# (Un)Natural Disasters: Electoral Cycles in Disaster Relief

Comparative Political Studies 2022, Vol. 0(0) 1–40 © The Author(s) 2022 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/00104140211047410 journals.sagepub.com/home/cps

# Alicia Cooperman<sup>1</sup> 0

#### Abstract

Emergency spending is often exempt from campaign period restrictions and procurement guidelines, making it attractive for opportunistic politicians, but natural disasters are seen as outside political business cycles. However, droughts are frequent but challenging to measure, so politicians can leverage discretion for electoral gain. This paper analyzes electoral cycles, term limits, and partisan targeting around municipal drought declaration in Northeast Brazil. Two sources of exogeneity (rainfall shocks, electoral calendar) isolate the effect of non-climatic factors on drought declarations. I find that drought declarations, which trigger relief, are more likely in mayoral election years. Incumbents are more likely to win re-election if they declare a drought in the election year, during below or even above average rainfall. The results are consistent with interviews suggesting voters reward competent mayors and mayors trade relief for votes. This study highlights the interaction between distributive and environmental politics, which has increasing consequences due to climate change.

#### **Keywords**

elections, public opinion, voting behavior, Latin American politics, subnational politics, natural disasters, environmental politics

**Corresponding Author:** Alicia Cooperman, Department of Political Science, TAMUS – 4348, Texas A&M University, College Station, TX 77843, USA. Email: alicia.cooperman@tamu.edu

<sup>&</sup>lt;sup>1</sup>Texas A&M University, College Station, TX, USA

## Introduction

Who gets critical government resources, and under what conditions? Opportunistic politicians use policy levers to increase their chances of re-election (Downs, 1957), and scholars have documented electoral and partisan cycles around government programs that politicians can expect to control during their term, such as economic policy, public sector employment, or annual budgets (Dubois, 2016; Shi & Svensson, 2006). These and other political factors, such as pork politics and clientelism, lead to the non-programmatic distribution of public goods and services.<sup>1</sup> To curb this, numerous context-based constraints including distribution criteria, limits on spending before elections, and public procurement guidelines—restrict politicians' willingness and ability to manipulate the timing and distribution of public resources (Rose, 2006; Calvo & Murillo, 2004; Franzese, 2002; Clark et al., 1998).

Regulations to prevent the political use of public resources have limitations. Disaster relief, due to its urgency, is often exempt from campaign period or procurement restrictions. Consequently, I argue that disaster response could also follow political business cycles—potentially more so than other policies. At first glance, this seems implausible. Political scientists primarily focus on infrequent disasters, such as once-in-a-generation hurricanes or earthquakes (Oliver & Reeves, 2015).<sup>2</sup> While exemptions from spending restrictions increase the possibility of political targeting or corruption, most politicians cannot expect an earthquake, major hurricane, or public health emergency in their term. Thus, politicians are unlikely to use emergency relief for infrequent disasters in their re-election strategy.

However, some disasters, especially drought shocks, are frequent, difficult to measure, and widespread. While unpredictable in their exact timing, they are frequent enough that a politician in a drought-prone area serving a 4 year term will likely experience a drought shock. Politicians presumably cannot fabricate a disaster such as a hurricane or a wildfire, even if the impacts of these events are endogenous to local conditions and policy decisions. However, drought does not have a clear definition, and the subjective nature of its declaration process in many countries may make it more vulnerable to corruption or exploitation than other hazards, including other frequent ones like floods or tropical storms. While only one of myriad types of disasters, drought has the potential for substantial impact on distributive politics throughout the world. More than two billion people live in dry lands vulnerable to droughts, and this includes more than half of the world's poor (Mearns & Norton, 2010).

Politicians can thus leverage the subjective nature of drought to claim that they are in a state of emergency in order to benefit from waivers of normal oversight mechanisms. The relative frequency combined with limited oversight makes this a reliable electoral strategy that can lead to an exaggerated political business cycle that is prone to partisan targeting, pork politics, and clientelism. Furthermore, politicians can pursue a combination of programmatic and non-programmatic strategies under a halo of disaster relief, since disasters are often seen as natural or random.<sup>3</sup>

Given the same environmental conditions, how do political factors shape where and when constituencies get critical resources for drought relief? I analyze the role of electoral cycles, term limits, and partisan alignment in the distribution of municipal drought declarations in Brazil, where mayors are limited to two consecutive terms. An approved emergency declaration automatically triggers distribution of much-needed relief, and my qualitative interviews suggest that politicians often use drought relief to improve their chances for re-election through democratic responsiveness and clientelism. Using data from 1999 to 2012, I find that, given the same drought conditions, drought emergencies are more likely to be declared in election years. Incumbents are more likely to win re-election when they declare a drought in the election year, irrespective of conditions of below or above average rainfall. I also find that many municipalities receive drought declarations during periods of above average rainfall, though this is less likely among term-limited mayors in election years. As such, drought declarations are not an automatic response to severe weather conditions alone.<sup>4</sup> Rather, they are used strategically for political gain. I do not find evidence that the effect of election years on drought declaration is stronger for mayors from the same party as the governor or president, though I find preliminary evidence for a partisan-electoral cycle whereby mayors from the Workers' Party (Partido dos Trabalhadores-PT) were more likely to have droughts declared in election years.

This paper contributes to our understanding of distributive politics, environmental politics, and the interaction between the two. It is part of a broader move to understand how the type of government resource impacts who benefits from politically-driven distribution (Kramon & Posner, 2013), and it shows how disaster relief, when disasters are frequent and hard to measure, can indeed follow political business cycles and perhaps have more pronounced cycles due to relaxed accountability and oversight. When electoral cycles interact with natural disasters, there can be drastic consequences for public welfare and the efficient and programmatic distribution of limited public resources as well as incentives for adaptation to climate change. As natural disasters are likely to become more frequent and more severe due to climate change (IPCC, 2014), I encourage scholars to systematically evaluate the role of politics in the distribution of government resources for emergency relief.

# **Theory and Hypotheses**

Office-seeking, opportunistic politicians will use available tools to gain votes and win re-election (Downs, 1957). A rich literature in distributive politics

suggests that many politicians target public policies for particularistic, politically motivated reasons instead of, or in addition to, following programmatic, technical guidelines. Multiple political factors shape the distribution of public goods and services, including political business/budget cycles (Dubois, 2016; Shi & Svensson, 2006), incumbency and term limits (Alt et al., 2011), and partisan affiliation (Brollo & Nannicini, 2012). Politicians' ability and willingness to strategically target government policies depend on their access to those policies and whether voters reward politicians for those policies (Calvo & Murillo, 2004).<sup>5</sup> The literature provides numerous assumptions about voter behavior, including that voters are myopic and reward politicians for election year policies due to recency bias (Healy & Malhotra, 2009) or that voters are rational and learn from politicians' actions in election years, especially in response to exogenous events (Franzese, 2002).<sup>6</sup>

Natural disasters provide an interesting case for evaluating theories about political behavior (Oliver & Reeves, 2015; Healy & Malhotra, 2013).<sup>7</sup> However, for a policy to be subject to a political business cycle, politicians must be able to manipulate the timing of the policy. Many disasters are infrequent and clearly identifiable; most politicians cannot expect that an earthquake will occur during their term and cannot fabricate an earthquake.<sup>8</sup>

I highlight a specific type of disaster—drought—that is frequent and difficult to measure. Like other disasters, its relief is not subject to campaign period or procurement restrictions, making it especially attractive to politicians seeking to buy votes or target government contracts to valuable constituencies or campaign donors. In drought-prone regions, a politician can expect that a drought will happen in her district during her term, and she may be more likely to get away with non-programmatic targeting of drought relief by claiming disaster response. Drought is a creeping phenomenon that affects areas over many months and years, and its impacts are hard to measure. In many countries, drought declarations are based on both climate and economic criteria and rely on detailed local information that may be challenging for central bureaucrats to access; the subjective criteria combined with low data availability can increase the ability of local politicians to manipulate indicators.

As in the political business cycle literature, I assume that voters lack complete information about the mayor's competence. If a politician provides earthquake relief in an election year, retrospective voters are likely to reward the politician for doing a good job. Prospective voters may perceive the politician as an effective leader who is likely to do other things well in the future. Disasters such as earthquakes are infrequent, so voters do not expect the same politician to provide earthquake relief in the near future. However, the prospective mechanism is even stronger for frequent disasters, since the provision of relief before an election suggests that a politician will be able to provide drought relief again in the future. Below, I outline the hypotheses that derive from theories about electoral cycles and retrospective voting, whereby drought declarations are more likely in election years, and voters reward politicians for drought declarations and the ensuing relief. The literature also highlights a competing theory of partisan cycles, whereby drought declarations are more likely for politicians who are politically aligned with central decision-makers; in Brazil this would reflect partisan alignment between a mayor and the governor or president. While context-specific factors make the partisan cycle (or partisan-electoral cycle) less likely in this case, I still test this important alternative mechanism.

### Electoral Cycles

If politicians are office-seekers who also want to help their fellow citizens, and/or if voters reward politicians for competently providing programmatic relief in the aftermath of true crises, then politicians will want to provide relief during droughts. We should see more droughts declared during below average rainfall periods (relative to above average rainfall periods), all else equal, regardless of time in the electoral cycle.

**Hypothesis 1.** *Droughts are more likely to be declared during below average rainfall periods than above average rainfall periods.* 

Programmatic distribution would imply that politicians declare droughts when and where there are rainfall shocks. Rainfall shocks are unpredictable and do not follow cycles that align with exogenous election calendars (every 2, 4, 5, or 6 years).<sup>9</sup> Therefore, if we see more droughts declared in election years, we can reasonably assume that political factors are also driving the distribution of these critical resources.

**Hypothesis 2.** *Droughts are more likely to be declared during election years, given the same environmental conditions.* 

The prospective and retrospective models for voting behavior focus on incumbents running for re-election, and scholars have found systematic differences in politicians' behavior depending on their status with respect to incumbency and term limits (Alt et al., 2011). In systems with strong parties or for parties with strong party identification, incumbency carries through the party. For example, a mayor from Party X may not be eligible for re-election, but if she distributes relief during the election year, the candidate from Party X will reap the rewards. In systems with weak parties or for parties with weak ideology and party identification, voting behavior is more personalistic than partisan. The case in this article is Brazil, which has a weak party system, especially at the municipal level. I therefore focus on incumbent politicians

instead of parties (De Magalhaes, 2015), and I expect incumbent politicians who are eligible for re-election to be more likely to go through emergency declaration procedures than those who are term limited.

While the public may perceive drought relief to be a programmatic resource, politicians can actually target it to specific constituencies. Many drought relief programs include funds for building roads to drought-affected areas, investing in new reservoirs and wells in drought-prone regions, and cash transfers to impoverished subsistence farmers, among others. Most of these programs could reasonably be considered standard public policies, such as infrastructure investment and social welfare policy. Since voters value these public goods and services regardless of the environmental conditions, politicians may have electoral incentives to request and declare droughts even during above average rainfall.

However, access to government resources is often costly, and emergency declarations require time, knowledge of bureaucratic processes, and political capital. Since providing drought relief during above average rainfall is sketchy at best, politicians may be unwilling to use their political capital (by requesting funds from political allies in other areas of government) or risk exposing themselves to corruption investigations. Politicians are less likely to bear the cost of declaring drought during above average rainfall in an election year if they are not eligible for re-election. While this is a fairly narrow category, it still encompasses a large number of instances: most incumbents run for reelection, and rainfall is above average half of the time. If we were to see more droughts declared under these conditions, it would be further evidence that the distribution is politically motivated.

