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Three Essays on Material Considerations in Political Behavior

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Abstract

A classic debate in the social sciences is to what extent material self-interest structures individual decisions. From the political science perspective, this question is important due to its implications to the democratic processes. For example, accountability is compromised if group norms prevent voters from punishing politicians for bad performance. In this dissertation, I engage with this debate. Specifically, I ask when and how material self-interest structures political behavior in Brazil. My focus on Brazil allows me to explain and describe understudied contingencies of the relationship between material self-interest and political behavior. I do this by sourcing and matching different types of data and applying causal inference methods.

In the first empirical chapter (Chapter 2), I analyze how material self-interest structures political behavior in a context in which state capacity is limited. The literature typically assumes that materially self-interested voters turn to the state for compensation and insurance in the case of adverse life events. I challenge this view by arguing that in contexts where state capacity is limited, materially self-interested voters might see other institutions as more effective providers of insurance and compensation. This is the case with the Evangelical church in many parts of Brazil. To test this argument, I construct a shift-share instrument for economic downturn based on the exposure of local labor markets to a sharp drop in exports that began in the early 2010s. I match the export shock with electoral and survey data. My results indicate that congregants exposed to the drop in exports become closer to their religious communities and more susceptible to political

persuasion by church leaders. If church leaders oppose pro-redistribution parties, then congregants facing economic adversity are more likely to follow the church lead.

The second empirical chapter (Chapter 3) examines how material self-interest shapes the way citizens respond to natural disasters. Conventional wisdom holds that natural disasters are unambiguously bad and, thus, increase environmental concern and support for green political platforms. We instead argue that natural disasters have distributive implications, particularly in countries where the primary sector is relatively large. In the context of Brazil, wildfires "clear" land by destroying natural vegetation. For some groups, these newly "cleared" lands present an opportunity for land grabbing, ranching and soy production. For the rest of the population, fires carry no benefits. Studies show that fires have negative effects on health and economic outcomes. We study the implications of fires to voting behavior by combining satellite, electoral and administrative data and employing two identification strategies. First, an instrumental variable design that exploits short-term variation in weather condition while controlling for long-term weather patterns. Second, a differences-in-differences design comparing municipalities affected by fires with those not affected. The results indicate that fires increase support for green political platforms only in municipalities with low concentration of employment in the cattle and soy sectors, which are likely to benefit from fires. Overall, our results suggest that material self-interest influences how citizens respond to natural disasters.

The third empirical chapter (Chapter 4) studies how narratives affect individual decisions involving direct risks to their health. Prior scholarship is skeptical about the potential of elite cues to influence individuals' decisions that involve direct costs to their safety and security. We argue that, when attachments to political groups are high, elite cues can influence attitudes and real-world behaviors even in these contexts. Our empirical analysis focuses on how Jair Bolsonaro's cues affected citizens' views and behaviors regarding pharmaceutical and non-pharmaceutical interventions implemented to contain and fight the COVID-19 pandemic. To study this phenomenon, we employ mobility, ad-

ministrative, electoral and original survey data. Estimates from a difference-in-differences design and two survey experiment suggest that President Jair Bolsonaro's cues affected citizens' compliance with social distancing measures and willingness to use drugs that have not been adequately tested or approved as COVID-19 treatments. Notably, the effect of Bolsonaro's cues is conditional upon political identity (and its strength) and cognitive capacity. These results indicate that individuals with strong attachments to political groups may accept to take high risks to their short-term material well-being in order to comply with group norms.

Contents

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Chapter 1

Introduction

It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest
—Adam Smith, 1776

It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness
—Karl Marx, 1859

Since the late 19th century, an increasingly important function of states has been "...the production and distribution of social well-being" (Esping-Andersen, 1990, 1). The reasons why states succeed or fail in doing so are multiple. In theories of democratic governance, citizens' preferences and evaluations are assumed to be key incentives for political elites. From this perspective, citizens are often assumed to act "as–if" rational. Democratic accountability relies on citizens' capacity to reward and punish politicians at the voting booth according to government's performance. Similarly, responsiveness depends on whether voters can distinguish between parties' political programs and identify which policies maximize their well-being. Given the importance of the subject, a large body of literature investigates when voters act "as-if" rational and when they do not.

Perhaps the most basic assumption of models that take citizens as rational actors is

that individuals are self-interested and primarily motivated by materialist motives (Mintz, Valentino and Wayne, 2021). However, a number of experimental studies contest this assumption. These studies have found that individuals sometimes chose to incur material loss in order to comply with social norms or fulfill non-material desires, such as boosting their self-esteem (e.g., Henrich et al., 2001). In this dissertation, I engage with this debate by asking when and how are citizens primarily motivated by material self-interest.

In each of the three empirical chapters of this dissertation, I address those questions from different angles using data from Brazil. As I discuss in greater detail below, the Brazilian context allows me to explore understudied aspects of the relationship between material self-interest and political behavior. In Chapter 2, I examine how material self-interest influences vote choice when state capacity is limited and churches work as informal insurance systems. I show that income loss can lead voters to prefer parties that are anti-redistribution and stress non-material issues, such as abortion. These findings contrast with theories positing that "as-if" rational voters necessarily respond to income and wealth loss by demanding more compensation and insurance from the state (e.g., Rehm, 2009; Margalit, 2011). Chapter 3 analyzes how distributive concerns shape citizens' responses to natural disasters. Much of the scholarship in this area tends to assume that natural disasters are unambiguously bad. Perhaps due to the literature's focus on developed countries, we argue that prior work has overlooked the fact that natural disasters may instead bring economic returns to some segments of society. For example, wildfires "clear" land, creating opportunities for land grabbing, ranching and agriculture. We show that while fires increase the salience of environmental issues in general, they only boost support for green political platforms where their costs outweigh their benefits. These results do not align with accounts of environmental issues as non-material (Inglehart and Flanagan, 1987) and complement studies that show how material self-interest structures preferences about environmental policy (Bechtel, Genovese and Scheve, 2019; Bush and Clayton, 2022). Chapter 4 turns to the question of how material self-interest interacts with political

identities. It shows that when political identities are strong, individual considerations might give more weight to social norms than to direct threats to their well-being. Our results lend nuance to the idea that identities trump material self-interest only when the costs are insignificant (Lavine, Johnston and Steenbergen, 2012; Groenendyk, 2013).

1.1 The argument in brief

Individuals are subject to myriad motives when forming their opinions, evaluations, and preferences. Examples of such motives include material self-interest, accuracy, confirmation of previous beliefs, social identity, and self-esteem. It is not rare that these motives point to different directions, causing ambivalence. Moreover, the salience of each of these motives for a single individual varies between contexts (Lavine, Johnston and Steenbergen, 2012).

In this dissertation, I examine moments when voters' lived experiences undergo sudden and often unexpected changes. Specifically, I focus on export shocks (Chapter 1), wildfires (Chapter 2) and the COVID-19 pandemic (Chapter 3). By doing so, I am able to identify the manner by which such unexpected changes are consequential to individuals' material safety and security. I argue that to understand how material self-interest shapes preferences and evaluations, it is key to consider three aspects. First, how a person seeks support in hard times (*insurance systems*), how she makes ends meet (*industry of employment*) and how she makes sense of changing realities (*narratives*).[1] Each empirical chapter of this dissertation analyzes one of these aspects.

1.2 Case selection

Economic globalization, environmental degradation, and contagious diseases that travel quickly across borders are major threats to individuals' material safety and security across

[1]These three aspects of citizens' lived experiences were highlighted by Zaller et al. (1992).

the globe. Each of the three empirical chapters of this thesis focuses on one such type of threat in the context of Latin America's largest democracy: Brazil. This setting is relevant to studying how material self-interest structures political behavior for three reasons. First, Brazil has a significant sub-national variation of development levels. The GDP per capita of the most prosperous Brazilian state (São Paulo) is over six times greater than that of the poorest state (Maranhão). Important variation is also found in state capacity across and within municipalities. Citizens in areas with less state capacity develop informal insurance systems to cope with adverse life events. This context enables me to analyze how material self-interest interacts with state- and non-state insurance systems in shaping support for redistributive political platforms.

Second, economic development and, as a consequence, the relationship with nature varies widely in Brazil. Home of the largest metropolis in South America, the city of São Paulo, Brazil is also where most of the Amazon (the largest rainforest in the world) is located. Hence, in Brazil we can find from people living in urban areas where the service sector dominates local economic activity to uncontacted tribes living as hunters and gathers. We can also find local labor markets highly dependent on extractive industries, such as mining, as well as agriculture and ranching. In addition, climate change is making extreme weather events more common in Brazil. Extreme rainfall causes floods and landslides, whereas dry spells lead to water crises and forest fires (Nobre, Marengo and Soares, 2019). The geographic variation in economic activities enables me to analyze how natural disasters interact with material self-interest to shape mass preferences, often in unexpected ways.

Third, Brazil was one of the countries hit hardest by the COVID-19 pandemic. As of July 2022, Brazil ranks 15$^{\text{th}}$ by the number of confirmed COVID-19 deaths per million inhabitants (De Best, 2022). Before the pandemic, health–related attitudes and behaviors were nearly consensual among the Brazilian public (e.g., Pereira and Nunes, 2021). However, this near-consensus about health attitudes and practices broke down during the

pandemic. This context combined with the availability of fine-grained and timely data gave us the opportunity to study when and how political leaders shape personal decisions over issues tied directly to individuals' physical safety and security.

