirrored across 0. We also suppress notation regarding districts whenever possible to simplify exposition.

A.1 Proofs

Proof of Proposition 1. First, note that at any equilibrium, $\pi_L \leq \pi_R$. If not, both candidates have a profitable deviation to their opponent's position since candidates are purely policy-motivated. The probability that L wins the election is $\Pr(u_z(\pi_L) \geq u_z(\pi_R))$ and, by the law of total probability, is given by

$$\begin{aligned} & \Pr\left(\alpha\gamma \geq (1-\alpha)\left(|z-\pi_L| - |z-\pi_R|\right)\right) \\ = \; & \Pr(z < \pi_L)\Pr\left(\gamma \geq \left(\frac{1-\alpha}{\alpha}\right)(\pi_L - \pi_R)\right) + \Pr(z > \pi_R)\Pr\left(\gamma \geq \left(\frac{1-\alpha}{\alpha}\right)(\pi_R - \pi_L)\right) \\ & + \Pr\left(\gamma - 2\left(\frac{1-\alpha}{\alpha}\right)z \geq -\left(\frac{1-\alpha}{\alpha}\right)(\pi_L + \pi_R) | z \in [\pi_L, \pi_R]\right) \end{aligned}$$

Let $\xi(z;\pi_L,\pi_R) \equiv \left(\frac{1-\alpha}{\alpha}\right)(-(\pi_L+\pi_R)+2z)$, and let $\underline{\beta} = \zeta - (1+\zeta)\delta$ and $\bar{\beta} = \zeta + (1+\zeta)\delta$, so that z is distributed uniformly between $\underline{\beta}$ and $\bar{\beta}$. Furthermore, let

$$g(\gamma) = \begin{cases} \dfrac{1}{2\psi} & \text{if } \gamma \in [-\psi, \psi] \\ 0 & \text{otherwise} \end{cases} \quad \text{and} \quad h(z) = \begin{cases} \dfrac{1}{2(1-|\zeta|)\delta} & \text{if } z \in [\underline{\beta}, \bar{\beta}] \\ 0 & \text{otherwise} \end{cases}$$

as the probability density functions of γ and z respectively, with associated CDFs given by $G(\cdot)$ and $H(\cdot)$. The probability L wins can now be written as

$$\begin{aligned} F(\pi_L,\pi_R) \equiv & \int_{\pi_L}^{\pi_R} \int_{\xi(0;\pi_L,\pi_R)}^{\psi - 2\left(\frac{1-\alpha}{\alpha}\right)z} g\left(\gamma + 2\left(\frac{1-\alpha}{\alpha}\right)z\right) h(z)\,\mathrm{d}\gamma\,\mathrm{d}z \\ & + \Big(1 - G\big(\xi(\pi_L;\pi_L,\pi_R)\big)\Big)H(\pi_L) + \Big(1 - G\big(\xi(\pi_R;\pi_L,\pi_R)\big)\Big)\big(1 - H(\pi_R)\big), \end{aligned} \tag{A.1}$$

where $1-F(\pi_L,\pi_R)$ is the probability that R wins.

Since candidates are policy-motivated, candidate i's expected payoff is

$$V_i(\pi_L,\pi_R) \quad = \quad -F(\pi_L,\pi_R)\,|y_i-\pi_L|-(1-F(\pi_L,\pi_R))\,|y_i-\pi_R|.$$

We first focus on L, whose interior best-response is characterized by the first-order condition:

$$\frac{\partial F}{\partial \pi_L}(\pi_R-\pi_L) \quad = \quad F(\pi_L,\pi_R). \tag{A.2}$$

Since F is differentiable almost everywhere, using the Leibniz integral rule, the first derivative of the probability that L wins the election with respect to π_L is given by

$$\begin{aligned}\frac{\partial F}{\partial \pi_L} = \quad & h(\pi_L)\Big(1-G\big(\xi(\pi_L;\pi)\big)\Big)-\left(\frac{1-\alpha}{\alpha}\right)g(\xi(\pi_L;\pi))H(\pi_L)+\left(\frac{1-\alpha}{\alpha}\right)(1-H(\pi_R))g(\xi(\pi_R;\pi)) \\ & +\int_{\pi_L}^{\pi_R}\left(\frac{1-\alpha}{\alpha}\right)g(\xi(z;\pi))\,h(z)\,\mathrm{d}z-\int_{\xi(0;\pi_L,\pi_R)}^{\psi-2\left(\frac{1-\alpha}{\alpha}\right)\pi_L} g\left(\gamma+2\left(\frac{1-\alpha}{\alpha}\right)\pi_L\right)h(\pi_L)\,\mathrm{d}\gamma\end{aligned}$$

which because

$$\int_{\xi(0;\pi_L,\pi_R)}^{\psi-2\left(\frac{1-\alpha}{\alpha}\right)\pi_L} g\left(\gamma+2\left(\frac{1-\alpha}{\alpha}\right)\pi_L\right)h(\pi_L)\,\mathrm{d}\gamma \quad = \quad h(\pi_L)\Big(1-G\big(\xi(\pi_L;\pi)\big)\Big),$$

reduces to

$$\left(\frac{1-\alpha}{\alpha}\right)\left[(1-H(\pi_R))g(\xi(\pi_R;\pi))+\int_{\pi_L}^{\pi_R} g(\xi(z;\pi))\,h(z)\,\mathrm{d}z-g(\xi(\pi_L;\pi))H(\pi_L)\right]. \tag{A.3}$$

Similarly, the first-order condition for R is

$$\frac{\partial F}{\partial \pi_R}(\pi_R-\pi_L) \quad = \quad 1-F(\pi_L,\pi_R), \tag{A.4}$$

and the derivative of the probability L wins with respect to π_R is

$$\frac{\partial F}{\partial \pi_R} = -h(\pi_R)\Big(1-G\big(\xi(\pi_R;\pi)\big)\Big)+\left(\frac{1-\alpha}{\alpha}\right)g(\xi(\pi_L;\pi))H(\pi_L)-\left(\frac{1-\alpha}{\alpha}\right)(1-H(\pi_R))g(\xi(\pi_R;\pi))$$
$$+\int_{\pi_L}^{\pi_R}\left(\frac{1-\alpha}{\alpha}\right)g(\xi(z;\pi))\,h(z)\,\mathrm{d}z-\int_{\xi(0;\pi_L,\pi_R)}^{\psi-2\left(\frac{1-\alpha}{\alpha}\right)\pi_L} g\left(\gamma+2\left(\frac{1-\alpha}{\alpha}\right)\pi_L\right)h(\pi_L)\,\mathrm{d}\gamma$$

which, through a similar calculation as for L, reduces to

$$\left(\frac{1-\alpha}{\alpha}\right)\left[-(1-H(\pi_R))g(\xi(\pi_R;\pi))+\int_{\pi_L}^{\pi_R} g(\xi(z;\pi))\,h(z)\,\mathrm{d}z+g(\xi(\pi_L;\pi))H(\pi_L)\right]. \quad \text{(A.5)}$$

Any pair of platforms (π_L,π_R), that simultaneously satisfy (A.2) and (A.4), along with $\gamma^*(\pi_L,\pi_R;z)$, characterize an interior equilibrium.