**Hypothesis 3.** The effect of election years on drought declarations will be smaller for term-limited mayors, especially during far above average rainfall conditions.

#### Voter Response

I expect that politicians will only go out of their way to target disaster relief during election years if they anticipate that voters will reward them for doing so.<sup>10</sup> Politicians could also benefit economically if they have private involvement in the firms contracted for providing relief, and they could use those private returns to invest in their re-election campaigns. Some scholars argue that voters irrationally punish politicians for natural disasters (Heersink et al., 2017; Achen & Bartels, 2017), while others find that voters are rational in these responses because disasters provide new information about incumbents (Ashworth et al., 2018; Masiero & Santarossa, 2020). Evidence from the U.S. suggests that voters punish politicians for disasters but reward them for providing relief (Gasper & Reeves, 2011),<sup>11</sup> especially when they provide relief closer to elections.<sup>12</sup>

**Hypothesis 4.** *Incumbents are more likely to win re-election if they provide relief during an election year, given the same environmental conditions.* 

#### Political Parties

Lastly, the distributive politics literature emphasizes the role of partisan alignment as an often significant factor in distribution of public resources. Emergency declarations require approvals at multiple levels of government, including the sign-off of elected officials. Special ties due to party affiliation could increase the likelihood of a mayor submitting a declaration request or having a submitted request approved. Scholars have found evidence for political targeting of disaster relief to politically important states or counties in the United States (Healy & Malhotra, 2009; Gasper & Reeves, 2011; Reeves, 2011; Garrett & Sobel, 2003).

A few key mechanisms could be at play. *Partisan Alignment–Mayor Credit*: Members of higher office (e.g., the governor) could target declarations to incumbent mayors from the same party during municipal election years, thus helping aligned mayors win election. This would help the party as well as encourage the mayor to campaign for the party or governor in the next state/ federal election. *Partisan Alignment–Governor Credit*: Members of higher offices could target declarations to mayors from the same party during state/ federal election years, and the governor might expect the aligned mayors to attribute relief benefits to the governor and campaign on her behalf to increase the governor's vote share in that municipality. *Partisan Support*: Political parties could train or support their party members in navigating complicated bureaucratic declaration processes. *Partisan Ideology*: Political parties with mayors from certain parties are more likely to pursue and receive declarations.<sup>13</sup>

However, higher-level officials and political parties are constrained by contextual factors that affect their ability and willingness to use political business cycles (Franzese, 2002; Clark et al., 1998). I briefly outline some key constraints in my case before including more detail in Case Information and Mechanisms. First, I find in qualitative interviews that voters attribute drought relief to mayors, not governors. This reduces the willingness of governors to manipulate the bureaucratic process. Second, mayors often switched parties between elections, and most parties are weak at the municipal level in Brazil (Novaes, 2018). This reduces the ability or willingness of most parties to develop local politicians. Thus, while the literature would suggest the following hypothesis, I do not expect it to hold in my case.

**Hypothesis 5.** The effect of election years on drought declarations will be larger for mayors from the same party as the governor or president, given the same environmental conditions.

The key exception in Brazil is the PT Party, which during the period of this study (1999–2012) was increasingly vertically organized, had stronger ideological cohesion, and groomed lower-level officials for higher office (Samuels & Zucco, 2018).

**Hypothesis 6.** The effect of election years on drought declarations will be larger for mayors from the PT Party, given the same environmental conditions.

In general, electoral cycles are likely to play a stronger role than partisan alignment or partisan cycles in this case, due to local political institutions and case-specific characteristics. I explore the observable implications of the key mechanisms outlined above in the Results section and provide tables in the Supplementary Materials.

#### **Case Information: Brazil**

I test my hypotheses using the case of drought relief in Brazil. Brazil is a major emerging democracy, and its primary administrative levels are the federal, state (26 states and one federal district), and municipal level (5570 municipalities). Municipalities are similar to U.S. counties, and the mayor and city councilors are elected every 4 years. Mayors are eligible for two consecutive terms and are directly elected through plurality rule (fewer than 200,000 eligible voters) or majority rule with runoffs (more than 200,000 eligible voters). Municipal elections are staggered by 2 years from state/federal elections, which also take place every 4 years. Elections occur on the same dates in October in all municipalities during the study period.<sup>14</sup>

Partisanship in Brazil matters less than social context and familial ties, especially at the municipal level (Novaes, 2018). The Brazilian party system is one of the most fragmented in the world, with extensive lists of parties at lower levels of government and across the country (Klašnja & Titiunik, 2017), and mayors often switch parties between elections (Feierherd, 2020). While Brazil is known for having a very weak party system, one specific party—the PT—built party identification through ideology and civil society (Samuels & Zucco, 2018), raised campaign finances by prioritizing PT-affiliated firms with public contracts (Boas et al., 2014), and strengthened intra-party cohesion by developing candidates at the municipal level (Samuels & Zucco, 2015).

Scholars have found significant political targeting of funds to coalitionaligned municipalities in mayor election years, especially for discretionary transfers that go to highly visible infrastructure projects and for first-term mayors (Brollo & Nannicini, 2012). Mayors also may act as brokers for politicians at higher levels of government (Novaes, 2018). However, with a large number of parties at the municipal level, many municipalities do not have mayoral candidates that align with incumbent state or federal executives. Voters generally do not reward (or punish) politicians from one party based on actions by copartisans at other levels, except within the few large parties (Feierherd, 2020; Ventura, 2021).

Northeast Brazil is one of the poorest regions in Brazil, and there is significant variation in poverty and bureaucratic capacity across and within states in the region (Tendler, 1997; Nelson & Finan, 2009; Ottonelli & Mariano, 2014).<sup>15</sup> Politics and drought intersect in Northeast Brazil, where historic patron-client networks have been created and reinforced by drought (Buckley, 2017). Politicians replaced the "rural colonel" patron (Leal, 2009), and a clientelistic system throughout the region has created a water-for-votes cycle (Kenny, 2002). Drought relief policies in the mid-1900s led to a "drought industry" (*indústria da seca*) where politicians used public resources to hire poor residents to build roads and other public works, often on private properties (Campos, 2015). Drought mitigation and relief policies have improved significantly since then (De Mello Lemos, 2003), which I describe below. Nevertheless, many scholars still highlight severe inequities in water insecurity and distribution of drought relief programs, both across and within municipalities (Finan & Nelson, 2001).

Municipalities in the semi-arid region (Figure 1) are eligible for specific drought relief programs. The semi-arid region holds 54% of the population of Northeast Brazil; the states of Ceará, Rio Grande do Norte, and Paraíba are almost entirely made up of semi-arid areas, encompassing 91.9%, 91.7%, and 89.6% of each state respectively. As of 2005, 1133 municipalities in 9 states, or approximately 58% of the Northeast area, were technically considered to be in the semi-arid region.<sup>16</sup>

Emergency declarations are necessary for local politicians to distribute valuable drought relief to local citizens. Drought relief is all-or-nothing: municipalities with drought declarations receive many lucrative programs; those without a declaration do not. Once a municipality receives an approved official emergency declaration, it automatically receives disaster relief. Disaster relief is funded by the state and/or federal government but administered by municipalities, and the benefits are plentiful. Relief programs include water truck delivery and cash transfers to rural farmers.<sup>17</sup> Dissemination of funds is legally tied to the emergency declaration: relief funds are available as soon as the declaration is approved, and they stop when the declaration period ends (Lei No. 12.340, 2010).<sup>18</sup>

During emergency periods, the mayor receives (1) a waiver of the bidding/ procurement (*licitação*) process for government contracts related to the emergency (Lei No. 8.666, 1993, art. 24), and (2) a waiver of restrictions on the use of funds during the electoral campaign period (Lei No. 9.504, 1997, art. 73-10). Relaxed oversight of emergency funding makes it especially prone to abuse and corruption, and Brazilian government accountability agencies



Figure 1. Map of the official semi-arid region (IBGE, 2007).

(*Ministério Público Federal, Tribunal de Contas da União*) have investigated and punished mayors for improperly declaring droughts during periods of above average rainfall (Bezerra, 2019), for improperly spending emergency funding on non-emergency resources (including parties for Carnaval) (Brito, 2017), and for improperly declaring states of emergency (especially financial emergencies) when there was no such emergency in order to avoid the bidding/procurement process (G1, 2014).

Researchers from the World Bank compiled budgetary measures to estimate that the federal government spent R\$ 16.6 billion Brazilian reals (approx. \$4.5 billion USD) during 2012–2014 on drought relief in the Northeast (De Nys et al., 2016).<sup>19</sup> However, they state that it is very challenging to determine the total costs of drought relief, as federal programs come from multiple agencies and are often paired with state and municipal programs. It is especially challenging to determine reliable, fine-grained relief amounts per municipality. Given these significant constraints, I use drought emergency declarations as a proxy for drought relief, since approved declarations are required for receiving relief.

Access to state and federal funds for drought relief is tied to objective and subjective procedures, and the declaration process makes it prone to political discretion. First, a mayor in the semi-arid region declares a state of emergency and submits an approval request<sup>20</sup> to the governor's office, via the state Civil Defense agency (*Defesa Civil*).<sup>21</sup> The approval request includes information such as precipitation, crop losses, the number of people affected across sectors, and the financial cost of the emergency. Mayors must outline a plan for how they will spend the funds and then must submit budget reconciliation reports. A mayor cannot receive state or federal relief funds unless the declaration is approved.<sup>22</sup>

Bureaucrats at the state Civil Defense agency compare the mayor's request to municipal-level indicators maintained by the agency. Indicators such as precipitation are objective and based on external data sources.<sup>23</sup> Indicators for crop losses, population affected, and financial cost are easier to manipulate and much harder for bureaucrats in the state capital to verify, especially for rural municipalities. The state Civil Defense agency then sends a bundle of municipal emergency declarations to the federal Ministry of National Integration (MIN) for final approval (Gutiérrez et al., 2014).<sup>24</sup> If a municipality wants to extend the time period for an approved declaration, it must repeat this process every 180 days. There are no formal constraints on the number of municipalities that declare emergencies in a year. If all municipalities deserve an emergency declaration, then they can and should receive one.

The federal government releases relief funds to the state Civil Defense agency, which distributes relief funds to municipalities; the federal government separately manages some relief programs such as water trucks and cash transfers.<sup>25</sup> The state chooses relief amounts according to multiple criteria,

and funds are transferred to the municipality, which decides the relief for each recipient (Finan & Nelson, 2009).

The work to declare an emergency occurs mainly within the mayor's office, according to interviews with staff who manage sub-municipal drought relief programs, local politicians, and state agencies. Municipal leaders described in 2016 and 2017 that it was much easier in the past for mayors to declare emergencies without much oversight, but state and federal authorities have better access to fine-grained precipitation and crop indicators now than during the 1990s and 2000s. Nevertheless, many indicators rely on detailed local information from remote communities and can be manipulated.<sup>26</sup>

## Mechanisms

The primary mechanism underlying my hypotheses is that politicians can benefit from targeting drought relief resources during certain time periods or to certain constituencies for electoral gain. Drought declarations and ensuing relief are targeted to municipalities, but allocation is decided at the local level. Administrators have great discretion over how they distribute water trucks and crop insurance payments across neighborhoods and even across households. Overall, drought relief at the local level tends to follow a combination of programmatic and non-programmatic distribution. My interviews suggest that, similar to dominant assumptions in the literature, voters have limited information about the competence of local politicians and react rationally to either seeing a politician obtain needed emergency responses and/or receiving preferential access to relief services. They respond in ways that are consistent with both democratic responsiveness and clientelistic targeting.