1.3 Overview of the empirical chapters

Chapter 2: Turning Away From the State (insurance systems)

Conventional wisdom holds that voters who lose from economic integration support parties that propose to expand the welfare state. In this chapter, I challenge this view by arguing that a key scope condition of this causal relationship is expectations about the state. In the global south, non-state organizations (such as churches and gangs) are often more credible providers of insurance than the state. In these contexts, globalization increases the effectiveness of "organizational brokers" in persuading local communities. To test this argument, I propose a new shift-share instrument that measures the exposure of Brazilian local labor markets to an exogenous decline in exports. By matching this instrument with electoral and survey data, I provide evidence that declining exports increased the power of Evangelical leaders to persuade their congregations to vote against parties that favor welfare-state expansion. My findings explain and describe the contingencies underlying the political consequences of globalization.

Chapter 3: Hot Takes (industries of employment)

As the climate crisis worsens, it becomes increasingly important to understand how voters respond to first-hand experience of natural disasters. Conventional wisdom holds that exposure to natural disasters fosters environmental concern, thereby increasing support for green parties and candidates. We argue instead that exposure to wildfires increases support for green candidates only when the costs outweigh the benefits. While fires

have unambiguously negative health effects, their economic implications are contingent. In areas where fires destroy natural vegetation, newly "cleared" land may represent an opportunity for land grabbing and ranching. We source satellite, administrative and electoral data from Brazil and use them in two different identification strategies. Our results show that exposure to fires increases support for the main green candidate only in municipalities with low levels of employment in sectors that are likely to benefit from land grabbing. Our findings shed light on the distributional implications of climate change and their political consequences.

Chapter 4: Words Can Hurt (narratives)

Do cues from political elites influence their constituents' decisions about personal matters, such as health behavior? If so, why? Leveraging on a combination of natural and survey experiments, we study how President Bolsonaro's dismissive stance towards COVID-19 in Brazil influenced the behaviors and opinions of his opponents and supporters. First, we exploit Bolsonaro's sudden display of skepticism towards COVID-19 in a differences-in-differences design. We show that municipalities with a concentration of his supporters witnessed higher mobility levels, excess hospitalization, and mortality in subsequent days. Second, results of two survey experiments indicate that these patterns are explained by Bolsonaro supporters following his cues and a backlash among his opponents. Heterogeneous exercises regarding participants' performance in a cognitive test and the strength of their political social identity provide evidence of the mechanisms. While heuristics drive the reaction of Bolsonaro opponents, willingness to comply with group norms explains the reactions of his supporters.

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Chapter 2

Turning Away From the State: Trade Shocks and Informal Insurance in Brazil

Paula Rettl (JMP)

When governments seem so strong and laws so stable, men do not see the danger that religion may run by allying itself with power.

When governments are clearly feeble and laws changeable, the danger is obvious to all, but often then there is no longer time to avoid it. One must learn to perceive it from afar.

—Alexis de Tocqueville, 1835

2.1 Introduction

Economic globalization has long been a contentious domestic issue due to its distributional consequences. Exposure to international markets can increase economic volatility and depress income among the most vulnerable industries, workers and communities (e.g., Rodrik, 1998; Autor, Dorn and Hanson, 2013; Dix-Carneiro, 2014). How does this volatility affect domestic politics? Ruggie (1982) famously hypothesized that the deepening of international economic integration was politically feasible thanks to higher public spending in welfare states. However, empirical evidence on the causal link between globalization

and demand for welfare programs and public spending is mixed. A number of studies support Ruggie's expectations (e.g., Scheve and Slaughter, 2004; Walter, 2010; Scheve and Serlin, 2022), while others show that globalization shocks can also generate demands for other types of political platforms, such as authoritarianism, nationalism and far-right populism (Colantone and Stanig, 2018*b*,*a*; Autor et al., 2020; Baccini and Weymouth, 2021; Ballard-Rosa et al., 2021; Ballard-Rosa, Jensen and Scheve, 2022). Such contrasting findings highlight the need to identify the scope conditions that underline the causal relations between economic integration and mass support for the welfare state.

I argue that an important scope condition of this causal relationship is the extent to which the state is seen as a credible provider of compensation and insurance *vis-à-vis* non-state actors (such as churches and gangs). Most of the research examining how voters' preferences change as a result of economic integration focuses on the US and European countries (for recent reviews, see Rodrik, 2021; Walter, 2021), where state capacity is high. In these contexts, goods and services provided by non-state actors (i.e., *informal insurance systems*)[1] play little to no role. However, even in these contexts scholars conjecture that state credibility matters. For instance, Colantone and Stanig (2019) put forward that post-Great Recession austerity measures have eroded the perceived ability of the state to compensate and insure workers against the negative effects caused by globalization, thereby causing voters to turn to protectionist instead of pro-redistribution parties. In the Global South, where expectations about the state (and not only about the welfare state) are diminished (Holland, 2018), I argue that the negative effects of globalization make vulnerable individuals more dependent on informal insurance systems. As a result, leaders of institutions that operate as informal insurance systems (e.g., bishops, gang leaders) are in a better position to act as *organizational brokers* (Holland and Palmer-Rubin, 2015) and influence political opinions and behavior in their communities.

[1] I define informal insurance systems as sources of financial resources, goods, services and social capital that can be accessed by individuals through informal transactional relations. For example, Evangelical churches provide financial help and access to rehabilitation centers for its members in exchange for recurrent donations and compliance with behavioral norms (Spyer, 2020).

I examine this argument in the context of Brazil, the 4th biggest democracy and 12th largest economy in the world. In the 2010s, lower growth in OECD countries and China caused a sharp decline in Brazilian exports.[2] The preceding period was marked by a sustained growth of exports and GDP per capita. Specifically, exports went from 60 billion in 1995 to a peak of 170 billion (constant USD) in 2012 and dropped to 120 billion in 2015.

The main center-left party, the Worker's Party (*Partido dos Trabalhadores*, PT), held the Presisdency for most of this period (from 2002 to 2016) and helped to promote positive social change by investing in welfare policies (Arretche, 2019), such as a conditional cash transfer program entitled *Bolsa Família* (BF). Despite these new government programs, a series of protests and mounting anti-PT sentiment marked the 2010s when economic growth slowed down (Samuels and Zucco, 2018). This process culminated with the impeachment of President Dilma Rousseff (PT) in 2016 and the election of a far-right populist President in 2018: Jair Bolsonaro. He ran with an anti-establishment, economic liberal, and socially conservative political platform (Hunter and Power, 2019; Nicolau, 2020).

Why did a substantial share of voters turn their backs on PT and its redistributive promises in the 2010s? This is a multicausal phenomenon that is still being studied. Some of the potential causes mentioned in the literature include the high crime levels and corruption scandals (Nicolau, 2020; Hunter and Power, 2019). In this paper, I focus on the interaction between declining exports and the role of informal insurance providers, specifically the Evangelical churches. I hypothesize that the decline in exports made members of Evangelical churches more dependent upon services and goods provided by the church. As a result, Evangelical leaders were better placed to influence vote choice among impoverished communities.

To test these hypotheses, I examine two consecutive Presidential elections in Brazil

[2] `https://www.ecb.europa.eu/pub/pdf/other/eb201601_focus01.en.pdf`

(2014 and 2018). Similar to recent research in economics and political science (Colantone and Stanig, 2018*b*,*a*; Campello and Urdinez, 2020; Costa, Garred and Pessoa, 2016; Baccini and Weymouth, 2021), I exploit plausibly exogenous change in trade patterns to construct a shift-share instrument (Bartik, 1987; Autor, Dorn and Hanson, 2013). Specifically, I measure the exposure of commuting zones (CZs) to the dramatic drop in Brazilian exports between 2011 and 2018 based on the labor market specialization of CZs in the pre-shock period. Aware of the recent developments in shift-share designs (Adão, Kolesár and Morales, 2019; Goldsmith-Pinkham, Sorkin and Swift, 2018; Borusyak, Hull and Jaravel, 2018), I conduct a series of tests and robustness checks to examine threats to inference. For example, I show that my results are substantially unchanged once I control for trends in CZs specialized in the top Brazilian exports. Also, I follow the method proposed by Adão, Kolesár and Morales (2019) to avoid the overrejection problem in shift-share designs.

I rely on electoral and census data to analyze the effect of the export shock on changes in PT vote shares in this period in CZs with different levels of Evangelical population. Matching electoral data to a series of party scores,[3] I analyze how the interaction between exposure to the drop in exports and reliance on church-based insurance changes the appeal of different types of parties. Lastly, I match survey data with the shock based on respondents' place of residency to provide evidence on the underlying mechanisms.