To solve explicitly for equilibrium platforms, we consider equilibria which are symmetric around ζ. Therefore, we let $\pi_L=\zeta-x$ and $\pi_R=\zeta+x$, for some $x\geq 0$. Using the expression in (A.1), we first establish that the probability that L wins is equal to $\frac{1}{2}$ in any equilibrium symmetric around ζ. There are two cases.

Case 1. When $x\geq(1-|\zeta|)\delta$, the probability L wins is

$$\int_{\underline{\beta}}^{\bar{\beta}}\int_{-2\left(\frac{1-\alpha}{\alpha}\right)\zeta}^{\psi-2\left(\frac{1-\alpha}{\alpha}\right)z} g\left(\gamma+2\left(\frac{1-\alpha}{\alpha}\right)z\right)h(z)\,\mathrm{d}\gamma\,\mathrm{d}z.$$

The bounds on the outer integral depend on whether $2\left(\frac{1-\alpha}{\alpha}\right)(z-\zeta)\in[-\psi,\psi]$, which reduces to $z\in\left[\zeta-\frac{\alpha\psi}{2(1-\alpha)},\zeta+\frac{\alpha\psi}{2(1-\alpha)}\right]$. Thus, the above expression simplifies to

$$\frac{1}{2}\left(H\left(\zeta+\frac{\alpha\psi}{2(1-\alpha)}\right)-H\left(\zeta-\frac{\alpha\psi}{2(1-\alpha)}\right)\right)+H\left(\zeta-\frac{\alpha\psi}{2(1-\alpha)}\right),$$

which is $\frac{1}{2}$ since H is uniform and centered at ζ.

Case 2. When $x < (1-|\zeta|)\delta$, the probability that L wins is

$$\int_{\zeta-x}^{\zeta+x} \int_{-2\left(\frac{1-\alpha}{\alpha}\right)}^{\psi-2\left(\frac{1-\alpha}{\alpha}\right)z} g\left(\gamma + 2\left(\frac{1-\alpha}{\alpha}\right)z\right) h(z)\,\mathrm{d}\gamma\,\mathrm{d}z + \left(1 - G\left(-2\left(\frac{1-\alpha}{\alpha}\right)x\right)\right) \times H\left(\zeta - \frac{\alpha\psi}{2(1-\alpha)}\right) + \left(1 - G\left(2\left(\frac{1-\alpha}{\alpha}\right)x\right)\right) H\left(\zeta + \frac{\alpha\psi}{2(1-\alpha)}\right).$$

If $x \geq \frac{\alpha\psi}{2(1-\alpha)}$, then the last two terms in the above expression reduce to 0, and through similar calculations as for the first case, the probability L wins is $\frac{1}{2}$. If $x < \frac{\alpha\psi}{2(1-\alpha)}$, then the above expression reduces to

$$\frac{1}{2}\left(H(\zeta+x) - H(\zeta-x)\right) + \left(\frac{\psi + 2\left(\frac{1-\alpha}{\alpha}\right)x}{2\psi}\right) H(\zeta-x) + \left(\frac{\psi - 2\left(\frac{1-\alpha}{\alpha}\right)x}{2\psi}\right)(1 - H(\zeta+x)),$$

which simplifies to $\frac{1}{2}$ because $H(\zeta-x) = 1 - H(\zeta+x)$.

Finally, in any symmetric equilibrium, because H is symmetric around ζ, and because

$$\xi(z;\zeta-x,\zeta+x) \in \left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right] \iff z \in \left[\zeta - \frac{\alpha\psi}{2(1-\alpha)}, \zeta + \frac{\alpha\psi}{2(1-\alpha)}\right],$$

the derivatives in equations (A.3) and (A.5) reduce to

$$\left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\min\left\{1, \frac{\frac{\alpha\psi}{2(1-\alpha)} + (1-|\zeta|)\delta}{2(1-|\zeta|)\delta}\right\} - \max\left\{0, \frac{(1-|\zeta|)\delta - \frac{\alpha\psi}{2(1-\alpha)}}{2(1-|\zeta|)\delta}\right\}\right). \tag{A.6}$$

Thus, the first-order conditions for any symmetric equilibrium $(\zeta-x, \zeta+x)$ are

$$x \quad = \quad \frac{1}{4\frac{\partial F}{\partial \pi_L}} \quad = \quad \frac{1}{4\frac{\partial F}{\partial \pi_R}}. \tag{A.7}$$

Using these equations we show that there exists a unique symmetric equilibrium.

First, consider a symmetric equilibrium with $x > (1-|\zeta|)\delta$. There are two cases to consider.

Case 1. When $(1-|\zeta|)\delta > \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) reduces to

$$\left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\frac{\frac{\alpha\psi}{2(1-\alpha)}+(1-|\zeta|)\delta}{2(1-|\zeta|)\delta}-\frac{(1-|\zeta|)\delta-\frac{\alpha\psi}{2(1-\alpha)}}{2(1-|\zeta|)\delta}\right)=\left(\frac{1}{4(1-|\zeta|)\delta}\right).$$

Plugging it back into (A.7), we get that $x=(1-|\zeta|)\delta$, which is a contradiction.

Case 2. When $(1-|\zeta|)\delta \leq \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$. Therefore, by equation (A.7), $x=\frac{\alpha\psi}{2(1-\alpha)}$. Therefore we conclude that a symmetric equilibrium where $x>(1+\zeta)\delta$ exists if and only if $(1-|\zeta|)\delta \leq \frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\zeta \leq \min\left\{\frac{\alpha\psi}{2(1-\alpha)\delta}-1,0\right\} \equiv \bar{\zeta}_L$ and $\zeta \geq \max\left\{1-\frac{\alpha\psi}{2(1-\alpha)\delta},0\right\} \equiv \bar{\zeta}_R$, and that $\pi_L^* = \zeta - \frac{\alpha\psi}{2(1-\alpha)}$ and $\pi_R^* = \zeta + \frac{\alpha\psi}{2(1-\alpha)}$ constitute this equilibrium.

Now, consider an equilibrium where $x \leq (1-|\zeta|)\delta$. As before, we consider two cases

Case 1. When $(1-|\zeta|)\delta < \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$, and by equation (A.7), $x=\frac{\alpha\psi}{2(1-\alpha)}$, which implies that $x \leq (1-|\zeta|)\delta < \frac{\alpha\psi}{2(1-\alpha)} = x$, a contradiction.

Case 2. When $(1-|\zeta|)\delta \geq \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) reduces to $\frac{1}{4(1-|\zeta|)\delta}$, and by equation (A.7), $x=(1-|\zeta|)\delta$. Therefore we conclude that a symmetric equilibrium where $x \leq (1+\zeta)\delta$ exists if and only if $(1-|\zeta|)\delta \leq \frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\zeta \in [\bar{\zeta}_L, \bar{\zeta}_R]$, and that $\pi_L^\dagger = \zeta-(1-|\zeta|)\delta$ and $\pi_R^\dagger = \zeta+(1-|\zeta|)\delta$ constitute an equilibrium.