The poor are most vulnerable to drought and other natural disasters (IPCC, 2012). In much of the world, citizens spend many hours per day seeking out potable, reliable water sources, and water access is highly politicized (Herrera, 2017). Even in middle-income countries such as Brazil, water access is limited, especially in rural areas. Qualitative evidence from Northeast Brazil highlights the incredible dependence that poor subsistence farmers have on local leaders and politicians for providing relief in the semi-arid, drought-prone region. My interpretation of the mechanisms underlying the politicization of drought draws on 87 interviews with rural farmers, community leaders, and politicians across 51 communities in 8 municipalities in the interior of Ceará state, conducted in April 2016, April 2017, and August 2017. I conducted an additional 17 interviews with state bureaucrats and local experts on drought relief policies and rural water access and management.<sup>27</sup>

Rural families are dependent on politicians and other local elites for fixing the well's motor, digging a new well, providing emergency water trucks, or facilitating access to a water source on private land.<sup>28</sup> A rural subsistence farmer told me that drought relief water trucks sometimes did not arrive for

4 months, while other rural respondents described receiving preferential access to water trucks due to electoral connections.<sup>29</sup> Some respondents reported buying from politicians or other elites who sell drinking water when water is scarce.<sup>30</sup>

With inconsistent rainfall and unreliable water sources, farmers have been known to "pray for drought," since drought relief may actually increase household stability relative to non-drought years (Nelson & Finan, 2009). Most rural farmers grow rain-fed crops such as corn and beans for subsistence as well as livestock for food and for sale (Finan & Nelson, 2001). They are very vulnerable to the impact of rainfall shocks on drinking water as well as food sources, and drought relief cash transfers are invaluable in the event of crop loss.<sup>31</sup>

In a drought-prone region, relief provision is often a signal of competence and effective governance. Still, one mayor of a rural municipality in the semiarid zone explained that there is enormous benefit to mayors of having a drought declared, since there are both economic and political benefits to providing relief to rural voters. He said that mayors have been known to declare droughts even when they are not happening in order to obtain these resources, though he argued that this has become harder in recent years as requirements and oversight became more stringent.<sup>32</sup>

Mayors publicize their actions to claim credit and gain public support. At a Friday night rodeo in a rural municipality in Ceará, the mayor's office set up a slideshow to showcase provision of recent services, including: drought relief cash transfers for rural farmers, 3000 rainwater cisterns, 500 dug cisterns, 517 plastic cisterns, 222 deep wells, 3000 animal water holes, and six new reservoirs.<sup>33</sup> Residents attribute drought policies to the mayor and not to other state or federal politicians, and they are aware of the declaration process. Numerous poor rural farmers told me that the mayor must secure a drought declaration to get relief funds for local residents.<sup>34</sup> Candidates for mayor and city council commonly promise future drought relief and water access during their campaigns.

Drawing on my earlier theory, I expect electoral cycles to influence the declaration of drought emergencies, since voters are affected more by events that take place closer to an election. While mayors claim credit and advertise their drought policy response throughout their terms, they reported that voters paid most attention to their actions during election years.<sup>35</sup> Brazilian municipal elections are staggered from state/federal elections by 2 years. Drought develops during the rainy season of January-June, and elections occur in October. Mayors with droughts declared prior to an election are able to target the relief funds to their constituents and show their ability to secure resources.

In summary, I hypothesize that declaration of drought emergencies and ensuing relief follow electoral cycles, and voters reward incumbent mayors for providing relief. My qualitative evidence and other scholarly work suggest the presence of two simultaneous mechanisms of democratic responsiveness and distributive politics. Voters demand drought relief and other public assistance, and the provision of drought relief (during below or above average rainfall) signals the competence of mayors in securing needed resources for their constituents. At the same time, many politicians target relief with the intention of buying votes and strengthening their political campaigns.<sup>36</sup>

# **Empirical Strategy**

To test my hypotheses, I utilize the exogenous timing of rainfall and the fixed electoral calendar to isolate the effect of non-climatic factors on drought declaration in Northeast Brazil. An election year is no more likely to have below average rainfall than another year, as rainfall does not follow 4 year cycles. Rainfall shocks will not affect the decision to hold an election in Brazil, a country with exogenous, fixed election timing.<sup>37</sup> A programmatic drought declaration policy would respond primarily to climate and local living conditions, and I consider remaining variation to represent inefficiencies caused by political factors.<sup>38</sup>

I analyze the distribution of drought declarations and voters' responses using fixed effects models with municipal-level drought declarations and election results. I evaluate drought conditions by using the Standardized Precipitation Index (SPI). I account for climate and human vulnerability indicators, and I use data on mayoral incumbency and partisan alignment. I evaluate the 1031 municipalities designated as "semi-arid" when the official government fund was created in 1999 (MIN, 2005).<sup>39</sup> The data are from 1999 to 2012.<sup>40</sup>

I test Hypotheses 1–3 with models that evaluate the distribution of drought declarations based on different combinations of rainfall shock, election timing, and mayoral term

$$Declaration_{it} = \beta_1 LowRain_{it} + \beta_2 Elec_t + \beta_3 LowRain_{it} * Elec_t + \beta \mathbf{X}_{it} + \alpha_i + \epsilon_{it}$$
(1)

$$Declaration_{it} = \beta_1 SecondTerm_{it} + \beta_2 Elec_t + \beta_3 SecondTerm_{it} * Elec_t + \beta \mathbf{X}_{it} + \alpha_i + \epsilon_{it}$$
(2)

where *Declaration*<sub>*it*</sub> is a binary dependent variable for declaration of a drought emergency in municipality *i* in year *t*; *LowRain*<sub>*it*</sub> is a dummy for below average rainfall (SPI<0); *Elec*<sub>*t*</sub> is a dummy for regularly scheduled election years; *SecondTerm*<sub>*it*</sub> is a dummy for a mayor being in her second-term; **X**<sub>*it*</sub> are control variables for the time trend and quadratic time trend, mayor in the PT party, potential evapotranspiration, beans, corn, and cattle;  $\alpha_i$  is a municipal fixed effect.<sup>41</sup> In equation (2), I subset the data to different rainfall conditions.<sup>42</sup> I test Hypothesis 4 by evaluating incumbent mayors' electoral performance relative to drought declarations

IncumbentWin<sub>it</sub> = 
$$\beta_1 DroughtElecYear_{it} + \beta \mathbf{X}_{it} + \alpha_s + \gamma_t + \epsilon_{it}$$
 (3)

where *IncumbentWin<sub>it</sub>* is a binary dependent variable for the incumbent mayor winning; *DroughtElecYear<sub>it</sub>* is a dummy for declaration of a drought emergency in the election year;<sup>43</sup>  $X_{it}$  is a series of control variables for previous vote share, potential evapotranspiration, beans, corn, and cattle;  $\alpha_s$  is a state fixed effect, and  $\gamma_t$  is a year fixed effect.<sup>44</sup> The sample is limited to observations when the incumbent is a first-term mayor because of the Brazilian limit of two consecutive terms (Chamber of Deputies, 2010);<sup>45</sup> I include instances where the incumbent does not run in order to conduct an unconditional analysis and reduce bias due to selection into running for re-election (De Magalhaes, 2015). I also evaluate equation (3) with a binary dependent variable *IncumbentRun<sub>it</sub>* for first-term mayors running for election.

I test Hypotheses 5–6 with models that evaluate the distribution of drought declarations based on different combinations of rainfall shock, election timing, and partisanship

$$Declaration_{it} = \beta_1 Copartisan_{it} + \beta_2 Elec_t + \beta_3 Copartisan_{it} * Elec_t + \beta \mathbf{X}_{it} + \alpha_i + \epsilon_{it}$$
(4)

$$Declaration_{it} = \beta_1 P T_{it} + \beta_2 E lec_t + \beta_3 P T_{it} * E lec_t + \beta \mathbf{X}_{it} + \alpha_i + \epsilon_{it}$$
(5)

where *Declaration*<sub>*it*</sub> is a binary dependent variable for declaration of a drought emergency in municipality *i* in year *t*; *Elec*<sub>*t*</sub> is a dummy for regularlyscheduled election years; *Copartisan*<sub>*it*</sub> is a dummy for a mayor being copartisan with either (1) the governor, (2) the president, (3) parties in the president's coalition; *PT*<sub>*it*</sub> is a dummy for a mayor being in the PT Party; **X**<sub>*it*</sub> are control variables for rainfall SPI, time trend and quadratic time trend, potential evapotranspiration, beans, corn, and cattle;  $\alpha_i$  is a municipal fixed effect. Sample limited to municipalities with variation in partisan alignment during the study period.<sup>46</sup>

I estimate all specifications using a linear probability model with fixed effects (OLS FE).<sup>47</sup> Equations (1), (2), (4), and (5) use cluster-robust standard errors at the state-year level. Since rainfall shocks are spatially correlated, I test the robustness of my results in equation (1) using randomization inference with historical rainfall data to estimate the variance on the rainfall shock coefficients of *LowRain* and *LowRain\*Elec* (Cooperman, 2017).

**Drought Declarations:** I measure drought declaration as a binary variable in each municipality-year (1999–2012) with data on disaster events from the Brazilian Atlas of Natural Disasters (UFSC, 2013).<sup>48</sup> Since relief funds are spread across multiple ministries and programs, it is very challenging to

calculate the amount of relief by municipality. I use the indicator of drought declaration to reflect whether municipalities received relief funds. Drought is the most widespread disaster in Brazil, with 19,517 droughts during 1991–2012, representing 48% of nationwide disaster declarations. The majority of drought declarations occur in the Northeast, where most are declared in March, April, and May. During the mayoral election years in the dataset, 44% of municipal-year observations included a declaration.

**Electoral Factors:** I measure election year timing, partisanship, and whether incumbent mayors run for and win re-election. I use election data from the Brazilian *Tribunal Superior Electoral* for municipal elections in 1996 (for incumbency), 2000, 2004, 2008, and 2012, and state/federal elections in 1998 (for incumbency), 2002, 2006, and 2010.<sup>49</sup>

**Climate Indicators:** The Standardized Precipitation Index (SPI) is an industry standard for drought monitoring and calculates the deviation between the monthly total precipitation and the 30-year average for that same month (McKee et al., 1993). The mean historical precipitation amount is SPI = 0, and negative values reflect below average rainfall. The 6-month SPI for January-June (the rainy season) measures the rainfall deviation from the municipal historic average from 1981 to 2012.<sup>50</sup> I primarily use a dummy variable for below or above average, which is most common in drought management (Mishra & Singh, 2010); robustness checks in the Supplemental Material use the continuous variable with different functional forms. Potential evapotranspiration (cm/month) is calculated with municipal monthly temperature averages and latitude.<sup>51</sup> The impact of rainfall shocks varies by temperature and evaporation, and this is particularly important for water storage in reservoirs, crops, and cattle.