I show that there is heteoregeneity in the responses to the decline in exports across Brazilian CZs. Consistent with the expectations of the economic voting literature (Duch and Stevenson, 2008; Healy and Malhotra, 2013; Campello and Zucco, 2016, 2020*a*), the PT lost support in regions negatively affected by the shock. However, in the 2018 election, when Evangelical leaders for the first time cohesively supported one specific candidate (Jair Bolsonaro), this effect is present only in CZs with high levels of Evangelicals. Turning to parties' political platforms, I provide evidence that exposure to the decline in

[3]Party scores are based on Comparative Manifesto Project (CMP), Chapel Hill Expert Survey (CHES) and ideological party scores by Power and Rodrigues-Silveira (2019).

exports in CZs with a high concentration of Evangelicals benefited parties that lean to the right and defend traditional moral values, oppose state-led redistribution and apply an anti-establishment rhetoric only in regions with a high concentration of Evangelicals. Analyzing survey data from 2017, I demonstrate that in the presence of a negative export shock, Evangelicals become even more religious and hold more negative attitudes towards the PT. However, I observe no effect of the decline in exports on individual-level attitudes towards redistribution or conservative values, such as opposition to abortion. These findings are consistent with my hypothesis that, in countries with low state capacity, some voters become more dependent upon informal instance systems during times of economic downturn. As a consequence, these voters become more susceptible to political persuasion by leaders of informal institutions that provide insurance and compensation.

My intended contribution is threefold. First, I add to the literature on public opinion responses to trade shocks by providing a theory and a mechanism that can help to explain seemingly contradictory findings (Margalit, 2011; Walter, 2017; Margalit, 2019*b*; Colantone and Stanig, 2018*a*,*b*). Second, I inform the debate about the material and non-material (i.e., cultural and psychological) roots of political behavior by showing that local contexts and social identities bind individuals to different types of insurance systems, thereby shaping their attitudes and political behavior (Shayo, 2009; Thachil, 2014; Margalit, 2019*b*; Suryanarayan, 2019). Third, I contribute to the vast literature on preferences for redistribution and insurance (Iversen and Soskice, 2001; Alesina and Ferrara, 2005; Scheve and Stasavage, 2006; Rehm, 2009, 2016; Huber and Stanig, 2011; Lefgren, Sims and Stoddard, 2016; Holland, 2018; Rueda and Stegmueller, 2019) by highlighting the importance of informal insurance systems in shaping electoral outcomes in times of economic decline.

2.2 Exposure to Trade and Political Behavior

An extensive literature in political economy examines how the distributional consequences of economic globalization in general and trade in particular impact demand for policies. Based on the idea that individuals are motivated by material self-interest, this literature claims that individuals who lose income or are exposed to higher risk of losing their job as a consequence of trade openness, will demand compensation and insurance in the form of increased public spending. A series of empirical work provide support for this theory (Scheve and Slaughter, 2004; Walter, 2010; Margalit, 2011; Scheve and Serlin, 2022). However, recent literature in the American and Western European contexts show that exposure to trade competition can also cause an increase in demand for nationalistic and authoritarian political platforms (e.g., Ballard-Rosa et al., 2021; Colantone and Stanig, 2018*b*).

Why similar trade shocks lead to different political outcomes? The literature has pointed to a number of contextual mediators and moderators that might explain this puzzle. First, the role of austerity and the credibility of increasing public spending (Colantone and Stanig, 2019). Second, the role of political entrepreneurs, such as trade unions and parties, in linking grievances about material loss and risk to specific policy solutions that can spam from the left to the right of the political spectrum. For example, political entrepreneurs claim that limiting competition for jobs and public services between natives and immigrants and increasing trade barriers can solve the problem of material loss and risk caused by increased trade openness (Colantone and Stanig, 2019; Cavaille, Ferwerda et al., 2017; Cremaschi et al., 2022). Third, psychological mechanisms unleashed by material insecurity might lead to a higher appeal of authoritarian and identitatian political platforms, at least among certain social groups (Ballard-Rosa et al., 2021; Ballard-Rosa, Jensen and Scheve, 2022; Baccini and Weymouth, 2021).

While the literature has made important progress in explaining the heterogeneous mass

public political responses to trade shocks, most work focuses on advanced economies (Rodrik, 2021; Walter, 2021). Remarkable exceptions include the work showing how commodity prices impact support for incumbent presidents and regime change in Latin America (Campello and Zucco, 2016, 2020*b*; Novaes and Schiumerini, 2021). If the literature on the effects of trade shock on political behavior is more scant in the global south, this is even more so when we consider studies that go beyond incumbent effects (however, see Campello and Urdinez, 2020, on how exposure to trade with China impacts attitudes towards China among voters and political elites in Brazil). The focus on incumbent effects is probably explained by the fact that the combination of weak, non-programmatic parties with welfare states that exclude the most vulnerable part of the population and states that are perceived as ineffective and corrupt do not yield straightforward predictions about how material self-interests structures political behavior (Holland, 2018).

I argue that to understand the effects of trade shocks on political behavior in the Global South it is crucial to examine how individuals seek to compensate and insure against adverse life events in these contexts. In particular, I argue that where the state fails to provide solutions for higher material loss and risk, it is important to take into account how non-state actors – such as religious organizations – insure and compensate the poor against adverse life events and how they use their resulting influence for political purposes.

2.3 Compensation and Insurance beyond the State

Due to its focus on advanced economies, the literature on the political consequences of trade tend to assume that the state is the unique resource that globalization losers have at their disposal to get compensation and insurance for increased economic loss and risk. For example, Rodrik (1998) argues that higher levels of trade integration coupled with high sectoral concentration in the economy increases the risk associated with international

business cycle. Hence, trade integration can only be politically feasible through compensatory programs delivered by the state. Some empirical evidence supports this claim. For example, Walter (2010) shows that workers more exposed to globalization support welfare expansion in the Switzerland. Also, Scheve and Serlin (2022) show that increased import competition from Germany led to higher electoral returns of parties that proposed welfare-state investments in 19$^{\text{th}}$ century Britain.

Yet, trade integration is not necessarily associated with an increase in public spending and welfare state expansion in developing countries (Kaufman and Segura-Ubiergo, 2001).[4] Scholars have identified multiple factors to explain why the positive association between exposure to globalization and expansion of the welfare state is often missing. Some examples include: (a) how the high proportion of low skilled workers hinders labor mobilization capacity (Rudra, 2002) and; (b) the fact that economic globalization causes more intense economic volatility (i.e., more pronounced booms and busts) in developing countries, preventing governments in these countries to access international credit markets and adopt counter-cyclical policies (Wibbels, 2006).

Not only trade integration often fails to foster increases in public spending and welfare state expansion in developing countries, but also existing benefits tend to exclude the most vulnerable individuals. For example, in Latin America, social spending is concentrated on contributory benefits for formal-sector workers, subsides tend to be either flat or regressive and informal access barriers make it difficult for the most vulnerable to access state benefits (Holland, 2018). Hence, in these contexts, disadvantaged citizens facing economic loss and insecurity tend to rely on goods and services provided by non-state formal and informal institutions. Examples of such institutions include within-family transfers as well as services and goods provided by gangs, civic organizations and churches (Hayashi, Altonji and Kotlikoff, 1996; Iannaccone, 1998; Milán, 2016; Ager and Ciccone, 2018; Auriol et al., 2020; Lessing and Willis, 2019; Tertytchnaya et al., 2018; Doyle, 2015; Holland

[4] Although, see Avelino, Brown and Hunter (2005) and Xu (2020) for discussion and evidence on when trade openness increases welfare spending in Latin America.

and Palmer-Rubin, 2015). A characteristic of such "informal security regimes" is that they rely on relationships that are informal, transactional and hierarchical, hence easily instrumented for clientelistic purposes (Gough et al., 2004).

While the effect of trade shocks on political behavior when state-led compensation is not credible has been discussed in the context of developed countries, much less has been written about that in the Global South context. In the developed world, the perceived inability of states to compensate and insure against globalization shocks creates demand for other types of state intervention: protectionism and more restrictive immigration policies (Colantone and Stanig, 2019; Cavaille, Ferwerda et al., 2017). I argue that in a context in which citizens already have diminished expectations about the state Holland (2018), non-state institutions play a key role in defining how citizens respond to trade shocks.

2.4 Goods, Services and Brokers

When disadvantaged citizens can hardly count on the state to cope with economic loss and risk, informal insurance systems develop. Civic organizations, churches and the family play an important role in risk sharing and compensation in these contexts. For example, Ager and Ciccone (2018) show that in US counties with greater agricultural risk in the 19^{th}, a larger share of the population belonged to religious organizations. Similarly, economic development and the consolidation and expansion of the welfare state explain secularization in the developed world (Norris and Inglehart, 2011).

Important features of such informal insurance systems is that they are informal, transactional and hierarchical, with organization leaders playing a prominent role in distributing and controlling resources (Gough et al., 2004). Such hierarchical structure provide organization leaders with brokerage opportunities. Using case studies from Colombia and Mexico, Holland and Palmer-Rubin (2015) show how organizational leaders with strong

ties with local communities gain votes for parties and candidates in exchange for particularistic or club goods. Similarly, Thachil (2014) shows that grassroots organizations in India successfully mobilize voters only when they provide services to local communities.