Note that when $\zeta=\bar{\zeta}_L$ or $\zeta=\bar{\zeta}_R$, both (π_L^*,π_R^*) and $(\pi_L^\dagger,\pi_R^\dagger)$ coincide. Thus, for all ζ there exists a unique symmetric equilibrium. □

Proof of Proposition 2. The proof follows from the expressions in equations (8) and (9). □

Proof of Proposition 3. When $\zeta < \bar{\zeta}_L$ (and when $\zeta > \bar{\zeta}_R$)), the first derivative of $\pi_R^* - \pi_L^* = \frac{\alpha\psi}{1-\alpha}$ with respect to α is

$$\left.\frac{\partial(\pi_R^*-\pi_L^*)}{\partial\alpha}\right|_{\zeta<\bar{\zeta}_L} = \frac{\psi}{(1-\alpha)^2} > 0. \tag{A.8}$$

When $\bar{\zeta}_L < \zeta < \bar{\zeta}_R$, equilibrium polarization is $\pi_R^\dagger - \pi_L^\dagger = 2(1-|\zeta|)\delta$, which does not depend on α.

Now, differentiate the expression in $\bar{\zeta}_L$ to get

$$\frac{d\bar{\zeta}_L}{d\alpha} = \frac{\psi}{2(1-\alpha)^2\delta} > 0. \tag{A.9}$$

Thus, whenever interior to $[-1,0]$, $\bar{\zeta}_L$ is strictly increasing in α, and when it hits 0, it remains constant in α. By symmetry, $\bar{\zeta}_R$ is decreasing in α whenever interior, and remains 0 thereafter.

Average polarization is given by

$$\left(\frac{1}{2}\right)\left[\int_{-1}^{\bar{\zeta}_L}\left(\frac{\alpha\psi}{1-\alpha}\right)\,\mathrm{d}j + \int_{\bar{\zeta}_R}^{1}\left(\frac{\alpha\psi}{1-\alpha}\right)\,\mathrm{d}j + \int_{\bar{\zeta}_L}^{\bar{\zeta}_R} 2(1+\zeta^j)\delta\,\mathrm{d}j\right],$$

which simplifies to

$$\left(\frac{2+\bar{\zeta}_L-\bar{\zeta}_R}{2}\right)\cdot\left(\frac{\alpha\psi}{1-\alpha}\right) + (\bar{\zeta}_R-\bar{\zeta}_L)(1+\zeta^j)\delta.$$

Combining (A.8) and (A.9), this expression is strictly increasing in α. □

A.2 Model Extensions

A important and novel feature of our model is the relationship between district leaning and what candidates know about their voters. Specifically, as a district's leaning becomes more ideologically extreme candidates face less uncertainty about the location of their district's representative voter. In this supplement we consider two alternative modeling choices for how district leaning influences uncertainty about a district's representative voter. First, we consider when the precision of the signal provided by a district's leaning does not vary with the leaning. Second, we reverse (relative to the main model) how district leaning influences what candidates know about their district's representative voter. In each case we show that the formulation of district leaning in our main model is necessary for congruence with the empirical findings.

A.2.1 Variance Independent of Leaning

In this section we consider the case where the ideological location of a district's representative voter is drawn from a uniform distribution centered at the district's leaning, but where leaning does not otherwise influence the voter's ideal point. That is, suppose

$$z^j \sim U[\zeta^j - \delta, \zeta^j + \delta],$$

where all other aspects of the model are identical to the main model.

Proposition A.1. *In the unique symmetric equilibrium,*

$$\begin{aligned} \pi_L^* &= \zeta - \max\left\{\frac{\alpha\psi}{2(1-\alpha)}, \delta\right\} \\ \pi_R^* &= \zeta + \max\left\{\frac{\alpha\psi}{2(1-\alpha)}, \delta\right\}, \end{aligned} \tag{A.10}$$

there is an intensive margin if and only if $\alpha \geq \frac{2\delta}{2\delta+\psi}$*, and there is no extensive margin, i.e.,*

$$\bar{\zeta}_L = \begin{cases} -1 & \text{if } \alpha \leq \frac{2\delta}{2\delta+\psi} \\ 0 & \text{if } \alpha \geq \frac{2\delta}{2\delta+\psi} \end{cases}, \tag{A.11}$$

and $\bar{\zeta}_R = -\bar{\zeta}_L$.

Proof. The expression for the probability of victory remains similar to equation (A.1), with the only difference being that $h(z) = \frac{1}{2\delta}$ for $z \in [\zeta - \delta, \zeta + \delta]$.

Because of the symmetry in the model, at any symmetric equilibrium the probability either candidate wins is $\frac{1}{2}$. The first derivatives in equations (A.3) and (A.5) similarly reduce to

$$\frac{\partial F}{\partial \pi_L} = \frac{\partial F}{\partial \pi_R} = \left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\min\left\{1, \frac{\frac{\alpha\psi}{2(1-\alpha)} + \delta}{2\delta}\right\} - \max\left\{0, \frac{\delta - \frac{\alpha\psi}{2(1-\alpha)}}{2\delta}\right\}\right). \tag{A.12}$$

and the FOC's at any symmetric equilibrium $(\zeta - x, \zeta + x)$ are the same as in (A.7).

First, suppose there exists a symmetric equilibrium where $x > \delta$. Mirroring the proof in Proposition 1, we consider two cases.

Case 1. When $\delta > \frac{\alpha\psi}{2(1-\alpha)}$, the first derivative of the probability of winning function, F, with respect to both π_L and π_R, reduce to

$$\left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\frac{\frac{\alpha\psi}{2(1-\alpha)}+\delta}{2\delta}-\frac{\delta-\frac{\alpha\psi}{2(1-\alpha)}}{2\delta}\right)=\left(\frac{1}{4\delta}\right).$$

Plugging it back into (A.7), we get that $x = \delta$, which is a contradiction.

Case 2. When $\delta \leq \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.12) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$. Therefore, by equation (A.7), $x = \frac{\alpha\psi}{2(1-\alpha)}$. Therefore we conclude that a symmetric equilibrium where $x > \delta$ exists if and only if $\delta \leq \frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\alpha \geq \frac{2\delta}{2\delta+\psi}$, and that $\pi_L^* = \zeta - \frac{\alpha\psi}{2(1-\alpha)}$ and $\pi_R^* = \zeta + \frac{\alpha\psi}{2(1-\alpha)}$ constitute this equilibrium.

Now, consider an equilibrium where $x \leq \delta$. As before, we consider two cases

Case 1. When $\delta < \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.12) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$, and by equation (A.7), $x = \frac{\alpha\psi}{2(1-\alpha)}$, which implies that $x \leq \delta < \frac{\alpha\psi}{2(1-\alpha)} = x$, a contradiction.