**Human Vulnerability:** The impact of drought also depends on human factors. Farmers growing rain-fed food crops for subsistence, such as corn and beans, are the most vulnerable (Gutiérrez et al., 2014). Small-scale rural farmers with livestock also suffer when pastures dry up; they must purchase expensive animal feed and often are forced to sell animals at low prices. I use yearly values for percent of harvested land growing corn and beans and (logged) head of cattle reported every 3–5 years, with yearly values based on the most recently recorded value (IPEADATA). These variables help with precision of the estimates.<sup>52</sup>

#### Results

Before testing the hypotheses, I examine variation in drought declarations. Figure 2 shows puzzling variation in drought declarations across rainfall levels during 1999–2012, where the unit of analysis is a municipal-year. On average across the Northeast region (top-left), drought declaration follows rainfall deviations in a programmatic fashion: as rainfall increases, the likelihood of drought declaration goes down. However, the regional average obscures large variation across states. Some states (Bahia, Ceará) show programmatic



**Figure 2.** Rainfall deviation and drought emergency declaration. Note: The number of municipalities in my sample per state is in parentheses. Negative values of Standardized Precipitation Index (SPI) reflect lower than average rainfall, 0 is mean historical level, and positive values reflect higher than average rainfall. Lines are "loess" smoothed local linear regression lines with span = 0.3. No controls included. Circles reflect the number of municipal-year observations in each bin of width = 0.15. SPI is 6 month average of SPI from January to June (rainy season for planting). Similar plots with SPI for April-June (3-month SPI) and January-September (9-month SPI) in the the Supplementary Materials. Includes all municipalities during 1999–2012.

distributions. Others (Paraíba, Rio Grande do Norte) have a peculiar spike in declarations around long-term average rainfall of SPI = 0, and a few states (Alagoas, Piauí) have many drought declarations in years with rainfall that is far above average. A Brazilian bureaucrat confirmed that these were drought, and not flood, declarations.<sup>53</sup> The variation in drought declarations relative to rainfall conditions motivates my desire to understand how climate and political factors influence when municipalities receive relief and under which environmental conditions.

#### Political Business Cycles and Drought Declaration

In Table 1, I find evidence for Hypothesis 1 that droughts are 29 percentage points (pp) more likely to be declared during below average rainfall, as opposed to above average rainfall (Column 1). This shows that there is a certainly a programmatic element to the distribution of this policy. Politicians are more likely to go through the bureaucratic procedures needed to declare drought emergencies during periods of below average rainfall. However, the same policy can have both programmatic and non-programmatic elements. Drought relief can be programmatic, but its (mis)use extends into political strategy.

Opportunistic politicians will use available policy levers to enhance their re-election prospects, and one common method is to target policies, especially those that voters prefer, to election years (Dubois, 2016; Shi & Svensson, 2006). While governments often constrain the ability of politicians to use this strategy through restrictions on campaign period spending or strict procurement/bidding processes, spending during emergency periods is exempt from these guidelines in Brazil. Since droughts are frequent and challenging to measure, I hypothesize that drought declarations will follow electoral cycles in Hypothesis 2.

I test this in Table 1, Column 2, with an interaction between below average rainfall and mayor election years. The base category is non-election years with above average rainfall. I find that below average rainfall increases the likelihood of declaration, and therefore receiving relief, in non-election years by 17 pp. Below average rainfall in an election year increases the likelihood by 61 pp relative to the base category, as shown by adding the main and interaction terms. The timing and extent of a rainfall shock relative to a fixed election cycle are considered to be exogenous treatments within each municipality. Politicians certainly anticipate and plan for election years, but the election calendar is fixed and exogenous to climate conditions, so these relationships are causally identified.

#### Mayoral Term and Drought Declaration

To unpack the incentives for declaring droughts, I look at patterns of drought relief for mayors in different terms and environmental conditions in Table 2.

Dependent Variable

	Drought Emergency Declared		
	(1)	(2)	(3)
Below average rainfall	0.288*** (0.052)	0.165*** (0.050)	0.198*** (0.062)
Mayor election year	0.043 (0.067)	-0.128** (0.059)	-0.113 (0.070)
State/Fed election year	0.006 (0.080)	<b>、</b> ,	0.028 (0.084)
Mayor election * Below ave. rainfall	<b>、</b> ,	0.577*** (0.147)	0.528*** (0.163)
State/Fed election * Below ave. rainfall			-0.108 (0.113)
Observations	14,054	14,054	14,054
R <sup>2</sup>	0.267	0.307	0.308
Adjusted R <sup>2</sup>	0.208	0.252	0.253
Residual std. error	0.445 (df = 13013)	0.432 (df = 13013)	0.432 (df = 13011)

#### Table 1. Election Years and Drought Declaration.

Includes Municipal FE. Standard errors clustered at state-year level. Below average rainfall is a dummy for SPI <0. Controls for Potential Evapotranspiration, Time trend and quadratic time trend, PT party, Cattle, Corn, and Beans included but not shown; see Supplemental material. \*p < .1; \*\*p < .05; \*\*\*p < .01.

Recall that Brazilian mayors are only eligible for two consecutive terms. I find mixed results for Hypothesis 3.

In municipalities under drought conditions of below average rainfall (Column 1), I find that second-term mayors are 11 pp more likely than firstterm mayors to declare droughts. Mayors are 30 pp more likely to declare a drought in the election year, relative to the non-election years. The election year boost holds regardless of the term, as shown by the insignificant interaction term in Column 2. Local politics in Brazil are highly personal, and second-term mayors usually indicate and endorse their successor, who may or may not be in their same party. The results are consistent with other scholarly findings that officials eligible for re-election tend to exert more effort, while those with more experience, but who may be term-limited, are more competent (Alt et al., 2011). In my qualitative interviews, municipal politicians and bureaucrats corroborated the time and effort needed to learn how to perform complicated bureaucratic procedures such as emergency declaration requests.

If there are lucrative opportunities from distributing relief, we might expect all mayors to constantly declare emergencies. However, interviews suggest

	Dependent var	iable				
	Drought Emer	gency Declared				
	Below Ave	Below Ave	Above Ave	Above Ave	Very High	Very High
	(1)	(2)	(3)	(4)	(5)	(9)
Second-term mayor	0.114***	0.099**	-0.0001	0.013	-0.046	0.084**
	(0.036)	(0.042)	(0.025)	(0.021)	(0.029)	(0.043)
Mayor election year	0.295**	0.275*	-0.162**	-0.148**	-0.001	0.091
	(0.149)	(0.153)	(0.065)	(0.067)	(0.080)	(0.079)
Mayor election * Second-term mayor		0.070		-0.045		-0.250***
		(060.0)		(0.044)		(0.068)
Observations	5528	5528	8526	8526	2436	2436
R <sup>2</sup>	0.316	0.317	0.354	0.354	0.551	0.561
Adjusted R <sup>2</sup>	0.158	0.158	0.265	0.265	0.229	0.246
Residual std. error	0.439	0.438	0.417	0.417	0.380	0.375
Includes Municipal FE. Standard errors clustere high rainfall is a dummy for SPI>1. Controls for not shown; see Supplemental material. *p < .	ed at state-year level. r Potential Evapotran I; **p < .05; ***p < .	. Below average rain spiration, Time trer 01.	fall is a dummy for S nd and quadratic tim	SPI≺0, above average e trend, PT party, C	e rainfall is a dumm attle, Corn, and Be	y for SPI>0, very ans included but

Table 2. Mayoral Term and Drought Declaration.

that emergency declaration is a lengthy bureaucratic process, and requests were sometimes denied at the state or federal level when indicators were insufficient for declaring or continuing a state of emergency.<sup>54</sup>

I thus test the second part of Hypothesis 3 that term-limited mayors are less likely to bear the risk and cost of declaring drought during very high rainfall in an election year. Column 6 evaluates very high rainfall conditions (one standard deviation above average, or SPI>1), and I find that second-term mayors are slightly more likely to declare droughts in years without a mayoral election (8 pp) than first-term mayors. However, second-term mayors are far less likely to pursue this strategy in their last year in office (the election year) as shown by the large and significant negative interaction term (-25 pp). The cost in time and effort may have dissuaded mayors from requesting declarations in election years when their application was weak and unlikely to be approved. The potential cost of a corruption scandal would also dissuade mayors from applying with misleading or manipulated indicators, and term-limited mayors would have even less incentive in the election year. As noted in the Case Section, the Brazilian government has investigated and punished many mayors for impropriety around the use of emergency declarations (G1, 2014).

# Incumbency and Voter Response

Next, Table 3 provides evidence for Hypothesis 4 that incumbent mayors are more likely to win re-election when drought was declared in the year of their re-election. In my sample, 72% of first-term mayors run for re-election and 49% win re-election.<sup>55</sup> Numerous factors, such as inherent motivation/type or success with attracting resources to a municipality, contribute to an incumbent's decision to run for re-election and likelihood of winning. I include controls typically used by other scholars to account for some of these latent characteristics, including prior popularity (mayor's vote share in the previous election) and partisan alignment with other levels of government (governor/president).

Incumbent mayors are 14 pp more likely to be re-elected when they declare a drought in the election year (Column 5) and 6 pp more likely to be re-elected when they declare a drought in either of the last 2 years of the term (Column 6). Incumbent mayors are slightly less likely to win when there is below average rainfall, though this is only significant at the 90% confidence level. I do not include below average rainfall and drought declaration in the same model due to the potential for post-treatment bias (Montgomery et al., 2018) since below average rainfall predicts drought declaration.<sup>56</sup>

I also explore the decision to run, and I find that incumbent mayors are 6 pp less likely to run for re-election when there is below average rainfall (Column 1). However, they are 6 pp more likely to run when they get a drought declared during the election year (Column 2). It is certainly possible that the first-term

	Dependent variable					
	Incumbent	Incumbent Runs		Incumbent Wins		
	(1)	(2)	(3)	(4)	(5)	(6)
Below average rainfall	-0.064*** (0.021)			-0.037* (0.022)		
Drought declaration in mayor election year		0.057** (0.025)			0.143*** (0.033)	
Drought declaration in last two years			0.045** (0.022)			0.060** (0.025)
Mayor's vote share in previous election	-0.029 (0.086)	-0.016 (0.090)	-0.012 (0.091)	0.334*** (0.094)	0.346*** (0.096)	0.351*** (0.098)
Copartisan president	0.060* (0.036)	0.057* (0.034)	0.058* (0.035)	0.040 (0.034)	0.034 (0.033)	0.037 (0.034)
Copartisan governor	0.004 (0.025)	0.005 (0.024)	0.004 (0.024)	0.006 (0.024)	0.005 (0.022)	0.005 (0.023)
Observations R <sup>2</sup>	2927 0.018	2927 0.015	2927 0.014	2927 0.030	2927 0.039	2927 0.029
Adjusted R <sup>2</sup> Residual std. error	0.011 0.448	0.009 0.449	0.008 0.449	0.024 0.494	0.033 0.492	0.023 0.494

Table 3. Incumbent Mayor Candidacy and Re-Election.

Data limited to election years and municipalities where incumbents are eligible for re-election. Includes State and Year FE; standard errors clustered at state-year level. Drought in Last Two Years signifies the year before and/or year of Mayor Elections. Controls for Potential Evapotranspiration, Cattle, Corn, and Beans included but not shown; see Supplemental material. \*p < .1; \*\*p < 0.05; \*\*\*p < .01.

mayor's decision to seek re-election depends on whether she got drought relief for her municipality.<sup>57</sup> Nevertheless, these results are consistent with the politicization of drought relief whereby re-election motivations are associated with mayors seeking and obtaining disaster relief.