I argue that, by changing local economic conditions, trade shocks affect the extent to which citizens need services and goods provided by non-state organizations. Hence, I expect that when local communities are negatively hit by trade shocks, the relationship between organization leaders and members is strengthened. As a consequence, organizational brokers are more successful in mobilizing voters in communities more exposed to the negative effects of trade openness.

2.5 The Case of Brazil

Brazil is an ideal case to study how the effect of trade shocks on political behavior is mediated by informal insurance systems for two main reasons. First, the Brazilian economy's complexity and size results in a significant sub-national variation of exposure to globalization shocks (Dix-Carneiro, 2014; Costa, Garred and Pessoa, 2016). Second, it is a country where non-state organizations — such as churches, gangs and social movements — have historically played an important role in compensating for the state's failure to provide for the most disadvantaged segments of the population (Lessing and Willis, 2019; Houtzager, 2001). These two factors allow me to leverage within-country variation of exposure to trade shocks and reliance informal insurance systems to test my argument.

2.5.1 Brazilian Exports and Politics in the 2010s

After a period of sustained growth, Brazilian exports began to decline sharply in 2012 as a result of low growth in advanced economies and the consequent reduced demand for commodities.[5] Figure 2.1 shows how Brazilian exports to the rest of the world (black

[5] https://www.ecb.europa.eu/pub/pdf/other/eb201601_focus01.en.pdf

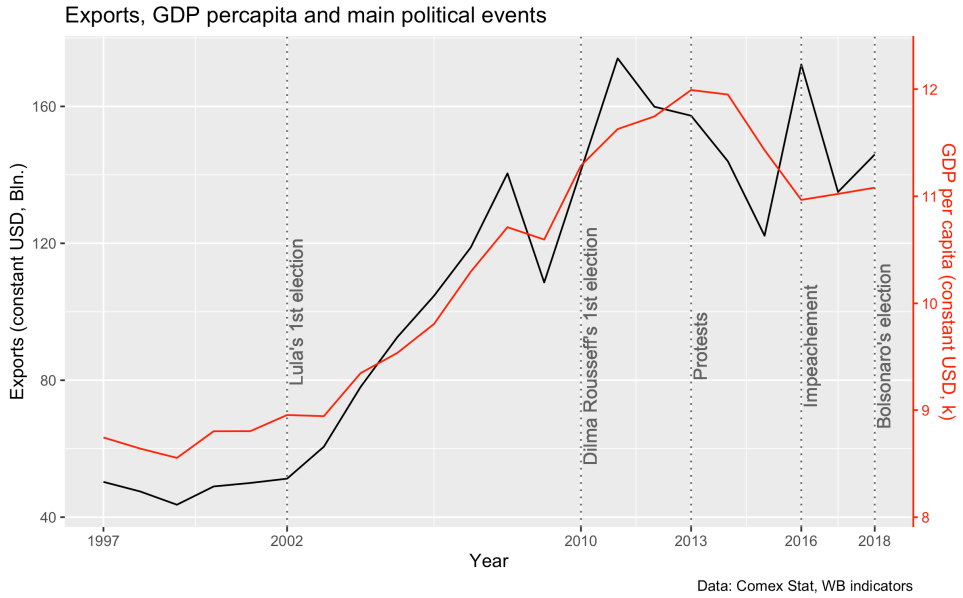


Figure 2.1: Evolution of Exports and GDP per capita in Brazil (1995-2018)

Note: The black line shows variations in total yearly exports in constant billion USD. The red line shows changes in GDP per capita in constant thousand USD. Export data comes from Comex Stat. Export values are in billions of constant USD. GDP per capita data comes from World Bank's World Development Indicators.

line) and GDP per capita (red line) were in a steady upward trend between 1997 (the first year to which data on exports is available) and 2012, followed by a sharp decline in both measures. Figure 2.A.1 in the Appendix, also shows how important a relatively small number of commodities are to the total value of Brazilian exports. Indeed, cereals (mostly soy), crude oil, iron ore, meat and sugar represented about 45% of the total value of Brazilian exports in 2010 (the base year in my analysis).

As a result of the economic recession, the value of imports from the rest of the world to Brazil also decreased. This was due to reduced economic activity in Brazil driving down demand for imports of intermediate materials – such as basic chemicals and parts of motor vehicles – that are used in Brazilian manufacturing (see 2.A.2 in the appendix). Because the decline in imports is due to the general decline in economic activity, not changes in import competition, my analysis focuses exclusively on exports.

The period that succeeds the decline in exports in Brazil is characterized by political turmoil. Dilma Rousseff (PT) was the President for most of the period considered in this study. She was elected in 2010, as the successor of Lula (PT), a center-left President that ruled the country for eight years. In 2014, Rousseff was re-elected by a small margin, just a year after massive country-wide demonstrations against her government. She was impeached in a controversial process in 2016. After her impeachment, the then vice-president, Michel Temer (MDB), took office. Jair Bolsonaro (PSL)[6]—a far-right politician, who was unknown by most of the population before the electoral campaign—was later elected in 2018 (for a graphic overview of political events in the period, see figure 2.1).

The PT is the organizing force in the Brazilian party system (Samuels and Zucco, 2018), and its importance in Presidential elections is paramount. the PT has either won or arrived second in all Presidential elections since the first post-dictatorship direct presidential election in 1989. Moreover, the PT won four consecutive Presidential elections in Brazil (2002, 2006, 2010, and 2014). Thus even though the PT was not the incumbent party in 2018, positive and negative sentiments towards this party were crucial in defining the election (Nicolau, 2020; Hunter and Power, 2019).

Moreover, the PT is considered to be one of the only programmatic parties in the country. Its campaigns and policies were historically marked by a concern with inequality and an effort to promote inclusion, redistribution and welfare expansion (Samuels and Zucco Jr, 2014; Samuels and Zucco, 2018). Examples of inclusive policies promoted by the PT's government include a massive conditional cash transfer program (*Bolsa Família*, hereafter BF) and improved access to tertiary education (Arretche, 2019; Lindert, Linder and Hobbs, 2007; de Brauw et al., 2015). Given the lack of consolidated party brands in Brazil (with the exception of the PT), it is puzzling that voters have turned to more economically conservative party in times of economic decline. I argue below that this is at least in part driven by anti-PT mobilization by leaders of Evangelical churches that

[6]Jair Bolsonaro exited the PSL (*Partido Social Liberal*) in 2019.

offer goods and services to their congregations.

2.5.2 Church Services and Religious Brokers in Brazil

While the PT was in power in Brazil, social policies became more inclusive. Policies such as conditional cash transfers and investments in basic infrastructure – such as electricity and drinkable water – benefited poor populations, especially in remote rural areas (Arretche, 2019). Yet, there remain many gaps in the Brazilian welfare state. For example, one of the PT's most popular and praised policies was a conditional cash transfer, named *Bolsa Família* (BF), introduced by Lula during his first term.[7] And yet, despite subsequent expansions of the program, by 2010, only 55% of the eligible families were receiving the benefit (Campello and Neri, 2014).

The historically limited ability of the state to support individuals facing economic scarcity and the incomplete expansion of social policies create the conditions for informal insurance systems to develop and persist (Gough et al., 2004). In the last decade, a prominent and increasingly important source of support for people facing adverse life events in Brazil are Evangelical churches. While in 1970 only 5% of the population self-declared as Evangelical, today they are about a third of the adult population.

Based on extensive ethnographic research, Spyer (2020) shows how Evangelical churches succeeded in supporting and improving the lives of poor individuals that often have few other alternatives. Evangelical churches are present in the most disadvantaged neighborhoods and remote parts of the country. These religious institutions provide financial resources, psychological support, access to networks that facilitate job hunting, medical and legal appointments, complementary educational activities to children as well as access to rehabilitation centers. As such, they provide a wealth of services and goods that help individuals ascend the socioeconomic ladder.

[7] The value transferred to families by the program varies depending on the number of children in the household and their age. Households with children are required to send children to school and vaccinate them.

Service provision by Evangelical churches differ from that of the Catholic Church (still the largest religious denomination in Brazil) in important ways. While the first provides services to members only, the second offers charity that is open to anyone. Moreover, Evangelical churches tend to impose stricter rules upon its members than the Catholic church. By limiting the number of members through strict behavioral rules and restricting access to services to members only, Evangelical churches are able to provide more generous services and goods to its members (Iannaccone, 1998). Therefore, belonging to an Evangelical church is a measure of reliance on an exclusionary form of insurance. By contrast, Catholic church's low barriers to entry and its inclusive approach to service provision make being Catholic a bad proxy for reliance of Catholic church services. This explains why economic decline has also been linked to conversion from Catholicism to Protestantism in Brazil Costa, Marcantonio and Rocha (2019).

Moreover, there is evidence that Evangelical leaders use their relationship with church members for electoral purposes. For example, in the 2018 election, Evangelical leaders spoke clearly and cohesively in favor Jair Bolsonaro (the far–right candidate) at the expense of the center-left candidate, Fernando Haddad (PT). Nicolau (2020) argues that Evangelical leaders influenced their congregants to vote disproportionately more to the former. Moreover, Cammett, Novaes and Tuñón (2022) show how a law that increased the importance of brokers during electoral campaigns benefited the *Republicanos* (a party with strong ties to a large Evangelical church) in legislative elections.