Case 2. When $\delta \geq \frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.12) reduces to $\frac{1}{4\delta}$, and by equation (A.7), $x = \delta$. Therefore we conclude that a symmetric equilibrium where $x \leq \delta$ exists if and only if $\delta \geq \frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\alpha \leq \frac{2\delta}{2\delta+\psi}$, and that $\pi_L^* = \zeta - \delta$ and $\pi_R^* = \zeta + \delta$ constitute an equilibrium.

Taken together, the electoral equilibrium is expressed by $\pi_L^* = \zeta - \max\left\{\frac{\alpha\psi}{2(1-\alpha)}, \delta\right\}$ and $\pi_R^* = \zeta + \max\left\{\frac{\alpha\psi}{2(1-\alpha)}, \delta\right\}$. Two things become apparent. First, there is an intensive margin if and only if $\alpha \geq \frac{2\delta}{2\delta+\psi}$ because α affects polarization only in this case. And second, there is no extensive margin. That is,

$$\bar{\zeta}_L = \begin{cases} -1 & \text{if } \alpha \leq \frac{2\delta}{2\delta+\psi} \\ 0 & \text{if } \alpha \geq \frac{2\delta}{2\delta+\psi} \end{cases}, \tag{A.13}$$

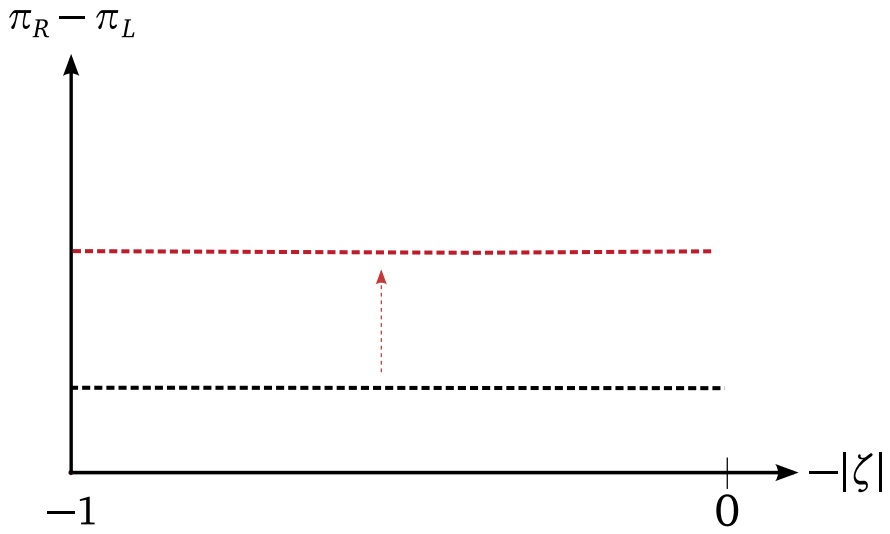
and $\bar{\zeta}_R = -\bar{\zeta}_L$. □

This establishes that when a district's leaning does not influence the quality of candidates' knowledge about their voters, then the average level of platform polarization is

$$2 \cdot \max\left\{\frac{\alpha\psi}{2(1-\alpha)}, \delta\right\},$$

which, by inspection, weakly increases in the salience of competence. Contrary to our main model, the salience of competence here affects the average level of platform polarization only along the intensive margin, and only when α is high enough. The empirical implications that follow from this model are illustrated in Figure A.1.

Figure A.1: Polarization and centrism when variance is independent of leaning



This figure illustrates the result in Proposition A.1. As α increases, polarization weakly increases uniformly for all leanings.

Figure A.1 should be contrasted with Figure 2 in the main text, which illustrates the empirical implications of our main model. Comparing these figures shows that the empirical implications of our main model, and not those of this extension, are consistent with our empirical findings. In particular, if this model extension were a better representation of the relationship between platform polarization and district leaning, then we should have found null results in the data. On the contrary, our empirical results demonstrate robust evidence for a relationship

between the average level of platform polarization and district leaning.

A.2.2 Variance Decreases in Centrism

In our main model, as a district's leaning becomes more extreme, the signal it provides about the location of the district's representative voter becomes more precise. In this section we reverse this feature of our model and suppose that as a district's leaning becomes *less* extreme the precision of the signal it provides about the location of the district's representative voter becomes *more* precise. Specifically, we suppose that

$$z^j \sim U[\zeta^j - (1+|\zeta^j|)\delta, \zeta^j + (1+|\zeta^j|)\delta,$$

and where all other aspects of the model are identical to the main model.

Proposition A.2. *In the unique symmetric equilibrium, for all centrists districts, i.e.* $\bar{\zeta}_L \leq \zeta \leq \bar{\zeta}_R$,

$$\begin{aligned} \pi_L^* &= \zeta - \frac{\alpha\psi}{2(1-\alpha)} \\ \pi_R^* &= \zeta + \frac{\alpha\psi}{2(1-\alpha)}; \end{aligned} \tag{A.14}$$

and for an extreme-left (extreme-right) district, i.e., for all $\zeta < \bar{\zeta}_L$ *(*$\zeta > \bar{\zeta}_R$*),*

$$\begin{aligned} \pi_L^\dagger &= \zeta - (1+|\zeta|)\delta \\ \pi_R^\dagger &= \zeta + (1+|\zeta|)\delta; \end{aligned} \tag{A.15}$$

and where

$$\bar{\zeta}_L = \min\left\{1 - \frac{\alpha\psi}{2(1-\alpha)\delta}, 0\right\} \quad \textit{and} \quad \bar{\zeta}_R = \max\left\{\frac{\alpha\psi}{2(1-\alpha)\delta} - 1, 0\right\}. \tag{A.16}$$

Proof. Because of the symmetry in the model, at any symmetric equilibrium the probability either candidate wins is $\frac{1}{2}$. The first derivatives in equations (A.3) and (A.5) similarly reduce

to

$$\left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\min\left\{1,\frac{\frac{\alpha\psi}{2(1-\alpha)}+(1+|\zeta|)\delta}{2(1+|\zeta|)\delta}\right\}-\max\left\{0,\frac{(1+|\zeta|)\delta-\frac{\alpha\psi}{2(1-\alpha)}}{2(1+|\zeta|)\delta}\right\}\right). \tag{A.17}$$

The first-order conditions for any symmetric equilibrium $(\zeta-x,\zeta+x)$ remain as in (A.7). Our proof now follows that for Proposition 1.

First, consider a symmetric equilibrium with $x>(1+|\zeta|)\delta$. There are two cases to consider.

Case 1. When $(1+|\zeta|)\delta>\frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.17) reduces to

$$\left(\frac{1-\alpha}{2\alpha\psi}\right)\left(\frac{\frac{\alpha\psi}{2(1-\alpha)}+(1+|\zeta|)\delta}{2(1+|\zeta|)\delta}-\frac{(1+|\zeta|)\delta-\frac{\alpha\psi}{2(1-\alpha)}}{2(1+|\zeta|)\delta}\right)=\left(\frac{1}{4(1+|\zeta|)\delta}\right).$$

Plugging it back into (A.7), we get that $x=(1+|\zeta|)\delta$, which is a contradiction.