These findings help to explain why mayors would want to obtain drought declarations in election years. The type of mayor who secures drought relief, given the same rainfall shock, is also more likely to be re-elected. Mayors may anticipate that voters will punish the incumbent for water scarcity and drought conditions. First-term mayors seeking re-election are more likely to go through the effort to obtain an emergency disaster declaration, because they want to show voters that they can obtain government resources. When they are able to declare a drought emergency and distribute relief, mayors may feel more confident in their re-election chances and are more likely to run. Mayors also may be more likely to go through the declaration process in the first place if they are planning to run again.

While I control for common confounders noted in the literature, there may still be omitted variable bias related to the politician's inherent motivation or effectiveness.<sup>58</sup> Since the type of mayor who obtains a declaration is also likely to be more competent with obtaining other resources, I caution that these are correlations and not causally identified. Nevertheless, they support my qualitative evidence that voters see mayors as responsible for obtaining drought declarations and reward or punish them accordingly. The strong association between drought declaration and re-election is consistent with a positive feedback cycle between electoral reward and targeting of declaration to election years.

Figure 3 supports the finding that voters reward incumbent mayors for providing relief in election years, during below and above average rainfall. When rainfall is below average, voters reward officials for providing relief to needy populations. When rainfall is above average, politicians may use drought relief and water resources for vote-buying. Alternatively, communities may need relief during above average rainfall if they lack sufficient water access due to inappropriate drought policy.<sup>59</sup> In interviews, rural residents said that relief such as cash transfers and water trucks do signal the mayor's competence in accessing resources. However, they said that relief is also commonly used for explicit vote-buying, especially in the lead-up to elections. Recent programs to reduce vulnerability to drought, such as installing rainwater cisterns, have been shown to reduce clientelism (Bobonis et al., 2017).



**Figure 3.** Incumbent mayor wins re-election by drought declaration and rainfall. Note: "loess" smoothed local linear regression lines calculated in R with span = 0.8. No controls included. Sample limited to municipalities where incumbent was eligible for re-election. Negative values of the Standardized Precipitation Index (SPI) reflect below average rainfall, 0 is mean historical level, and positive values reflect above average rainfall. Circles reflect the number of municipal-year observations in each bin of width = 0.25.

#### Partisan Cycles and Alignment

How does partisanship interact with electoral cycles? I test two additional hypotheses related to partisanship.<sup>60</sup> I find suggestive evidence of a partisanelectoral cycle in favor of *Partisan Support* within the PT party and overall higher declaration rates for mayors aligned with the president, but little to no evidence for other partisan mechanisms.

I first evaluate partisan alignment and drought declarations during municipal elections (*Partisan Alignment–Mayor Credit*). Higher-level executives (governor, president) could pressure bureaucrats to approve declarations from partisan aligned mayors during municipal election years. This would help the mayor get elected, and the mayor would be expected to campaign for the person or party 2 years later. In Table 4, Column 2, I find that mayors from the same party as the president are more likely to receive drought declarations; the interaction with election year is not significant. This is consistent with work by Healy and Malhotra (2009) and others that politically valuable counties are targeted overall with federal transfers, but this alignment does not interact with electoral cycles.

I do not find a statistically significant relationship between drought declaration in mayor election years and partisan alignment between mayors and governors or mayors and the president's coalition (Table 4, Columns 3–4). I also use a regression discontinuity design to evaluate whether municipalities where a governor's copartisan barely wins (vs. barely loses) tend to receive more drought declarations in mayor election years, and the results are not statistically significant (Supplemental Table 17). Taken together, these results suggest that the governor, president, and members of the president's coalition either were not in a specific position to target approvals of drought declarations to specific party members during mayor election years, and/or they did not perceive it worthwhile to do so.

I also evaluate whether incumbent governors target declarations to aligned municipalities and whether voters reward the governor for declarations (*Partisan Alignment–Governor Credit*). Governors could target declarations to mayors during state election years and hope that voters reward the governor or that the mayor credits the governor when she campaigns on the governor's behalf. In a regression discontinuity design, municipalities where a governor's copartisan barely wins are not more likely to receive declarations in state election years (Supplemental Table 17). Given the weak party system and frequent mayoral party switching, many political networks between mayors and governors involve personal ties, where mayors that endorse a specific gubernatorial candidate will campaign on behalf of that candidate (Novaes, 2018). If so, we might not observe an effect of partisan alignment, but we would still expect to see more declarations declared in state/federal election years relative to years without elections. However, in Table 1, declarations are

	Dependent	variable		
	Drought E	mergency D	eclared	
	(1)	(2)	(3)	(4)
Mayor election year	-0.111 (0.082)	0.069 (0.053)	0.038 (0.054)	0.022 (0.053)
РТ	_0.001 (0.052)	( )	· /	( )
Copartisan mayor president		0.   *** (0.033)		
Copartisan mayor governor			-0.0001 (0.025)	
Copartisan mayor president coalition				0.038* (0.021)
Mayor elec. * PT	0.396*** (0.094)			( )
Mayor elec. * Co. mayor pres.		-0.109 (0.068)		
Mayor elect. * Co. mayor gov.			-0.053 (0.040)	
Mayor elec. * Co. mayor pres. coal.				0.007 (0.036)
Observations R <sup>2</sup>	l 383 0.340	4318 0.336	9,386 0.305	13,818 0.306
Adjusted <i>R</i> <sup>2</sup> Number of municipalities	0.283 101	0.282 315	0.250 687	0.251 1014

Table 4. Partisan Cycle	es and Drought Declaration.
-------------------------	-----------------------------

Includes Municipal FE. Standard errors clustered at state-year level. Sample limited to municipalities with variation in partisan alignment during the study period (see Supplemental material for results with unlimited sample). Controls for Rainfall SPI, Potential Evapotranspiration, Time trend and quadratic time trend, Cattle, Corn, and Beans included by not shown; see Supplemental material. \*p < .1; \*p < .05; \*\*\*p < .01.

not more likely during state/federal elections. Lastly, voters do not reward governors for drought relief. Incumbent governors do not receive a higher vote share in municipalities where droughts were declared in the state/federal election year (Supplemental Table 15).<sup>61</sup> This is consistent with my qualitative interviews, where voters attributed drought relief to the mayor and not to other officials.

There could still be partisan features, such as support within the party or ideology, that affect the distribution of public resources. I focus on the PT Party, which had a specific role within the Brazilian party system during 1999-2012.<sup>62</sup> I find in Table 4, Column 1 that PT mayors are significantly more

likely to get drought declarations in election years, relative to mayors from other parties in election years.<sup>63</sup> Contrary to Brazil's partisan norm of weak ideology and cohesion, the PT Party had a strong organizational network between federal and municipal levels (Samuels & Zucco, 2018). These networks facilitate *Partisan Support*, whereby higher-level PT officials gave access to a larger centralized party system that could provide information and knowledge of complex bureaucratic processes. Higher-level PT politicians could also target declarations to PT mayors in order to reinforce their standing at the municipal level and groom them for future positions in the party.<sup>64</sup>

I do not find evidence for *Partisan Ideology*: the PT election boost holds during both below and above average rainfall (Supplemental Table 14), and PT mayors are not more likely to declare drought in the absence of elections (Table 4, Column 1). However, there could be an interaction between ideology of PT politicians/voters and electoral cycles such that PT mayors are more likely to pursue the policy during election years when it is most likely to be at the forefront of voters' minds. Partisan identity is not randomly assigned, though it is exogenous to the timing of rainfall shocks, and should be interpreted as a heterogeneous treatment effect.<sup>65</sup>

#### Spatial Correlation

One concern for my analysis is that weather patterns are highly correlated across space, interfering with the independence of my observations. A common way to control for spatial clustering is to use cluster-robust standard errors for a broader regional area like states.<sup>66</sup> However, weather patterns cross political boundaries, which violates the assumptions required for clusterrobust standard errors. Many spatial error models rely on modeling assumptions to estimate the spatial weights matrix, but weather does not follow consistent clustering patterns. I therefore estimate the variance using randomization inference with historical weather patterns (Cooperman, 2017). The timing of the rainfall shock is considered to be a randomly assigned treatment, and the sampling distribution is composed of simulated average treatment effects (ATEs) using randomly assigned weather patterns. I perform randomization inference on the interaction term from Table 1, Column 2. I draw potential randomizations from records of below average rainfall (January-June 6-month SPI) for each municipality during 1981–2012 with different clustering assumptions: municipality, state, and region. My findings are robust at the p < 0.05 level in all specifications.

# Conclusion

This paper finds that political factors significantly influenced the declaration of drought emergencies in Northeast Brazil during 1999–2012. With a

rigorous research design, I find that, during conditions of drought, declarations were more likely in mayoral election years. Incumbents were more likely to win re-election when they declared a drought during the election year, all else equal. Many municipalities even receive drought declarations during periods of far above average rainfall, though this is less likely among term-limited mayors in election years. In a partisan-electoral cycle, mayors from the PT Party benefit more during election years, though there are no election year benefits for mayors from the same party as higher-level officials in general. These findings are consistent with numerous reports during fieldwork of local politicians using drought relief funds for vote-buying as well as democratic responsiveness to drought relief provision in mayor election years. My findings are most applicable in democracies with the resources and capacity to distribute public goods, particularly disaster relief, while still suffering from widespread patronage politics.

I provide evidence that disaster declarations, often seen as programmatic, are also subject to political business cycles and distributive politics. Studies show that politicians target relief for major hurricanes and earthquakes to certain groups, but these are considered to be isolated incidents that could not follow political business cycles. However, since governments often waive oversight mechanisms or campaign period restrictions for emergency response policies, relief for frequent disasters like drought may be more prone to political business cycles. These cycles could take various forms: higher likelihood of declaration in election years, but similar relief provision per declaration; or equal likelihood of declaration across years, but higher relief amounts per declaration in election years; or some combination of these two. I encourage others to pursue this distinction in other contexts where financial data is available.

During actual emergencies, it is important to reduce time-consuming accountability mechanisms because the response needs to be quick and adaptive. Certain emergencies, like drought, are inherently subjective and should not be limited to places that adhere to precise rainfall cut-offs, even if this subjectivity increases the possibility of political manipulation. The tradeoff between emergency response and oversight is very challenging to address. Future work could explore the relationship between oversight/accountability mechanisms and political business cycles across different policy areas.

To design effective policies, we need to know more about how disaster response can be manipulated. However, variation in distributive politics is notoriously hard to measure. By leveraging the exogenous timing of climate variation within and across countries in panel studies, scholars will have a much stronger empirical tool to explore the mechanisms and conditions driving who gets what and why. The identification strategy used here can be applied anywhere with exogenous electoral calendars, challenging climate conditions, and weaker oversight mechanisms during emergency response. My findings have serious implications for incentives to invest in adaptation to climate change going forward. Disaster politics may become commonplace as disasters become more frequent and severe. When citizens reward politicians for providing relief, they strengthen incentives for politicians to be responsive. However, since it is easier for voters to observe the benefits of relief than preparedness, career-minded politicians have a stronger incentive to direct efforts toward disaster response than to reduce the public's vulnerability to future disasters (Gailmard & Patty, 2019; Fox & Van Weelden, 2015). Vulnerability to natural disasters is very likely in the same parts of the world characterized by clientelistic politics, and citizens' vulnerability to climate shocks may increase their dependence on politicians and reinforce clientelistic relationships. This is problematic as forecasts predict increased future droughts within Northeast Brazil (Marengo et al., 2017) and globally (IPCC, 2014).