In summary, Evangelical churches provide exclusive goods and services to congregants in exchange for donations, engagement in the community, and compliance with strict behavioral rules. These exchanges are regulated only informally and the power of Evangelical leaders to distribute services and goods makes these relations hierarchical. Therefore, Evangelical churches constitute an informal insurance system, often making up for gaps in the welfare–state. I argue that negative globalization shocks increase the dependency of congregants on the services and goods provided by their church. As a consequence, the

persuasive power of Evangelical leaders is stronger in communities that are more exposed to the decline in exports.

Therefore, I hypothesize that in the 2018 election the negative effect of the drop in exports on vote share for the PT is higher in magnitude where Evangelicals represent a larger share of the population. In the next section, I discuss my data and empirical strategy for testing these hypotheses.

2.6 Data

My empirical analysis relies on data at the commuting zone (CZ) and individual levels. I first describe the construction of my main explanatory variable: the export shock. This is a variable at the CZ–level and which is used in both CZ and individual–level analysis. I then proceed by explaining the dependent variables I use in my CZ–level analysis. Then, I describe other co-variates at the CZ–level. Lastly, I describe the individual–level data and how I match it with CZ–level data.

2.6.1 Export shocks

I estimate the effect of the drop in Brazilian exports on voting behavior and attitudes. My empirical strategy relies on a shift-share instrument, in the spirit of the one proposed by Bartik (1987). Recently, many authors have applied a similar approach both in political science and economics to measure local exposure to changes in trade patterns (Autor, Dorn and Hanson, 2016; Autor et al., 2020; Colantone and Stanig, 2018*a*,*b*; Campello and Urdinez, 2020; Scheve and Serlin, 2022).

The unit of analysis are microregions, which are territorial units defined for statistical purposes by The Brazilian Institute of Geography and Statistics.[8] They are the equivalent of commuting zones (CZs) and are defined in accordance to their specificity in terms of

[8]The official definition can be found at The Brazilian Institute of Geography and Statistics glossary: `https://censo2010.ibge.gov.br/apps/atlas/pdf/209_213_Glossario_ATLASDEMO`

production specialization and natural resources. Therefore, microregions (henceforth, CZs) are the ideal unit of analysis for this research. This is also the level of analysis used in previous work that apply shift-share instruments in the Brazilian context (Dix-Carneiro, 2014; Costa, Garred and Pessoa, 2016; Campello and Urdinez, 2020; Xu, 2020) and beyond (Autor, Dorn and Hanson, 2016).

I measure the exposure of Brazilian CZs to the drop in exports in the 2010s following the empirical strategy by Autor, Dorn and Hanson (2013). I use 2010 as my base year because it is the first election prior to the decline in exports that began in 2012. Specifically, I compute

$$\Delta EPW_{rt} = \sum_{j}^{n} \frac{L_{rjt=2010}}{L_{rt=2010}} \cdot \frac{\Delta EXP_{jt}}{L_{jt=2010}} \tag{2.1}$$

where r indexes commuting zones (CZs), t election-years (2014 or 2018) and j industries. $\frac{L_{rjt=2010}}{L_{rt=2010}}$ measures the labor market specialization of CZs in the base year. $L_{rjt=2010}$ is the number of formal employees in CZ r and industry j in the base year. L_{rt} is the total number of formal employees in CZ r in the base year. $\frac{\Delta EXP_{jt}}{L_{jt=2010}}$ measures the per capita change in exports by industry j at time t from Brazil to the rest of the world. More precisely, ΔEXP_{jt} is the change in exports of industry j between 2010 and time t measured in thousand constant USD Free on Board (USD FOB). I normalize this value by the total number of jobs in industry j in the base year in the entire country ($L_{jt=2010}$).

The intuition behind this measure is that a CZ's level of exposure to a decline in exports is a function of the employment structure in that CZ prior to the shock. For example, a CZ in which a large share of the population is employed in a sector that experienced a steep decline in exports receives a more negative export shock score than a CZ with a low share of employment in that sector (all else equal). Figure 2.2 shows the geographical distribution of the export shocks net of state-year fixed effects in 2014 (left panel) and 2018 (right panel), which are included in all models.

Data on exports at the product level comes from the Brazilian Ministry of Economy.[9]

[9] `https://www.gov.br/produtividade-e-comercio-exterior/pt-br/assuntos/comercio-exter`

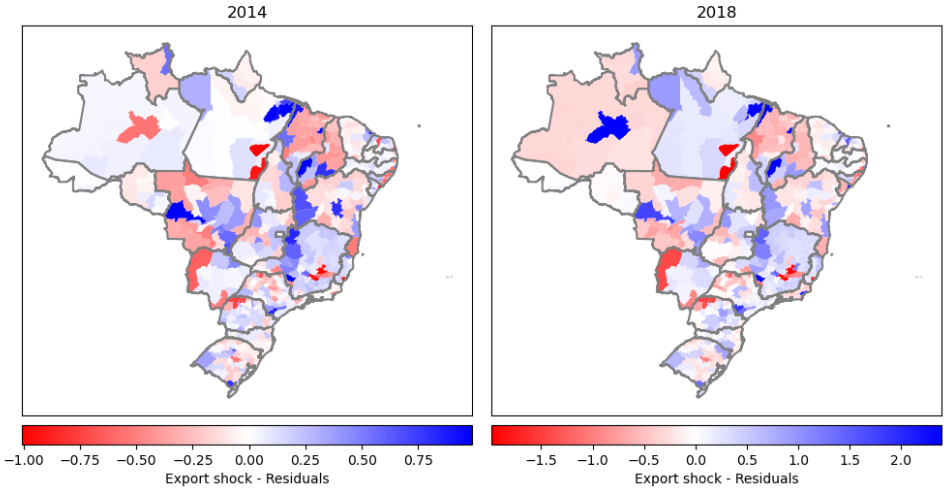


Figure 2.2: Geographic Distribution of Exposure to Changes in Exports from Brazil to the Rest of the World per Worker

Note: This figure displays the geographic distribution of ΔEPW_{rt} in 2014 (on the left) and 2018 (on the right) net of state fixed-effects. Blue colors indicate a shock above the state average, while red colors indicate a shock below the state average.

Data on the number of jobs in each industry and CZ come from RAIS (*Relação Anual de Informações Sociais*), which is an administrative data set collected annually by the Brazilian Ministry of Economy. It contains information on the universe of formal jobs in Brazil, including municipality and detailed industry classification. The de-identified data is publicly available on the Ministry of Economy website.[10] A key challenge of constructing this database is to match the classification of jobs to the classification of exports because they follow different classification systems (CNAE 2.0 and NCM 2012, respectively). To do that, I rely mostly on existing conversion tables provided by the Brazilian Statistical Office and convert both systems into International Standard Industrial Classification (ISIC) Revision 4. In appendix 2.B.1 I explain the process in detail. My final database contains 178 industries, which are listed in table 2.A.1.

ior/estatisticas/base-de-dados-bruta

[10]The website (`ftp://ftp.mtps.gov.br/`) is accessible only from Brazil.

2.6.2 Electoral Data and Party Scores

The commuting zone (CZ) level analysis is based on two dependent variables. The first is the change in vote shares for the PT in presidential elections. This is computed as the change in valid votes for the PT in CZ r between the base year 2010 and election-year t, where t is either 2014 or 2018. The second outcome variable is a CZ-level ideological score (as in Colantone and Stanig, 2018*b*; Power and Rodrigues-Silveira, 2019). These scores are meant to represent the aggregate ideological position (or "center of gravity") of a given CZ. The CZ center of gravity is defined as the sum of ideological positions of parties, weighted by their vote share in each CZ. Brazil has a highly fragmented and volatile party system (Zucco and Power, 2020). A way to measure changes in electoral behavior when many parties are involved is to consider party characteristics (e.g., Martin and Vanberg 2020). More precisely, in volatile or fragmented party systems, we may assume that a voter did not change her voting behavior if, in subsequent elections, she votes for different parties that highlight the same policy issues and stand for similar issue positions and general ideology.

To construct the CZ-level ideology scores, I gather data on party-positioning on general political ideology (i.e., position on the *Left-Right* scale) and policy issues related to welfare state and religion, namely: state-led redistribution (*Redistribution*), expanding the welfare state (*Welfare*), relationship between politics and religious principles (*Religiosity*) and support for traditional moral values (*Traditional Morality*). I also gather data on the use of anti-establishment rhetoric (*Anti-establishment*). These data come from three sources that apply different methodologies to compute party scores across different policy issues. The first source I use is the Brazilian Legislative Surveys (BLS), which includes data at the year-legislator level on a series of policy issues as well as self-placement and perceptions of party position on the left-right scale (Zucco and Power, 2019). Specifically, I rely on the party ideological scores computed by Power and Rodrigues-Silveira (2019). Second, I

also obtain party-position data from the 2020 Chapel Hill Expert Survey (CHES): Latin America. This dataset, based on a survey of 160 experts in Latin American politics, scores the positions of 11 Brazilian parties across a series of policy issues. The drawback of this data set is that it contains only one wave. Hence, when using this data set to measure party scores, party positions are necessarily fixed over time. Third, I use the Comparative Manifesto Project (CMP), which computes party position on political ideology and a series of policy issues based on text analysis of party manifestos.[11]

To measure policy preferences at the commuting zone (CZ) level, I compute *CZ's center of gravity* on political ideology and a series of policy issues by weighting party scores by party vote shares. Data on electoral results come from the Brazilian official electoral authority.[12] Formally,

$$Center\ of\ Gravity_{rt} = \sum_{p}^{n} \frac{Vote_{pt}}{Vote_{rt}} \times PartyScore_{pt} \tag{2.2}$$

where r indexes CZs, t election-years and p parties. $\frac{Vote_{pt}}{Vote_{rt}}$ denotes the vote share of party p in CZ r in year t. I then subtract $Center\ of\ Gravity_{rt}$ at election-year 2014 or 2018 by its value in the base year (i.e., 2010) to obtain the change in the center of gravity ($\Delta\ Center\ of\ Gravity_{rt}$).