Case 2. When $(1+|\zeta|)\delta\leq\frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.17) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$. Therefore, by equation (A.7), $x=\frac{\alpha\psi}{2(1-\alpha)}$. Therefore we conclude that a symmetric equilibrium where $x>(1+\zeta)\delta$ exists if and only if $(1+|\zeta|)\delta\leq\frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\zeta\geq\min\left\{1-\frac{\alpha\psi}{2(1-\alpha)\delta},0\right\}\equiv\bar{\zeta}_L$ and $\zeta\leq\max\left\{\frac{\alpha\psi}{2(1-\alpha)\delta}-1,0\right\}\equiv\bar{\zeta}_R$, and that $\pi_L^*=\zeta-\frac{\alpha\psi}{2(1-\alpha)}$ and $\pi_R^*=\zeta+\frac{\alpha\psi}{2(1-\alpha)}$ constitute this equilibrium.

Now, consider an equilibrium where $x\leq(1+|\zeta|)\delta$. As before, we consider two cases

Case 1. When $(1+|\zeta|)\delta<\frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) is $\left(\frac{1-\alpha}{2\alpha\psi}\right)$, and by equation (A.7), $x=\frac{\alpha\psi}{2(1-\alpha)}$, which implies that $x\leq(1+|\zeta|)\delta<\frac{\alpha\psi}{2(1-\alpha)}=x$, a contradiction.

Case 2. When $(1+|\zeta|)\delta\geq\frac{\alpha\psi}{2(1-\alpha)}$, the RHS of equation (A.6) reduces to $\frac{1}{4(1+|\zeta|)\delta}$, and by equation (A.7), $x=(1+|\zeta|)\delta$. Therefore we conclude that a symmetric equilibrium where $x\leq(1+\zeta)\delta$ exists if and only if $(1+|\zeta|)\delta\leq\frac{\alpha\psi}{2(1-\alpha)}$ which is equivalent to $\zeta\leq\bar{\zeta}_L$ and $\zeta\geq\bar{\zeta}_R]$, and that $\pi_L^\dagger=\zeta-(1+|\zeta|)\delta$ and $\pi_R^\dagger=\zeta+(1+|\zeta|)\delta$ constitute an equilibrium.

Note that when $\zeta=\bar{\zeta}_L$ or $\zeta=\bar{\zeta}_R$, both (π_L^*,π_R^*) and $(\pi_L^\dagger,\pi_R^\dagger)$ coincide. Thus, for all ζ there exists a unique symmetric equilibrium. □

To connect this characterization with the empirical implications of this model we have

Proposition A.3. *(i) Platform polarization in centrist districts is strictly decreasing in the ideological leaning of the district, i.e., $-|\zeta|$, whereas there is no relationship between platform polarization and district leaning in extreme districts.*

(ii) The average level of polarization across districts is strictly increasing in the salience of competence, α. In particular, the level of polarization in centrist districts, $\pi_R^* - \pi_L^*$, is strictly increasing in α, whereas the level of polarization in extreme districts, $\pi_R^\dagger - \pi_L^\dagger$, is constant in α. Moreover, the share of centrist districts increases in α.

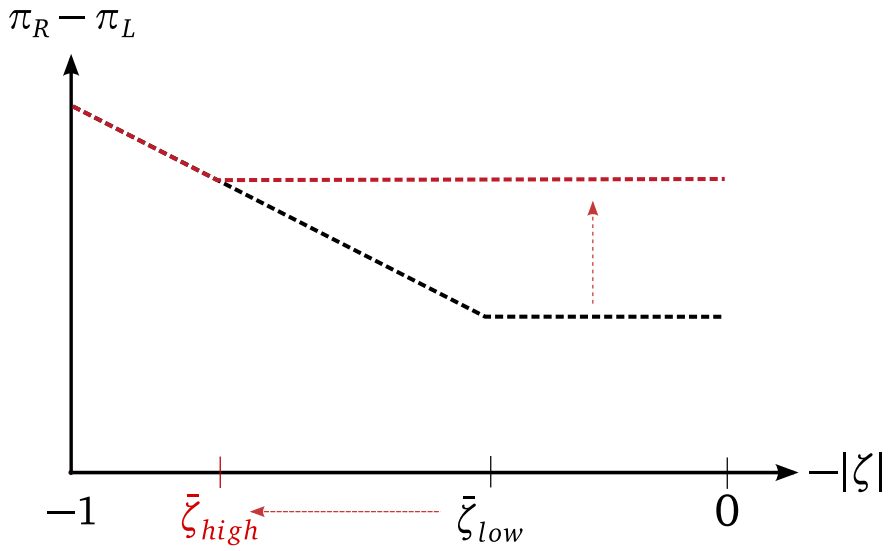
Proof. The first claim follows through the expression in (A.14) and (A.15).

For the second, the expression in (A.15) implies that the intensive margin is the same as in the model in the main text. The extensive margin serves to increase the share of "centrist districts" where competition is driven by competence uncertainty, where the intensive margin is in effect. As opposed to Proposition 3, in this version of the model, this increase in average polarization is concentrated in centrist districts. □

The nature of our main results flips regarding which districts are responsible for increased polarization. The empirical implications produced by this model are illustrated in Figure A.2. Contrasting this with Figure 2 in the text, which illustrates the empirical implications of our main model, shows that the empirical implications of this model are not consistent with our empirical findings. In particular, if this model extension were a better representation of the relationship between platform polarization and district leaning, then we should have found results in the data opposite the sign of those we found.

These results, Propositions A.1 and A.2, are important because they show the importance of how we model district leaning in our main model in producing our empirical results.

Figure A.2: Polarization and centrism when variance decreases in centrism



This figure illustrates the result in Proposition A.2. $\bar{\zeta}_{low}$ and $\bar{\zeta}_{high}$ denote the cutoffs that determine whether a district is extreme or centrist when α is low or high respectively. When α is low, there is a strong negative relationship between the centrism of the district, $-|\zeta|$, and polarization. As α becomes high, the share of centrists districts increases, the negative relationship between polarization and $-|\zeta|$ attenuates, and average polarization increases, with the increase concentrated in centrist districts.

B Building the Campaign Proposals Dataset

The campaign proposals for each candidate are available for the mayoral elections of 2012, 2016, and 2020 at the following the website: *https://divulgacandcontas.tse.jus.br/divulga/*. For the top two candidates in our 95 large cities in these three elections, we had a potential of 570 proposals, which implies a maximum of 285 municipality-year observations for the polarization measure in our data. Given that a few candidates failed to produce the document, our effective sample has 257 observations.

The downloaded documents in PDF were first converted to text and then incorporated into a corpus. As usual, we removed *stopwords*, symbols, separators, punctuation, numbers, and accents; converted all characters to lower-case; and kept only words with two or more letters.