I seek to encourage those policymakers already working to reduce vulnerability to drought shocks, so that we can continue to move from "combating the drought" to "coexistence with the semi-arid," in the words of recent policies in Northeast Brazil (Pereira, 2016; Diniz & Piraux, 2011). Combining Figure 2 with other scholarly work, declarations and ensuing relief are generally programmatic and have improved over time (Tendler, 1997). Modern drought relief has made a great difference in saving lives and reducing dependence on local bosses and public works projects that served large landowners (Bobonis et al., 2017; Campos & de Carvalho Studart, 2008). Still, there continues to be room for improvement, particularly if droughts were declared more often during election years.

As disasters affect increasing numbers of people globally, it is imperative that we understand the diverse ways that disasters can be politicized. By contributing to studies on both distributive and environmental politics, this paper illustrates a political phenomenon that has broad implications for our understanding of politics, humanitarian crises, and local impacts of climate change around the world.

#### Acknowledgments

Thank you to Aline Santos Martins and Andrea Junqueira for excellent research assistance and Clodoveu Arruda, Taylor Boas, Daniela Campello, Allison Carnegie, Daniel Corstange, Lindsay Dolan, Nikhar Gaikwad, Kolby Hanson, Daniel Hidalgo, Macartan Humphreys, Yuri Kasahara, Robert Keohane, Valmir Lopes, Maria Victoria Murillo, Brigitte Seim, Tara Slough, Francisco de Assis de Souza Filho, Luciana de Souza Leão, Paula Vieira, Erin York, and Cesar Zucco for their generous, thoughtful comments and support with the project. I thank Thomas Brambor, Johannes Urpelainen, and Alice Xu for help with electoral data, the Columbia University Digital Social Science Center for help with climate data, and the participants of APSA 2015, MPSA 2015, the Summer Graduate Student seminar at Columbia University, the

Seminar for the Study of Development Strategies at Columbia, the Causal Inference in IPE seminar at Columbia, the Americas South seminar at Columbia, the Graduate Seminar at FGV-RJ, and the CIPEG seminar at Texas A&M University for their comments. This study received IRB approval from Columbia University (AAAN8507 and AAAR3407).

### **Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The Fulbright-Hays Doctoral Dissertation Research Abroad Fellowship, Columbia GSAS International Travel Fellowship, and Columbia ILAS Travel Grant provided generous support for fieldwork.

# ORCID iD

Alicia Cooperman D https://orcid.org/0000-0002-1652-4488

## Supplemental Material

Supplemental material for this article is available online.

## Notes

- Programmatic distribution requires that criteria be formalized, public, and shape the actual distribution of benefits or resources (Stokes et al., 2013, p. 7). Nonprogrammatic distribution occurs where criteria are not made public or are overtaken by other dynamics, especially partisan or other political considerations.
- Similar shocks include sudden outbreaks of violence, infrequent major commodity price shocks, or global public health crises.
- 3. Programmatic and non-programmatic distributions are often present within the same policy. I thank an anonymous reviewer for this key point.
- Scholars may use emergency declarations as a proxy for natural hazards or disaster events, but I demonstrate that declarations are not exogenous to political factors.
- 5. I focus on elected officials in competitive democracies who are subject to fixed terms (typically 4–6 years) and regular, free, and fair elections.
- 6. I draw on both theories and am agnostic as to which matters more in this case. Both assumptions imply the same outcome whereby opportunistic politicians use the policy levers available to them to target voter-preferred policies in election years, and voters reward incumbents for doing so. In Mechanisms, I point to interviews that support these assumptions in my case. I thank an anonymous reviewer for this point.

- Many studies highlight how voters may punish politicians for disasters outside the politicians' control (Achen & Bartels, 2017), but reward politicians for providing relief (Blankenship et al., 2020; Bechtel & Hainmueller, 2011; Gasper & Reeves, 2011; Healy & Malhotra, 2009).
- 8. Any given local politician cannot count on most disasters happening in her district during her term. This certainty is reserved for national (and perhaps state) politicians in situations where that politician or level of government is in charge of declaration and relief.
- 9. Dubois (2016) raises the importance of examining whether electoral calendars are exogenous or endogenous when analyzing political business cycles. In the latter case, governments could even manipulate the timing of elections to fit the economic cycle. In Brazil, the electoral calendar is fixed and did not change during the time period of this study. Other emergencies, such as the Covid-19 pandemic, did indeed lead to delays of Brazilian municipal elections in 2020.
- This finding would be consistent with other studies that find that voters reward incumbents for drought relief in India (Blankenship et al., 2020; Cole et al., 2012) and Mexico (Fuchs & Rodriguez-Chamussy, 2014).
- 11. While vulnerability to disasters is a policy decision for which politicians should be held accountable, effective preparedness is very hard to observe. Voters cannot observe what would have happened in the counterfactual world with less preparedness investment. They cannot see how bad things could have been, so they are unable to reward politicians for this difference. Voters may even be rationally wary of politicians who spend money on preparedness, since it could be spent in corrupt ways (Gailmard & Patty, 2019).
- See findings by Chen (2013) on hurricane relief in Florida and Cole et al. (2012) on flood and drought relief in India. Masiero and Santarossa (2020) find the opposite effect regarding earthquake relief in Italy.
- This is most similar to the "partisan cycles" in the political business cycle literature (Dubois, 2016).
- 14. Special elections may take place if the mayor leaves or is removed from office. These elections are staggered in time. My analysis of electoral cycles uses data from regularly scheduled elections.
- 15. Variation in municipal bureaucratic capacity would be an interesting area for future work on discretion and targeting of emergency declarations and other policies. A good starting point would be the municipal survey by IBGE (2013), which shows that only about one half of small to medium-sized municipalities had a Civil Defense agency in 2009 (Graphic 66).
- The technical guidelines are very specific across multiple dimensions using 30 year panel data, including annual precipitation levels and irregularity, solar radiation, temperature, and soil type (MIN, 2005).
- 17. See Gutiérrez et al. (2014) for a detailed overview of the process and programs.
- 18. A former mayor from the region described that mayors often have to spend money on disaster relief before the declaration can be approved. In this case, the state or

federal government will reimburse the municipal government for disaster expenditures if and when the declaration is approved.

- 19. Primary costs were debt renegotiation for rural farmers, PAC equipment for well drilling and dam construction, Bolsa Estiagem and Garantia Safra cash transfers to rural farmers, and water truck deliveries. For comparison, the GDP (current R\$) of the semi-arid region in 2011 was approx. R\$163.5 billion (SIGSAB, 2011).
- 20. During the time period of this study, mayors could begin this process by submitting one of three different documents: Preliminary Notification of a Disaster (NOPRED), Evaluation of Damages (AVADAN), or a Municipal Decree. Following the publication of the *Instrução Normativa* no. 1 (August 24, 2012), these documents were replaced by a single document, the Form for Disaster Information (FIDE) (UFSC, 2013). The process changed again in later years to introduce stricter guidelines and a simpler submission process.
- 21. Civil Defense agencies vary by state in terms of hiring procedures and institutionalization. Governors are responsible for nominating the head of the agency; however, the profile of those selected for the office varies. In some states, it seems to be the case that the appointee must have considerable experience in the military, while in others it seems that the governor has more discretion. There is little information on variation in state institutions for civil defense, and future research could explore the relationship between state bureaucracies and political discretion in policy making in disaster relief and other policy areas.
- 22. My data reflect approved drought declarations. Data on denied applications are not available.
- 23. There are not specific thresholds for precipitation amounts or deviations. World Bank researchers working closely with Brazilian government agencies in fact recommended to the government that a Drought Monitor use threshold values of drought indicators based on meteorological, hydrological, and agricultural factors (De Nys et al., 2016).
- 24. On rare occasions, especially if only one municipality is subject to the emergency, the mayor would apply directly to the federal MIN.
- 25. Unfortunately, data on relief amounts do not exist. This data challenge leaves open the possibility that federal or state officials have discretion to manipulate the relief amounts so that certain constituencies benefit more than others. For example, they may manipulate the amount that municipalities receive or change the type of relief program (water trucks prone to neighborhood-level targeting relative to crop insurance cash transfers prone to individual-level targeting). In the absence of reliable relief funding data, I am not able to evaluate that likely scenario. The additional manipulation of relief funds, on top of manipulation of emergency declarations, would strengthen my argument. I recommend this as an area for future study if reliable relief amounts become available in this case or if they are available in other cases.
- Interview 12 with the mayor of a rural municipality in Ceará; Interview 23 with a municipal Civil Defense bureaucrat of a rural municipality in Ceará; Interviews 97

and 98 with analysts at the Ceará state Institute of Statistics, Geography, and Information; Interview 104 with the coordinator of the Ceará state drought relief cash transfer program.

- 27. See the detailed Interview Methods Appendix in the Supplemental Material following recommendations by Mosley (2013).
- 28. Interviews 8, 25, 47, 56, 86.
- 29. Interviews 13, 19.
- 30. Interviews 27, 83.
- 31. Interviews 16, 24.
- 32. Interview 12. The Brazilian government, especially the anti-corruption Comptroller General (*CGU*), began investigating impropriety with emergency declarations (G1, 2014).
- 33. Author's observation, August 12, 2017.
- 34. Interviews 15, 23, 27, 33, 37.
- 35. Interview 12.
- 36. Pork barrel or clientelistic targeting may provide incentives to politicians to apply for drought relief and thus disperse public services to vulnerable groups. However, this is suboptimal for citizen welfare in the long-run, since politicians are using drought relief as a social safety net instead of emergency insurance. Drought relief policies do not address the underlying vulnerability of these populations to economic insecurity or future drought shocks.
- 37. In countries where rainfall shocks may affect violence, they could alter election schedules.
- 38. Political factors raised in qualitative interviews include political budget cycles, pork politics, and clientelism. Other inefficiencies may include suboptimal land-use, such as water-intensive crops in a drought area, or inadequate water storage leading to drought conditions even in the absence of below average rainfall shocks.
- The semi-arid designation changed in 2005 to include 102 more municipalities and changed again in 2017.
- 40. Replication materials and code can be found at Cooperman (2021).
- 41. I do not include year fixed effects because I am interested in variation in drought declaration within a given municipality across years given the same rainfall shock, not variation in declaration within years. I include a quadratic time trend to account for possible increases in declaration over time. See the Supplemental Materials.
- 42. See the Supplemental Material for a triple interaction between rainfall deviations (*SPI* categorical variables), election timing, and mayoral term.
- 43. I do not include *LowRain* in the main specification due to potential concerns about post-treatment bias. I do include it, and its interaction with *DroughtElecYear* in the Supplemental Material, due to other concerns about omitted variable bias. See also footnote 56.
- 44. I include year fixed effects because I am interested in variation in re-election rates within a year depending on having a drought declared in that year. I include state fixed effects in case of higher re-election rates or declaration processes in some

states. The sample is limited to first-term mayors and election years and therefore includes 2–4 observations per municipality. See the Supplemental Material for additional specifications.