2.6.3 Insurance and Compensation

Based on the discussion I develop in section 2.5.2, I consider two main insurance systems: welfare state policies and the Evangelical church. I measure reliance on the state and on the Evangelical church using census data collected in 2010, the base year. For each commuting zone (CZ), I compute the share of adults that (a) are beneficiaries of the conditional cash transfer program *Bolsa Família* and (b) belong to any Evangeli-

[11] For scores computed using the CMP, the position of a party on a policy issue is computed based on the number of negative and positive references to such issue, as in Colantone and Stanig (2018*b*) and Martin and Vanberg (2020).

[12] `https://www.tse.jus.br/eleicoes/estatisticas/repositorio-de-dados-eleitorais-1`

cal denomination.[13] Figure 2.3 shows the geographic distribution of *Bolsa Família* (BF) beneficiaries (left panel) and Evangelicals (right panel) in 2010 net of state fixed effects. Interestingly, the correlation between the share of evangelicals and BF recipients at the CZ level net of state fixed effects is negative (-0.37). I also include a measure of the share of the population in a CZ that receive a pension. Pensions in Brazil are an important source of income, especially among the poor in rural areas. Hence, I include this measure as another way to proxy reliance on the welfare state.

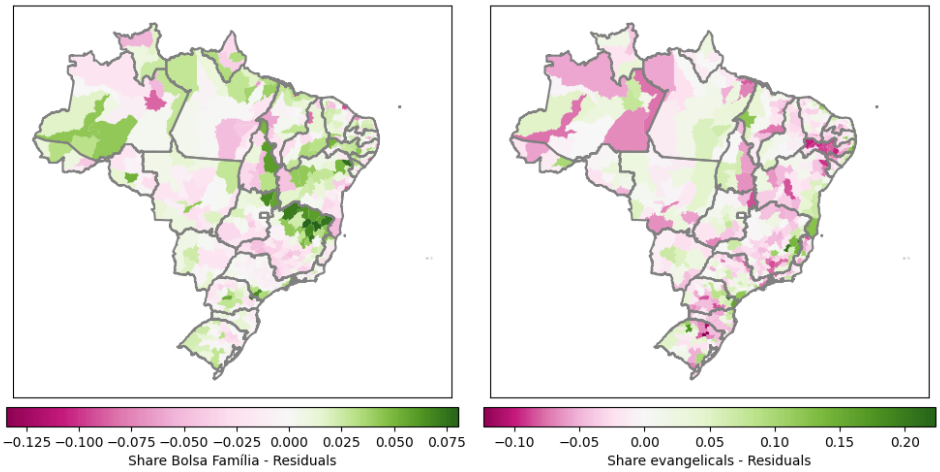


Figure 2.3: Spatial Variation of BF Beneficiaries and Evangelicals in 2010

Note: This figure displays the geographic distribution of beneficiaries of the conditional cast transfer program *Bolsa Família (on the left)* and Evangelicals (on the right) at the CZ level net of state FE. Calculations are based on the 2010 Brazilian census. Data is sourced from the Brazilian Institute of Geography and Statistics. Shades of green indicate a concentration above the state average, while shares of pink indicate a shock below the state average.

As I discussed in section 2.5.2, I do not expect the Catholic church to work as an informal insurance system. I include this variable as a placebo in order to test whether it is *religion* at work or the organizational power of the Evangelical church. I also include

[13]While Evangelical churches in Brazil are usually classified as belonging to "historical Protestantism" or "(Neo-)Pentecostalism", how this distinction works in practice is not clear-cut. For example, Spyer (2020, p. 54) argues that many Evangelical churches that have their origins in the historical Protestantism adopt an hybrid model, incorporating many of the values and practices of Pentecostal churches. Furthermore, Araújo (2022) shows how the attitudes towards the PT are very similar between historical Evangelicals and Pentecostals.

data on the share of pensioners in a CZ.

2.6.4 Other CZ–Level Data

I also include a series of covariates at the commuting zone level. First, GDP per capita and log popualtion at the base year.[14] Data is sourced from Ipeadata, ran by the Brazilian Institute of Applied Economic Research. Second, the share of the population working on export sectors. This variable is computed based on the matching of RAIS and export data made available by the Brazilian Ministry of Economy. For more information about the data cleaning and matching procedure, see section 2.6.1 above and appendix 2.B.1.

2.6.5 Individual–Level Data

Commuting zone–level electoral returns capture within-country variation in voting behavior. However, many different factors underlie voting decisions. To better examine the channels through which export shocks caused a shift away from parties that defend welfare-state expansion, I gather individual-level survey data from the Latin American Public Opinion Project (LAPOP). These data include information on the municipality of residency of respondents. I then use this information to match the survey data with the export shock at the commuting zone level. To approximate the date of the 2018 election, I use the 2017 wave of the LAPOP survey. While there was a wave that was on the field close to the 2014 election, it excludes items that are crucial for my analysis. Therefore, I use the 2017 wave only.

I construct indices that measure respondents' religiosity as well as attitudes toward the political establishment and traditional moral values. To measure attitudes towards the political establishment, I select items that measure attitudes towards political institutions (e.g., the national legislature, political parties) and politicians (i.e., the prevalence of corruption practices among politicians). Turning to religiosity, I selected three items:

[14] `http://www.ipeadata.gov.br/Default.aspx`

how often the respondent prays, goes to church, and how important she thinks religion is in her life. Lastly, I measure opinion on traditional moral values based on items on women's role in society and LGBTQIA+ rights (i.e., whether homosexuals should be allowed to be public officials, whether they should be allowed to marry, and if men are better politicians than women). Based on these survey items, I use factor analysis to construct three indices that I use as dependent variables: *religiosity, traditional morality* and *anti-establishment*. Details about the reliability of indices items can be found in appendix 2.A.5.

I also select items that measure attitudes toward the PT and redistribution. To measure support for *Redistribution*, I select one item that measures agreement on a 7-point Likert scale with the statement "the state should implement public policies to reduce inequality of opportunity." To measures attitudes toward PT, I select the following items: (a) whether, on a 10-point Likert scale, the respondent likes PT supporters (*like PT sup.*) and; (b) to what extent, on a 7-point Likert scale, the respondent thinks that the impeachment of Dilma Rousseff's (a member of PT and the President of Brazil between 2010 and 2016) was unfair.

I also construct two dummy variables that I use in the individual level models to estimate heterogeneous treatment effects. These variables are: *BF beneficiary* (equals one if respondent is a BF beneficiary) and *Evangelical* (equals one if respondent is Evangelical). Lastly, I control for basic socioeconomic characteristics, namely: gender, age, race, and the number of years of education. I select variables that are unlikely to be affected by the export shock, since including variables that can be affected by the treatment is a source of bias (Rosenbaum, 1984). These same basic socioeconomic characteristics have been used in previous research that analyzes survey data matched with trade shocks (Colantone and Stanig, 2018*b*).

2.7 Research Design

2.7.1 Model Specification

My empirical strategy relies on examining the effect of changes in exports per worker at the commuting zone (CZ) level on electoral behavior and public opinion. First, for electoral behavior, I estimate stacked first differences models at the CZ level, which is in line with previous research in political science and economics studying the effect of trade shocks (Autor, Dorn and Hanson, 2016; Colantone and Stanig, 2018*b*; Scheve and Serlin, 2022). I estimate regressions of the following form

$$\Delta Y_{srt} = \alpha_{st} + \beta \Delta EPW_{srt} + \gamma \Delta EPW_{srt} \cdot Evang_{srt=2010} + \zeta Evang_{srt=2010} + \mathbf{X_{srt=2010}}\eta' + \epsilon_{srt}, \tag{2.3}$$

where r indexes CZs in state s, election-year t, and ϵ_{srt} is the error term. ΔY_{srt} is one of the dependent variables described in section 2.6.2 (i.e., either first differences in PT's vote shares or CZ's centers of gravity). The term α_{st} are- state-year fixed effects, which capture factors common to all regions within a state in a given election, such as the governor's ideological leaning and the general political climate in the state. $Evang_{srt=2010}$ is a dummy variable that equals one if CZ r is above the median in terms of the share of the population that belongs to any Evangelical denomination in 2010. $\mathbf{X_{srt}}$ is a vector of controls measured pre-treatment, i.e., in 2010. It includes the share of formal jobs in CZ r that are in export industries, log population, and log GDP per capita. The coefficients of interest are β – which estimates the effect of the export shock in CZs with low levels of Evangelicals – and, γ, which estimates the difference of the effect of the export shock in CZs with high levels of Evangelicals (as compared to CZs with low levels of Evangelicals). The dependent variables and ΔEPW_{srt} are standardized to facilitate the interpretation of the results.