We also made sure that our methodology counted the words that directly refer to the names of the budget categories present in the FINBRA database of local finances. Accordingly, we manually converted the following pairs of words to a single term: *Meio Ambiente* (Natural

Enviroment) and *Assistência Social* (Social Assistence). None of the other names of budget categories were compound words.

As it is usual, we also removed words that were too common or uncommon. More precisely, we only kept words that appear in at least 10% of the documents, and no more than 90% of documents. This gave us a total of 3,380 words for the analysis. We emphasize that all policy words from our list were kept in the dataset whether or not they satisfy these conditions. This means that this step is relatively more relevant to the polarization measure built with the *Wordscores* methodology. Accordingly, the results using *Wordscores* remain robust if we change out thresholds above by or ±5% (available upon request).

With this data, we calculate the frequency of each policy word as a share of total frequency of policy words in each document. We use these frequencies to calculate the polarization level in each city-year, which is the 6-dimensional Euclidean distance between the proposals of the top two candidates. For the *Wordscores* methodology we train the algorithm on the 2012 proposals of the 12 most relevant parties in the country in 2012, which are classified as either left (score of -1) or right (score of 1). Based on this, each proposal receives a score, and the polarization level in each city-year is the absolute difference between the scores of the top two candidates. Finally, for the seeded-topic model the algorithm generated 6-topics with our seed words, and for every document, it attributed the weight related to each topic. This allowed us to again build a city-year polarization score based on the 6-dimensional Euclidean distance between the topic-weights of the top two candidates.

Table B.1: Most frequent words in the sample (1-100)

Word	Count	Word	Count	Word	Count
cidade	16861	todos	4835	fortalecer	3426
municipal	16128	ser	4792	esporte	3352
saude	13596	implantacao	4728	todas	3330
programa	10630	criacao	4693	renda	3295
gestao	10523	promover	4666	**ambiental**	3283
educacao	9919	forma	4656	espacos	3235
municipio	9674	centro	4589	sociais	3225
acoes	9616	acesso	4446	maior	3221
governo	9607	programas	4424	bairros	3160
desenvolvimento	9268	vida	4357	novas	3080
servicos	8309	recursos	4292	formacao	2976
plano	8242	projetos	4212	lei	2965
social	8127	construcao	4112	bem	2957
populacao	7987	**escolas**	4111	culturais	2924
atendimento	6855	meio	4070	sobre	2912
ampliar	6626	municipais	4065	apoio	2906
publica	6601	prefeitura	4021	outros	2902
nao	6564	projeto	3997	direitos	2843
politicas	6323	anos	3991	estado	2835
sao	6181	**transporte**	3989	administracao	2821
criar	5978	participacao	3946	**mobilidade**	2819
cultura	5860	atividades	3901	novos	2801
rede	5810	garantir	3831	infraestrutura	2771
sistema	5800	area	3818	uso	2758
qualidade	5772	tambem	3776	secretaria	2745
pessoas	5715	urbana	3773	planejamento	2741
areas	5671	lazer	3692	outras	2735
publicos	5600	atraves	3677	equipamentos	2729
seguranca	5526	ensino	3647	propostas	2703
publico	5422	unidades	3534	economia	2694
implantar	5306	ampliacao	3521	parcerias	2680
politica	5186	sociedade	3510	visando	2667
trabalho	5120	alem	3502		
publicas	4841	parceria	3440		

Table and footnotes continue on the next page...

Table B.2: Most frequent words in the sample (101-200)

Word	Count	Word	Count	Word	Count
turismo	2662	**escola**	2138	nova	1825
cultural	2659	objetivo	2114	familia	1816
empresas	2634	producao	2113	**deficiencia**	1811
sera	2621	**meio ambiente**	2107	conselho	1811
criancas	2599	**escolar**	2106	prevencao	1796
controle	2597	assim	2091	oferta	1791
cada	2591	obras	2078	comunidade	1786
ainda	2582	ate	2074	tecnologia	1757
federal	2561	setor	2065	deve	1753
grande	2558	tempo	2057	junto	1752
regiao	2550	**transito**	2052	espaco	1752
assistencia social	2536	numero	2044	transparencia	1747
melhoria	2494	melhor	2043	geracao	1743
jovens	2460	urbano	2042	**agua**	1742
local	2441	nacional	2040	poder	1736
profissionais	2401	realizar	2016	rua	1736
promocao	2369	realizacao	2011	especial	1733
servico	2368	incentivar	1999	ano	1723
protecao	2368	emprego	1980	toda	1721
condicoes	2359	rio	1975	acao	1716
situacao	2304	familias	1964	referencia	1716
violencia	2300	fortalecimento	1960	mil	1705
atencao	2271	economico	1953	rural	1705
civil	2267	centros	1950	coligacao	1705
processo	2227	manutencao	1910	fundamental	1687
implementar	2215	servidores	1907	valorizacao	1685
mulheres	2198	investimentos	1897	central	1679
melhorar	2197	capacitacao	1894	estrutura	1671
sustentavel	2196	eventos	1890	serao	1663
integracao	2163	diretrizes	1882	incentivo	1657
inclusao	2160	partir	1881	construir	1643
desenvolver	2156	cidadania	1878	principais	1640
locais	2156	**alunos**	1874		
novo	2154	cidadao	1864		

Policy-related words are shown in bold.

C TABLES

Table C.1: Polarization of Mayoral Campaigns During the Pandemic (ex-health care)

DV: Campaign Polarization	(1)	(2)	(3)	(4)
β_1	0.308*	0.330*	0.346*	
	(0.122)	(0.123)	(0.125)	
β_2	0.282*	0.296*		
	(0.141)	(0.145)		
β_3	-0.751*	-0.782*	-0.806*	-0.777*
	(0.282)	(0.283)	(0.289)	(0.286)

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate.

Table C.2: Main Results with 10 Policy Categories

DV: Campaign Polarization	(1)	(2)	(3)	(4)
β_1	0.162*	0.172*	0.174*	
	(0.081)	(0.082)	(0.082)	
β_2	0.325*	0.342*		
	(0.129)	(0.132)		
β_3	-0.441*	-0.459*	-0.475*	-0.467*
	(0.192)	(0.195)	(0.196)	(0.196)
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate. Includes all 10 budget categories shown in Figure 1 (text). The keywords for the remaining 4 categories are: Culture: Culture (*Cultura*); Sports and Leisure: Sport (*Esporte*), Leisure (*Lazer*); Housing: Habitation (*Habitação*); and Businesses and Tourism: Economy (*economia*), Firm (*empresa*), and Tourism (*turismo*).

Table C.3: Main Results with Policy Words taken from the 300 Most Frequent

DV: Campaign Polarization	(1)	(2)	(3)	(4)
β_1	0.248*	0.257*	0.290*	
	(0.116)	(0.120)	(0.120)	
β_2	0.222	0.228		
	(0.181)	(0.185)		
β_3	-0.682*	-0.696*	-0.778*	-0.736*
	(0.276)	(0.280)	(0.284)	(0.278)
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate. The additional words are: Transportation and Infrastructure: Bus (*Onibus*); Public Security: Guarda (*Guard*); and Sanitation and The Environment: Collection (*Coleta*) and Residues (*Resíduos*).