- 45. In the sample, 71% of first-term mayors ran for re-election, and 68% of incumbents won among those who ran. The data have a few instances where a mayor attempted or served three consecutive terms, and many were eventually charged for various crimes. Many of them declared droughts during multiple years of above average rainfall. Marcos Santos of Traipu, Alagoas, was elected in 2000, 2004, and 2008. He was sentenced in 2012 to 2016 years, 9 months of jail for commanding a criminal ring designed to divert public funds using shell companies, manipulating bidding processes, fraud, money laundering, and others (MPF, 2012). He had drought declarations during 8 of 12 years in office, including in 2002, 2008, and 2009, when the SPI values for his municipality were 1.15, 1.2, and 1.06, respectively.
- 46. See the Supplemental Material for triple interaction between partisanship, election year, and below average rainfall and for equations (4) and (5) with unlimited sample.
- 47. With a binary dependent variable, limited dependent variable models are indicated but more challenging to interpret. Results using a FE conditional logit have coefficients and statistical significance that are equivalent in direction and interpretation to the OLS FE model (see the Supplementary Materials). For ease of interpretation, I report the OLS FE model.
- 48. The atlas provides data from 1991 to 2012, which limits my dataset. In some years, there were up to three droughts in a single municipality since the emergency must be renewed within 180 days. I collapse the emergencies into a binary variable.
- 49. In my analysis, I use the timing of the regularly-scheduled elections and do not include data on timing of special elections. The only exception is data on political party affiliation of the mayor, which incorporates changes due to special elections.
- 50. SPI between 0 and -0.79 is considered abnormally dry; -0.8 to -1.29 is moderate drought; -1.3 to -1.59 is severe drought; -1.6 to -1.99 is extreme drought; < -2 is exceptional drought. The 6-month SPI incorporates short-term shocks and longer-term impacts (De Nys et al., 2016).
- 51. SPI was calculated in R with the SPEI package from monthly precipitation levels for  $0.05 \times 0.05^{\circ}$  grid cells (approx. 5 by 5 km), downloaded from CHIRPS (Funk et al., 2015). Temperature data comes from the NOAA NCEP CPC Monthly Global Surface Air Temperature Data Set at 0.5° from 1948 to present, and PET was calculated in R with the SPEI package's Thornthwaite method.
- 52. Beans, corns, and cattle can be considered post-treatment variables, so I include lagged versions and results are very similar (see the Supplementary Materials). Other indicators such as population, poverty, and distance from the coast are time-invariant or recorded infrequently, so they are accounted for with municipal fixed effects.
- 53. Interview 97.

- 54. Unfortunately, data on denied applications for drought relief is unavailable.
- 55. Among those who run, 68% are re-elected.
- 56. I thank an anonymous reviewer for this point. I report additional analyses in the Supplementary Materials, since I have reason to believe that below average rainfall plays an independent role from drought declaration and excluding it could lead to omitted variable bias. For example, prior analyses in the paper demonstrate that drought declarations even occur during far above average conditions; below average rainfall therefore is not a necessary precondition for declaration. Below average rainfall may also affect an incumbent's decision to run or likelihood of winning, since drought conditions affect the broader economy and many voters' livelihoods. Regardless of obtaining relief, voters experiencing drought are likely to be suffering and may punish the incumbent for that, whether or not the incumbent was actually at fault (Achen & Bartels, 2017). In an "unavoidable" situation (King, 2010), I opt to present models in the Supplemental Material showing the variables separately and together; I find that the coefficients barely change when including them together, suggesting that they indeed each have partial relationships with incumbents' decisions and ultimate success.
- 57. Indeed, I find that first-term mayors who are seeking re-election are more likely to have droughts declared than first-term mayors who are not seeking re-election; see Supplemental Table 7. Without data on the specific timing of disaster declarations, I cannot evaluate whether mayors decide to run before or after obtaining declarations. My qualitative interviews with former mayors in this region suggest that the date of the declaration would also not necessarily reflect the disbursement of funds, since mayors can be reimbursed for emergency-related spending if there is a delay in the declaration process. If there are other contexts with sharp discontinuities in the timing of candidacy and declaration approval (or spending restrictions) and strict regulations around timing of emergency spending, this would be a promising area for future research.
- 58. I conduct sensitivity analyses following Cinelli and Hazlett (2020) and find that the point estimate and variance estimate in Table 3, Column 5 are robust to the possible inclusion of an omitted variable three times as strong as prior vote share. I thank an anonymous reviewer for this suggestion. See the Supplemental Material.
- 59. Heavy rains in one year may not replenish surface water and groundwater, and rainfall may be concentrated in one region of large municipalities or during short time periods, known as green droughts. Where land is used for water-intensive projects or water infrastructure is broken or hard to access, citizens may experience water shortages even with high rainfall. However, if citizens experience water insecurity such that they truly require drought relief during periods of far above average rainfall, this indicates inappropriate drought mitigation policies.
- 60. I thank anonymous reviewers for this and other suggestions on evaluating the role of partisan alignment. Mayors are elected in October and take office in the next January. A municipality where the Party A's candidate was elected in 2008 is considered to have a Party A mayor starting in 2009.

- 61. I find preliminary evidence that voters may reward the incumbent governor's party for droughts declared during the year of the state/federal election or the year prior when using state fixed effects but not municipal fixed effects (Supplemental Tables 15 and 16).
- 62. The PT Party held the presidency for most of the 1999-2012 study period. Fernando Henrique Cardoso of the PSDB party was president during 1995–2002, and Luiz Inácio Lula da Silva of the PT Party was president from 2003 to 2012.
- 63. Table 4, Column 1 uses a sample limited to the 101 municipalities with changes in PT alignment during the study period; those electing PT mayors during all 4 municipal elections (2 municipalities) and those electing no PT mayors (928 municipalities) do not contribute variation. See the Supplemental Material for results from unlimited sample; the coefficient on the interaction is smaller but statistically significant ( $\beta = 0.19, p < 0.01$ ). Party affiliation of the mayors during the years 1999-2012 reflect the mayors elected during the 1996, 2000, 2004, and 2008 elections or special elections held during 1997-2012. Mayors elected in 2012 did not take office until January 2013. After the 1996 municipal election, only 2 of the 1031 municipalities had a PT mayor. By the end of the study period, 101 additional municipalities elected a PT mayor in at least one election. It would seem that results for mayor-president alignment and for PT mayors should be very similar, since the PT held the presidency from 2003 to 2012. However, with so few PT mayors in the Northeast in the early parts of the sample, there are significantly fewer municipalities that have variation in PT alignment during the study period. In contrast, 148 PSDB mayors were elected in 1996 and 167 PSDB mayors were elected in 2000. Thus there are more municipalities with variation in partisan alignment with the president.
- 64. A few mechanisms could drive *Partisan Support*: 1) PT mayors are more likely to apply in election years than non-PT mayors due to bureaucratic learning within the PT Party; (2) PT mayors are more likely to have their applications approved in election years because PT governors/presidents value partisan success; (3) PT mayors are more likely to have their applications approved in election years because PT governors/presidents perceive future personal electoral benefit. An alternate explanation is that PT mayors are more qualified than mayors from other parties and thus more adept at navigating the bureaucracy. It would be very interesting to investigate how these mechanisms worked within the PT Party in future work.
- 65. There may be systematic differences in the type of mayor that joins the PT Party or in the type of municipality that elects a PT mayor. Indeed, I find that municipalities with a PT mayor at any point in my sample tended to have lower average precipitation, more heads of cattle, and greater distances to the state capital. However, the fixed effects model studies change within municipalities. Another concern could be that drought patterns changed within the study period and these changes occurred primarily in municipalities more likely to elect PT mayors. However, changes in rainfall patterns are challenging to pin down, and 14 years is a very short period

within which to observe significant changes. It is therefore reasonable to assume that any changes that may have occurred would take place across the region.

66. I cluster at the state-year level: 126 clusters for the model in Supplemental Tables 1 and 36 clusters in Table 3.

#### References

- Achen, C. H., & Bartels, L. M. (2017). Democracy for realists: Why elections do not produce responsive government (volume 4). Princeton University Press.
- Alt, J., Bueno de Mesquita, E., & Rose, S. (2011). Disentangling accountability and competence in elections: Evidence from US term limits. *The Journal of Politics*, 73(1), 171–186. http://dx.doi.org/10.1017/S0022381610000940.
- Ashworth, S., Bueno de Mesquita, E., & Friedenberg, A. (2018). Learning about voter rationality. *American Journal of Political Science*, 62(1), 37–54. http://dx.doi.org/ 10.1111/ajps.12334.
- Bechtel, M. M., & Hainmueller, J. (2011). How lasting is voter gratitude? An analysis of the short- and long-term electoral returns to beneficial policy. *American Journal of Political Science*, 55(4), 852–868. https://doi.org/10.1111/j.1540-5907.2011.00533.x.
- Bezerra, D. (2019). *Ministério público ajuíza ações contra o prefeito de itainópolis em razão de decreto de emergência*. Cidades na Net.
- Blankenship, B., Kennedy, R., Urpelainen, J., & Yang, J. (2020). Barking up the wrong tree: How political alignment shapes electoral backlash from natural disasters. *Comparative Political Studies*, 54(3), 0010414020970211. http://dx.doi.org/10. 1177/0010414020970211.
- Boas, T., Hidalgo, F. D., & Richardson, N. (2014). The spoils of victory: Campaign donations and government contracts in Brazil. *The Journal of Politics*, 76(02), 415–429. https://doi.org/10.1017/S002238161300145X.
- Bobonis, G., Gertler, P., Gonzalez-Navarro, M., & Nichter, S. (2017). Vulnerability and clientelism. NBER Working Paper No. 23589.
- Brito, G. (2017). *Ex-prefeito de juazeiro é acusado de improbidade por uso ilegal de recursos públicos*. Ministério Público do Estado da Bahia.
- Brollo, F., & Nannicini, T. (2012). Tying your enemy's hands in close races: The politics of federal transfers in Brazil. *American Political Science Review*, 106(04), 742–761. https://doi.org/10.1017/S0003055412000433.
- Buckley, E. E. (2017). *Technocrats and the politics of drought and development in twentieth-century Brazil.* UNC Press Books.
- Calvo, E., & Murillo, M. V. (2004). Who delivers? Partisan clients in the argentine electoral market. *American Journal of Political Science*, 48(4), 742–757. http:// dx.doi.org/10.2307/1519931.
- Campos, JN (2015). Paradigms and public policies on drought in Northeast Brazil: A historical perspective. *Environmental Management*, 55(5), 1052–1063. https:// doi.org/10.1007/s00267-015-0444-x.