Second, to estimate the effect of the drop in exports on individual–level attitudes, I estimate regressions of the following general form

$$Attitude_{isr} = \alpha_s + \beta \Delta EPW_{sr(i)} + \gamma \Delta EPW_{sr} \cdot Evangel_i + \zeta Evangel_i + \mathbf{X_{srt=2010}}\eta' + \mathbf{Z_{it}}\kappa' + \varepsilon_{isrt}, \tag{2.4}$$

where i indexes individuals, s states and r CZs. $Attitude_{isr}$ is one of the dependent variables described in section 2.6.2, namely: religiosity, attitudes towards the PT, support for redistribution, opinion on traditional moral values, and the political establishment. $\Delta EPW_{sr(i)}$ is the export shock at the CZ–level attributed to individual i based on her municipality of residency. $Evangel_i$ is a dummy variable that equals one if respondent i self-described as Evangelical. α_s is a vector of state-fixed effects and $\mathbf{X_{srt=2010}}$ is the vector of pre-treatment, regional-level controls. Finally, $\mathbf{Z_{it}}$ is a vector of individual-level controls that includes: gender, age, ethnicity, and educational levels. The coefficients of interest are β – which estimates the effect of the export shock among non-Evangelicals – and, γ – which estimates the difference of the effect of the export shock among Evangelicals (as compared to non–Evangelicals).

2.7.2 Identification

A potential issue with this empirical strategy is that local pre-shock labor market specialization (i.e., the shares of jobs in CZ r that are in sector j in the base year, 2010) are correlated with pre-existing trends in electoral outcomes (Goldsmith-Pinkham, Sorkin and Swift, 2020). For example, regions with a high concentration of soy production may exhibit an upward trend in favor of a particular type of candidate preceding the drop in exports. I address this concern in two different ways. First, in appendix 2.C, I control for trends in CZs with similar labor market specialization in 2010. Namely, I control for the share of workers in the main export industries interacted with election-year. I define the main export industries as the top four Brazilian exports in 2010. These industries

correspond to 42% of the total Brazilian exports in that year (see figure 2.A.1). Table 2.C.1 in Appendix 2.C shows that the results I present in the next section are substantively unchanged once I add these controls. Second, in Appendix 2.C, I regress the export shock in 2014 and 2018 on lags of the main dependent variable. I show that there is no statistically significant correlation between the export shock and lagged changes in vote shares for the PT.

Another threat to inference is spatial autocorrelation. I account for that by clustering the standard errors at the mesoregion-year level. Mesoregions are defined by the Brazilian Institute of Geography and Statistics and are one level of aggregation above CZs (i.e., microregions). Mesoregions share social and economic characteristics. There are 137 mesoregions and 558 CZs in Brazil. Moreoever, Adão, Kolesár and Morales (2019) call attention to another potential problem with the residuals in shift-share designs. Specifically, units with similar labor market specialization in the pre-shock period (i.e., with similar shares) may have correlated residuals, causing an overrejection of the null hypothesis. This issue is not solved by clustering standard errors at higher levels of geographic aggregation. To test for this issue, the authors recommend conducting a placebo exercise in which the shift part of the shift-share instrument (here, the per capita change in exports by industry) is replaced by a normally distributed random variable. The exercise is repeated thousands of times and the rejection rate is computed at the 95% confidence level. An indication of the overrejection problem occurs when the test yields a rejection rate considerably above 5%. I perform this exercise as they suggest. After running the regression in equation 2.3 with my "random shift" replacing my shift-share instrument ten thousand times, I end up with a rejection rate of 5.5% for the coefficient of interest (i.e., the interaction of the export shock with the Evangelical dummy). The rejection rate for the coefficient of the export shock on its own is similar and available upon request. Figure 2.D.1 in Appendix 2.D shows the distribution of the estimated coefficients in this placebo test. The figure shows that the estimates are normally distributed with mean

equals zero. These results suggest that the correlation between residuals of units with similar labor market specialization in the pre-shock period is unlikely in this case.

2.8 Effects of Exports Decline on Electoral Returns

I first examine the effects of export decline on voting for the PT in the 2010s. Table 2.1 reports the results of models with changes in vote shares for the PT between 2010 and the two subsequent Presidential elections (2014 and 2018) as the dependent variable. All variables are standardized to make interpretation easier. My theoretical expectation is that a decrease in exports reduces the votes cast for the PT, especially in CZs with higher concentration of evangelicals. The results suggest that the decline in exports in the 2010s decreased the votes cast for the Workers' Party (PT). Column (1) shows that one standard deviation decrease in the export shock reduces the vote share for the PT by approximately 0.04 standard deviations. While the estimated effects are small, this is common in studies examining the effect of trade shocks on voting behavior (Margalit, 2019*a*). Moreover, columns (2) and (3) suggest that this effect is stronger in CZs with above the median levels of Evangelicals.

To assess whether the marginal effect of the export shock on vote shares for the PT is a linear function of the concentration of evangelicals at the regional level, I follow the diagnostic recommendations by Hainmueller, Mummolo and Xu (2018). Specifically, I re-estimate model (3) in table 2.1 using their proposed binning estimator. Figure 2.E.1 in Appendix 2.E plots both the linear marginal effects as well as the binning estimator. The fact that the Low, Medium and High binned estimates align almost perfectly with the linear marginal effect line suggests that the assumption holds for this moderator. Moreover, the density plot at the bottom of the figure demonstrates a high degree of common support. Finally, these results indicate that the heterogeneity within Evangelical communities reported in table 2.1 is not sensitive to the coding of the Evangelical variable.

	DV: ΔPT Vote Shares				
	(1)	(2)	(3)	(4)	(5)
ΔEPW_t	0.0378**	0.0211	0.0445***	0.0618***	0.0437***
	(0.0154)	(0.0135)	(0.0132)	(0.0237)	(0.0131)
Evangelicals (dummy) × ΔEPW_t		0.0593**			
		(0.0253)			
Evangelicals (dummy)		-0.0552		-0.0874	
		(0.0693)		(0.0589)	
Catholics (dummy)		-0.0790		-0.0987	
		(0.0572)		(0.0647)	
Evangelicals (cont.) × ΔEPW_t			0.0213*		
			(0.0117)		
Evangelicals (cont.)			-0.141**		-0.159***
			(0.0625)		(0.0579)
Catholics (cont.)			-0.145**		-0.161**
			(0.0583)		(0.0632)
Catholics (dummy) × ΔEPW_t				-0.0326	
				(0.0262)	
Catholics (cont.) × ΔEPW_t					-0.0198*
					(0.0120)
Constant	3.496***	3.775***	3.638***	3.835***	3.632***
	(0.432)	(0.501)	(0.489)	(0.514)	(0.486)
Observations	1114	1114	1114	1114	1114
Adjusted R^2	0.820	0.821	0.822	0.820	0.822
Evangelicals (dummy) × year		✓			
Evangelicals (cont.) × year			✓		
Catholics (dummy) × year				✓	
Catholics (cont.) × year					✓
State × year FE	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓

Note: Stacked first difference estimates at the commuting zone (CZ) level. Models (2) and (3) include interaction between the export shock and the share of Evangelicals at the CZ level as a dummy variable (i.e., below the median equal zero and above the median equals one) and as a continuous variable, respectively. Columns (4) and (5) do the same but with the concentration of Catholics. All models include state by year fixed effects and the following CZ-level controls: share of workers in export sectors, log GDP per capita and log population in base year. All continuous variables are standardized. Standard errors clustered at the meso-region by year level in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.1: Effects of Export Decline on Votes for the PT by Concentration of Evangelicals and Catholics (2010–2018)