Table C.4: Main Results with the *Wordscores* Methodology

DV: Campaign Polarization	(1)	(2)	(3)	(4)
Data Trained on the 12 Most Relevant Parties				
β_1	0.175+	0.225*	0.256*	
	(0.091)	(0.087)	(0.098)	
β_2	0.501*	0.486*		
	(0.148)	(0.139)		
β_3	-0.515*	-0.575*	-0.655*	-0.613*
	(0.229)	(0.220)	(0.250)	(0.247)
Data Trained on the 12 Most Relevant Parties, excluding centrists PMDB, PSDB, PPS, and PDT				
β_1	0.240*	0.272*	0.317*	
	(0.102)	(0.103)	(0.112)	
β_2	0.642*	0.627*		
	(0.161)	(0.156)		
β_3	-0.679*	-0.717*	-0.815*	-0.757*
	(0.256)	(0.258)	(0.281)	(0.276)
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate.

Table C.5: Main Results with the *Seeded Topic Model* Methodology

DV: Campaign Polarization	(1)	(2)	(3)	(4)
β_1	0.270*	0.301*	0.307*	
	(0.131)	(0.129)	(0.133)	
β_2	0.366*	0.359+		
	(0.183)	(0.184)		
β_3	-0.648*	-0.685*	-0.742*	-0.738*
	(0.318)	(0.311)	(0.322)	(0.321)
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate.

Table C.6: Robustness of Results to the Right-Shift in 2016-2020

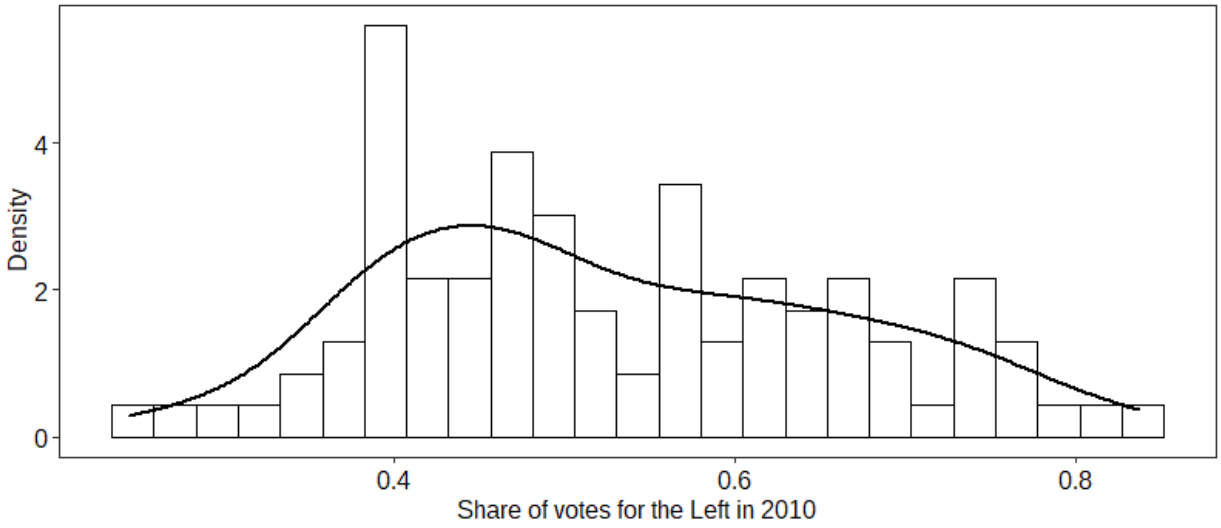
DV: Campaign Polarization	(1)	(2)	(3)	(4)
β_1	0.220+	0.224+	0.316*	
	(0.122)	(0.122)	(0.114)	
β_2	0.294+	0.298*		
	(0.151)	(0.150)		
β_3	-0.582*	-0.586*	-0.753*	-0.716*
	(0.266)	(0.266)	(0.252)	(0.245)
Election Covariates	No	Yes	Yes	Yes
Municipality F.E.	No	No	No	Yes
Year F.E.	No	No	No	Yes

+p<0.1, *p<0.05. A total of 255 observations. Standard errors are clustered by municipality (parenthesis). The coefficients reflect the regression in equation 13. The outcome was normalized to values between zero and one. All regressions control for the total number of words in the two documents, the election covariates are defined in the text. The regression also includes the Right-Shift variable – as defined in the text – as a covariate.

D FIGURES

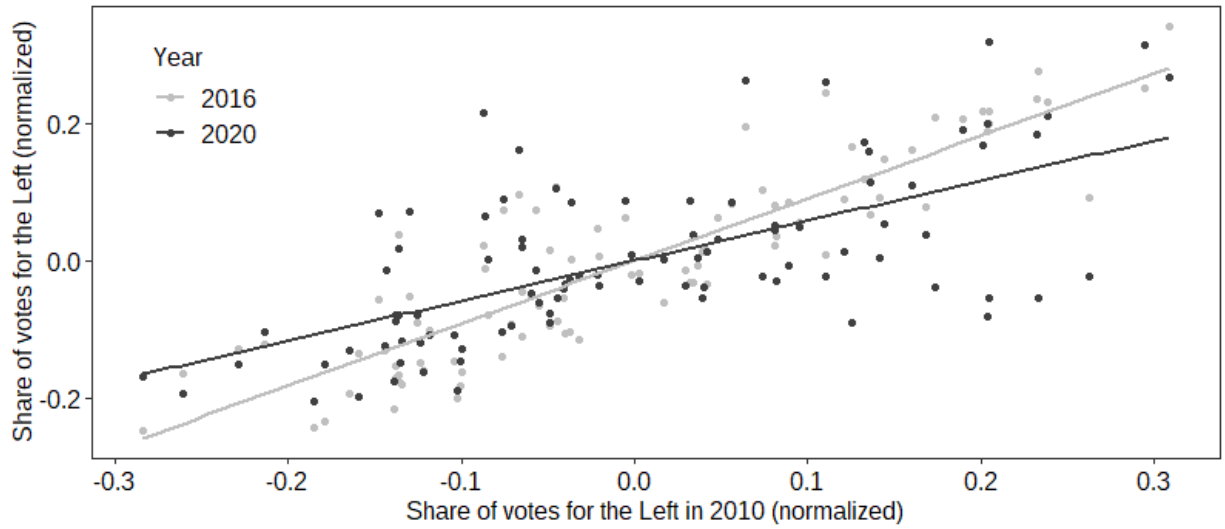
Figure D.1: The Presidential Left-wing Vote in Brazil