- Campos, J. N. B., & de Carvalho Studart, T. M. (2008). Drought and water policies in Northeast Brazil: Backgrounds and rationale. *Water Policy*, 10(5), 425–438. http://dx.doi.org/10.2166/wp.2008.058.
- Chamber of Deputies (2010). Constitutional amendment no. 16/1997 Constitution of the Federative Republic of Brazil. Biblioteca Digital da Câmara dos Deputados (third edition). Chamber of Deputies.
- Chen, J. (2013). Voter partisanship and the effect of distributive spending on political participation. *American Journal of Political Science*, 57(1), 200–217. https://doi.org/10.1111/j.1540-5907.2012.00613.x.
- Cinelli, C., & Hazlett, C. (2020). Making sense of sensitivity: Extending omitted variable bias. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 82(1), 39–67. https://doi.org/10.1111/rssb.12348.
- Clark, W. R., Reichert, U. N., Lomas, S. L., & Parker, K. L. (1998). International and domestic constraints on political business cycles in OECD economies (52, pp. 87–120). International Organization.1
- Cole, S., Healy, A., & Werker, E. (2012). Do voters demand responsive governments? Evidence from Indian disaster relief. *Journal of Development Economics*, 97(2), 167–181. https://doi.org/10.1016/j.jdeveco.2011.05.005.
- Cooperman, A. D. (2017). Randomization inference with rainfall data: Using historical weather patterns for variance estimation. *Political Analysis*, 25(3), 277–288. http://dx.doi.org/10.1017/pan.2017.17.
- Cooperman, A. D. (2021). Replication data for: (Un)natural disasters: Electoral cycles in disaster relief. *Harvard Dataverse*. https://doi.org/10.7910/DVN/MWT7YG.
- De Magalhaes, L. (2015). Incumbency effects in a comparative perspective: Evidence from brazilian mayoral elections. *Political Analysis*, 23(1), 113–126. https://doi. org/10.1093/pan/mpu012.
- De Mello Lemos, M. C. (2003). A tale of two policies: The politics of climate forecasting and drought relief in Ceará, Brazil. *Policy Sciences*, 36(2), 101–123. https://doi.org/10.1023/A:1024893532329.
- De Nys, E., Engle, N., & Magalhães, A. R. (2016). Drought in Brazil: Proactive management and policy. CRC Press.
- Diniz, P. C. O., & Piraux, M. (2011). Das intervenções de combate à seca às ações de convivência com o semiárido: trajetória de 'experimentalismo institucional' no semiárido brasileiro. *Cadernos de estudos sociais*, 26(2), 210–218.
- Downs, A., (1957). An economic theory of democracy. Harper.
- Dubois, E. (2016). Political business cycles 40 years after nordhaus. Public Choice, 166(1–2), 235–259. https://doi.org/10.1007/s11127-016-0313-z.
- Feierherd, G. (2020). How mayors hurt their presidential ticket: Party brands and incumbency spillovers in Brazil. *The Journal of Politics*, 82(1), 195–210. https:// doi.org/10.1086/705742.
- Finan, T., & Nelson, D. (2001). Making rain, making roads, making do: Public and private adaptations to drought in Ceará, Northeast Brazil. *Climate Research*, 19(2), 97–108. http://dx.doi.org/10.3354/cr019097.

- Finan, T., & Nelson, D. (2009). Decentralized planning and climate adaptation: Toward transparent governance. In W. N. Adger, I. Lorenzoni, & K. L. O'Brien (Eds.), *Adapting to climate change: Thresholds, values, governance.* Cambridge University Press.
- Fox, J., & Van Weelden, R. (2015). Hoping for the best, unprepared for the worst. Journal of Public Economics, 130, 59–65. https://dx.doi.org/10.2139/ssrn. 2301954.
- Franzese, R. J., Jr. (2002). Electoral and partisan cycles in economic policies and outcomes. *Annual Review of Political Science*, 5(1), 369–421. https://doi.org/10. 1146/annurev.polisci.5.112801.080924.
- Fuchs, A., & Rodriguez-Chamussy, L. (2014). Voter response to natural disaster aid: Quasi-experimental evidence from drought relief payments in Mexico. The World Bank.
- Funk, C, Peterson, P, Landsfeld, M, Pedreros, D, Verdin, J, Shukla, S, Husak, G, Rowland, J, Harrison, L, Hoell, A, et al. (2015). The climate hazards infrared precipitation with stations—A new environmental record for monitoring extremes. *Scientific Data*, 2(3), 150066. https://doi.org/10.1038/sdata.2015.66.
- G1 (2014). Há cidades que declaram calamidade para fazer obra sem licitação, diz cgu. Globo.com.
- Gailmard, S., & Patty, J. W. (2019). Preventing Prevention. American Journal of Political Science, 63(2), 342–352. https://doi.org/10.1111/ajps.12411.
- Garrett, T. A., & Sobel, R. S. (2003). The political economy of fema disaster payments. *Economic Inquiry*, 41(3), 496–509. http://dx.doi.org/10.1093/ei/cbg023.
- Gasper, J. T., & Reeves, A. (2011). Make it rain? Retrospection and the attentive electorate in the context of natural disasters. *American Journal of Political Science*, 55(2), 340–355. http://dx.doi.org/10.1111/j.1540-5907.2010.00503.x.
- Gutiérrez, A. P. A., Engle, N. L., De Nys, E., Molejón, C., & Martins, E. S. (2014). Drought Preparedness in Brazil. *Weather and Climate Extremes*, 3, 95–106. https://doi.org/10.1016/j.wace.2013.12.001.
- Healy, A., & Malhotra, N. (2009). Myopic voters and natural disaster policy. *American Political Science Review*, 103(03), 387–406. https://doi.org/10. 1017/S0003055409990104.
- Healy, A., & Malhotra, N. (2013). Retrospective voting reconsidered. Annual Review of Political Science, 16(1), 285–306. http://dx.doi.org/10.1146/annurev-polisci-032211-212920.
- Heersink, B., Peterson, B. D., & Jenkins, J. A. (2017). Disasters and elections: Estimating the net effect of damage and relief in historical perspective. *Political Analysis*, 25(2), 260–268. https://doi.org/10.1017/pan.2017.7.
- Herrera, V. (2017). *Water and politics: Clientelism and reform in urban Mexico*. University of Michigan Press.
- IBGE (2007). Semi-Arido Brasileiro. Instituto Brasileiro de Geografia e Estatística.
- IBGE (2013). Perfil dos municípios brasileiros 2012. Instituto Brasileiro de Geografia e Estatística.

- IPCC (2012). Managing the risks of extreme events and disasters to advance climate change adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press.
- IPCC (2014). Climate change 2014: Impacts, adaptation, and vulnerability (working group ii). Cambridge University Press.
- Kenny, M. L. (2002). Drought, clientalism, fatalism and fear in Northeast Brazil. *Ethics, Place & Environment*, 5(2), 123–134. https://doi.org/10.1080/1366879022000020194.
- King, G. (2010). A hard unsolved problem? Post-treatment bias in big social science questions. In Hard Problems in Social Science" Symposium, Cambridge, MA, 10 April, 2010.
- Klašnja, M., & Titiunik, R. (2017). The incumbency curse: Weak parties, term limits, and unfulfilled accountability. *American Political Science Review*, 111(1), 129–148. http://dx.doi.org/10.1017/S0003055416000575.
- Kramon, E., & Posner, D. N. (2013). Who benefits from distributive politics? How the outcome one studies affects the answer one gets. *Perspectives on Politics*, 11(2), 461–474. https://doi.org/10.1017/S1537592713001035.
- Leal, V. N. (2009 [1949]). Coronelismo: The municipality and representative government in Brazil. Cambridge University Press.
- Lei No. 12.340 (2010). *Lei no. 12.340, de 1 de dezembro de 2010*. Diário Oficial da União.
- Lei No. 8.666 (1993). Lei no. 8.666, de 21 de junho de 1993. Diário Oficial da União.
- Lei No. 9.504 (1997). Lei das eleições lei no. 9.504, de 30 de setembro de 1997. Diário Oficial da União.
- Marengo, J. A., Torres, R. R., & Alves, L. M. (2017). Drought in Northeast Brazil past, present, and future. *Theoretical and Applied Climatology*, 129(3), 1189–1200. https://doi.org/10.1007/s00704-016-1840-8.
- Masiero, G., & Santarossa, M. (2020). *Natural disasters and electoral outcomes*. European Journal of Political Economy.
- McKee, T. B., Doesken, N. L., & Kliest, J. (1993). The relationship of drought frequency and duration to time scales In Proceedings of the 8th Conference of Applied Climatology, Anaheim, CA, 17–22 January, 1993. (pp. 179–184). American Meteorological Society.
- Mearns, R., & Norton, A. (2010). Social dimensions of climate change: Equity and vulnerability in a warming world. World Bank Publications.
- MIN (2005). Relatório Final: Grupo de trabalho interministerial para redelimitação do semi-árido nordestino e do polígono das secas. Ministério da Integração Nacional.
- Mishra, A. K., & Singh, V. P. (2010). A review of drought concepts. Journal of Hydrology, 391(1–2), 202–216. https://doi.org/10.1016/j.jhydrol.2010.07.012.
- Montgomery, J. M., Nyhan, B., & Torres, M. (2018). How conditioning on posttreatment variables can ruin your experiment and what to do about it. *American Journal of Political Science*, 62(3), 760–775. https://doi.org/10.1111/ajps.12357.
- Mosley, L. (2013). Interview research in political science. Cornell University Press.

- MPF (2012). *Mpf obtém condenação de prefeito afastado de traipu (al)*. Technical report. Assessoria de Comunicação, Ministério Público Federal em Alagoas.
- Nelson, D. R., & Finan, T. J. (2009). Praying for Drought: Persistent vulnerability and the Politics of Patronage in Ceará, Northeast Brazil. *American Anthropologist*, 111(3), 302–316. https://doi.org/10.1111/j.1548-1433.2009.01134.x.
- Novaes, L. M. (2018). Disloyal brokers and weak parties. American Journal of Political Science, 62(1), 84–98. https://doi.org/10.1111/ajps.12331.
- Oliver, A. J., & Reeves, A. (2015). Emerging trends in the social and behavioral sciences: An interdisciplinary, searchable, and linkable resource. *The Politics of Disaster Relief*, 1–8. https://doi.org/10.1002/9781118900772.etrds0258.
- Ottonelli, J., & Mariano, J. L. (2014). Pobreza multidimensional nos municípios da região nordeste. *Revista de administração Pública*, 48(5), 1253–1279. https://doi. org/10.1590/0034-76121724.
- Pereira, M. C. G. (2016). Água e convivência com o semiárido: Múltiplas águas, distribuições e realidades. PhD thesis. Brasil Scientific Electronic Library.
- Reeves, A. (2011). Political disaster: Unilateral powers, electoral incentives, and presidential disaster declarations. *The Journal of Politics*, 73(04), 1142–1151. http://dx.doi.org/10.1017/S0022381611000843.
- Rose, S. (2006). Do fiscal rules dampen the political business cycle? *Public Choice*, 128(3-4), 407–431. https://doi.org/10.1007/s11127-020-00797-3.
- Samuels, D., & Zucco, C. (2015). Crafting mass partisanship at the grass roots, from the top down. *British Journal of Political Science*, 45(4), 755–775. https://doi.org/ 10.1017/S0007123413000549.
- Samuels, D. J., & Zucco, C. (2018). Partisans, antipartisans, and nonpartisans: Voting behavior in Brazil. Cambridge University Press.
- Shi, M., & Svensson, J. (2006). Political budget cycles: Do they differ across countries and why? *Journal of Public Economics*, 90(8), 1367–1389. https://doi.org/10. 1016/j.jpubeco.2005.09.009.
- SIGSAB (2011). Tabela 21-1: Produto interno bruto a preços correntes. Technical report. IBGE em parceria com os Órgãos Estaduais.
- Stokes, S. C., Dunning, T., Nazareno, M., & Brusco, V. (2013). *Brokers, voters, and clientelism: The puzzle of distributive politics*. Cambridge University Press.
- Tendler, J. (1997). Good government in the tropics. Johns Hopkins University Press.
- UFSC (2013). *Atlas brasileiro de desastres naturais 1991 a 2012* (volume 2). Universidade Federal de Santa Catarina: Centro Universitàrio de Estudos e Pesquisas sobre Desastres, Florianópolis.
- Ventura, T. (2021). Do mayors matter? Reverse coattails on congressional elections in Brazil. *Electoral Studies*, 69, 102242. https://doi.org/10.1016/j.electstud.2020. 102242.