The Distribution of the Left-wing Vote in the 2010 Presidential Race



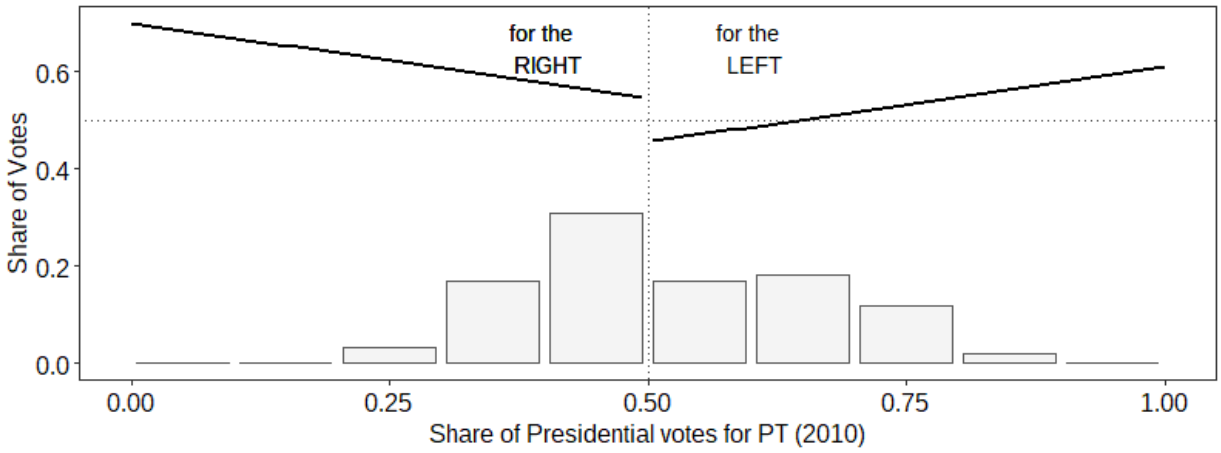
The y-axis shows the density of the variable. The share of votes is calculated based on the PT vote in the seond round of the 2010 election.

The Left-wing Presidential Vote is Stable Over Time Across Cities

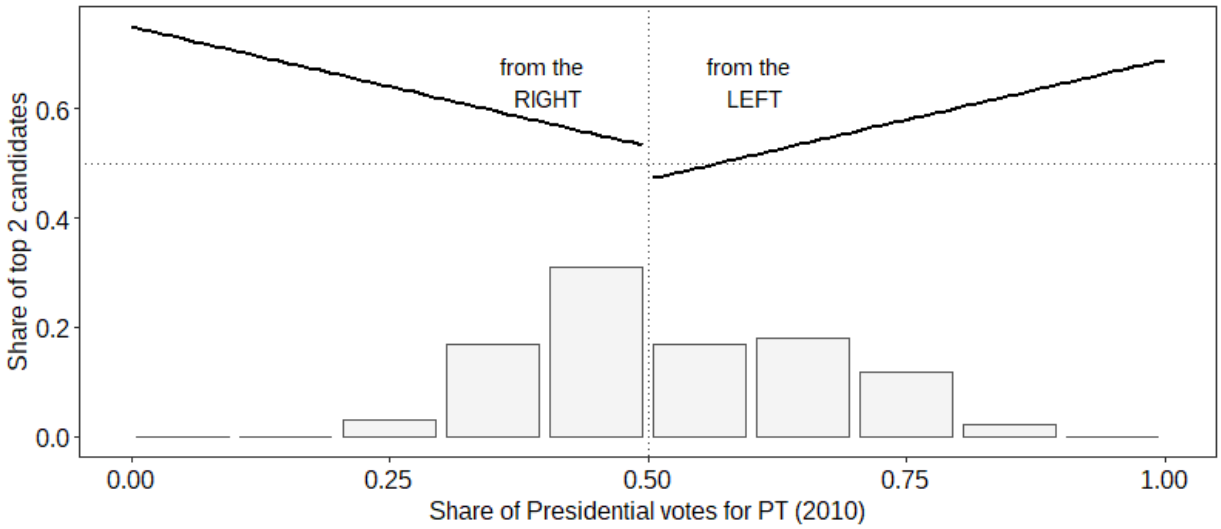


The y-axis shows Left-wing vote in the 2014 and 2018 Presidential races. The x-axis shows the same variable for the 2010 race.

Figure D.2: Presidential Elections are a Good Predictor of Mayoral Election Outcomes



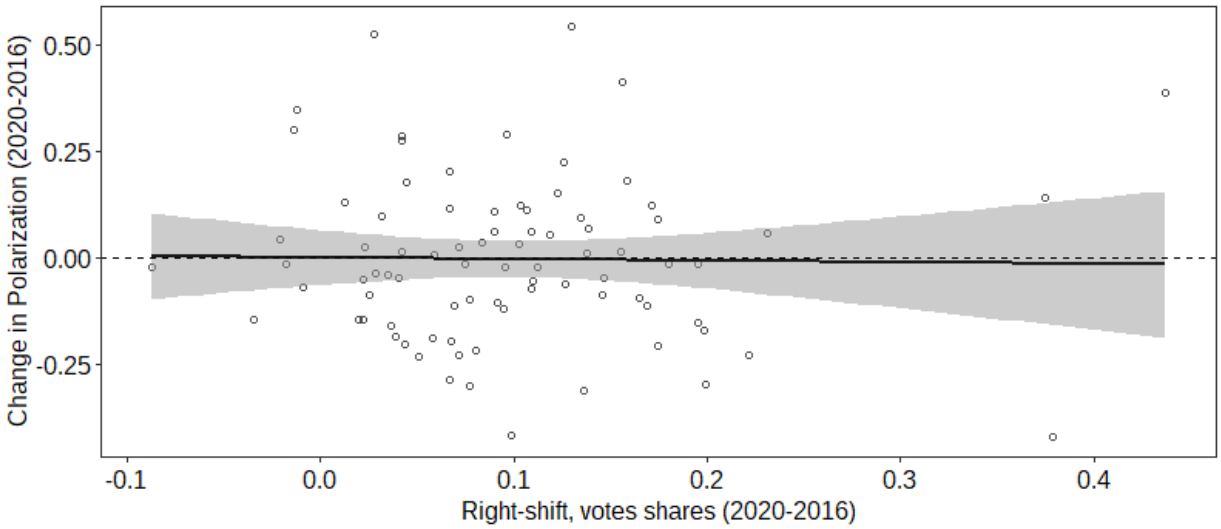
The y-variable is the share of votes of Right-wing (Left-wing) parties in the election's first round, for all $L_j < 0.5$ ($L_j > 0.5$).



The y-variable is the number of Right-wing (Left-wing) parties among the top 2 in the race, for all $L_j < 0.5$ ($L_j > 0.5$).

For both plots, the columns show the distribution of the sample along the x-axis. For every municipality, the x-variable is L_j as defined in the text. The lines show the predicted value of the y-variable after regressing it on L_j. The regression also controls for the local poverty level of the municipality in 2010, the party of the mayor elected in 2008, and election fixed effects.

Figure D.3: The Right-shift in the Presidential Vote and Polarization Shifts



The y-axis shows the change in polarization between 2016-2020, according to the main measure described in the text. The x-axis shows the change in the Right-wing vote between the 2014 and 2018 Presidential races. The p-value of the slope is 0.6.