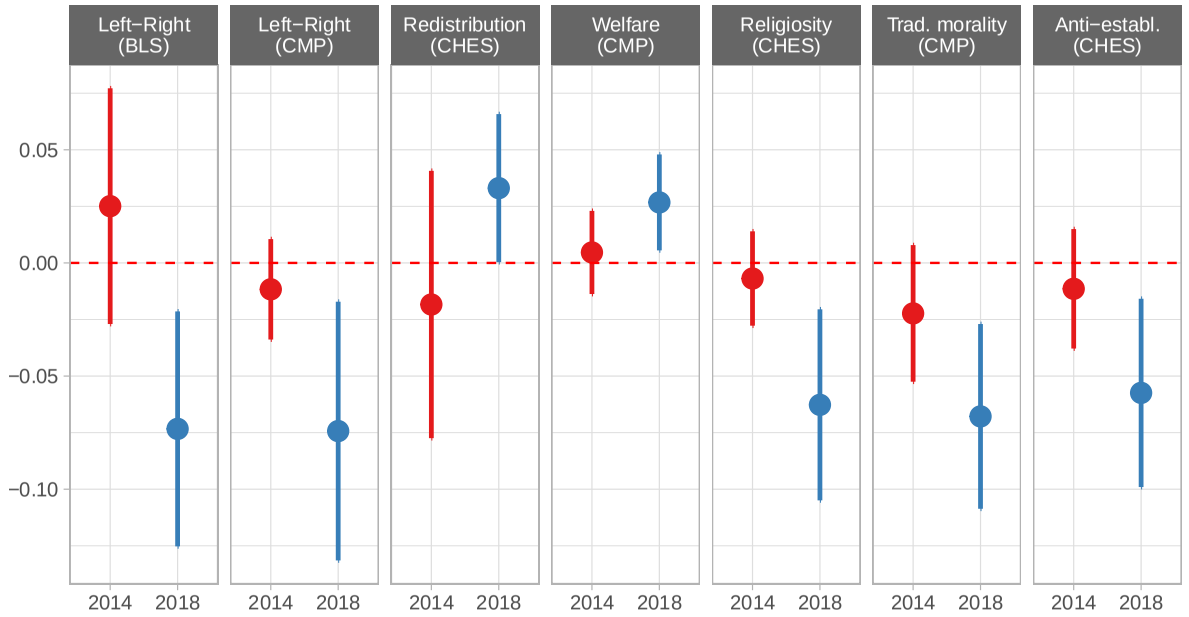
	DV: ΔPT Vote Shares					
	2014 Election			2018 Election		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔEPW_t	0.0544*	0.0376	0.0990**	0.0308*	0.0136	0.0503*
	(0.0301)	(0.0342)	(0.0477)	(0.0175)	(0.0139)	(0.0289)
Evangelicals (dummy) × ΔEPW_t		0.0616			0.0604**	
		(0.0590)			(0.0288)	
Evangelicals (dummy)		-0.0714	-0.0720		-0.100	-0.104
		(0.0762)	(0.0773)		(0.0878)	(0.0886)
Catholics (dummy)		-0.0674	-0.0683		-0.0908	-0.0940
		(0.0735)	(0.0729)		(0.0876)	(0.0887)
Catholics (dummy) × ΔEPW_t			-0.0619			-0.0260
			(0.0589)			(0.0299)
Constant	3.581***	3.832***	3.831***	3.402***	3.767***	3.781***
	(0.411)	(0.574)	(0.568)	(0.773)	(0.852)	(0.856)
Observations	557	557	557	557	557	557
Adjusted R^2	0.665	0.665	0.665	0.758	0.759	0.758
State FE	✓	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓	✓

Note: Stacked first difference estimates at the commuting zone (CZ) level. Models (1–3) report the results for the 2014 election. Models (4-6) to the 2018 election. Models (2) and (5) include interaction between the export shock and the concentration of Evangelicals at the CZ level as a dummy variable, while models (3) and (6) interact the export shock with a dummy variable indicating the concentration of Catholics at the CZ-level. All models include state fixed effects and the following CZ-level controls: share of workers in export sectors, log GDP per capita and log population in base year. All variables are standardized. Standard errors clustered at the meso-region level in parenthesis.

Table 2.2: Effects of Export Decline on Votes for the PT by Concentration of Evangelicals and Catholics by Election

I then proceed by estimating the models in columns (1), (3), and (5) in table 2.1 by election–year. While many Evangelical leaders – notably Edir Macedo (The Universal Church of the Kingdom of God) and Silas Malafaia (Assemblies of God) – took a clear position against the PT and in favor of the far-right candidate, Jair Bolsonaro, in 2018, the same did not happen in 2014 (Nicolau, 2020). Hence, I expect that the effect of the interaction between the export shock and the concentration of Evangelicals at the CZ level to be statistically significant only in 2018. Table 2.2 reports the results. Columns (1) and (4) show that a decrease in exports causes a decline in vote share for the PT in both elections. While in 2014 there is no difference between CZs with larger Evangelical communities (column 2), in 2018 this effect is driven entirely by CZs with high shares of Evangelicals (column 5). This difference between 2014 and 2018 suggests that mobilization by religious elites is a necessary condition for church-based insurance to matter electorally. Again, the interaction of the export shock with a variable indicating the concentration of Catholics does not yield statistically significant results, suggesting that, as I argue in section 2.5.2, there is something particular to the Evangelical churches in this context.

I then proceed by examining whether the change in vote shares for the PT caused by the decline in exports also translated into support for parties with political platforms more in line with the interests and values of Evangelical churches. To do that, I ran the same models as in columns (2) and (6) of table 2.2 but with my alternative CZ-level outcome: specifically, I substitute the first difference in vote share for the PT with the first difference in centers of gravities of CZs. The first difference of centers of gravity is meant to capture changes in preferences for parties with different political platforms. Centers of gravity are computed as the weighted average of party scores, where the weights are vote shares. Details about how centers of gravity are computed can be found in section 2.6.2. I consider three dimensions of party positions: general ideology (i.e., position on the left-right scale), redistribution and welfare state, the relationship between religious values and practices and politics, and, finally, use of anti-establishment rhetoric. The estimated coefficients for



Note: The figure plots the estimated coefficients and 95% confidence intervals of the interaction between the export shock and the evangelical dummy for models as in columns (2) and (5) of table 2.2 but with different DVs. The DVs are the first difference of the centers of gravity of CZs for different party scores: position in the left-right scale (*Left-Right*), use of anti-establishment rhetoric (*Anti-establ.*) as well as support for: redistribution (*Redistribution)*, expansion of the welfare state (*Welfare*) and religious principles in politics (*Religiosity)*. CZs' centers of gravity are a weighted average of party scores where the weights are vote shares. For more information about how the centers of gravity are computed, see 2.6.2. The acronyms in parenthesis indicate the data source for the party scores used to compute the centers of gravity, namely: the Brazilian Legislative Survey (BLS), the Comparative Manifesto Project (CMP), and the Chapel Hill Expert Survey (CHES).

Figure 2.4: Estimates of Export Shock Interacted with Evangelical Dummy (DVs: Centers of Gravity)

the interaction of the export shock and the Evangelicals dummy are reported in figure 2.4. The estimates in figure 2.4 suggest that in CZs with high shares of Evangelicals, the decline in exports caused a shift in preferences toward parties with different political platforms only in the 2018 election (blue lines), but not in 2014 (red lines). Specifically, the decline in exports caused CZs with high shares of Evangelicals to turn more towards right-wing parties, parties more opposed to redistribution and welfare expansion as well as parties that are more in favor of adopting religious practices and values in politics. Finally, the decline in exports also led to a stronger support for parties that adopt anti-establishment rhetoric in CZs with above-the-median Evangelical populations.

2.9 Evaluating the Mechanisms

In the previous section, I show that the decline in exports had a negative effect on the electoral returns of the Workers' Party (PT) both in the 2014 and in the 2018 election. I also provided evidence that in 2018, but not in 2014, this effect was stronger in commuting zones (CZs) where Evangelicals represent a higher share of the population. Moreover, in 2018 the shift away from the PT in Evangelical-dominated CZs is accompanied by increased support for parties that lean to the right, oppose redistribution and defend religious values and practices. I conjecture that the shift in party preferences is explained by a two-step process. First, in CZs that are more exposed to the decline in exports, the relationship between members of the Evangelical church and their leaders becomes stronger. As I argue in section 2.5.2, this difference is explained by Evangelical churches acting as informal insurance providers. More specifically, I put forward that when Evangelicals face economic insecurity, they tend to invest more in their ties with their religious communities in order to increase access their the goods and services distributed by Evangelical leaders. Second, Evangelical leaders acting as brokers for parties and candidates that share their political views — notably Jair Bolsonaro, who ran in 2018 but not in

2014 — are more successful in mobilizing voters in places where the dependency of church members on church services and goods is stronger (i.e., places in economic decline). To better explore this individual-level mechanism, I now turn to my analysis of survey data.

I rely on the LAPOP's Americas Barometer 2017 Brazilian wave. This wave was selected for two reasons. First, to approximate the date of the 2018 Brazilian Presidential election. Second, due to data availability, namely the presence of survey items that measure: the relationship between individuals and religion and attitudes towards the PT. I also select items that measure attitudes towards redistribution, traditional moral values and anti-establishment sentiment. If the decline in exports caused changes in policy preferences or values, this might suggest that voters are turning away from the PT for programmatic reasons.

Table 2.3 reports the results. The variables are standardized to make interpretation easier. Column (1) shows that the decline in exports increases religiosity (i.e., frequency of prayer and church services attendance as well as the importance of religion) only among Evangelicals. Columns (2) and (3) show that a decline in exports causes a decrease pro-PT sentiment (i.e., liking PT supporters and thinking that the Rousseff's impeachment (PT) was unfair). Columns (4) and (5) show that the decline in exports did not change Evangelicals' attitudes towards redistribution, nor their conservatism in relation to traditional moral values. Finally, column (6) shows that the decline in exports caused more negative attitudes towards the political establishment in general only among Evangelicals (however, this effect is statistically significant only at the 90% confidence level). Overall, the results suggest that Evangelicals became closer to their religious communities as a result to the decline in exports. However, such tighter relationship did not translate into more conservative values (e.g., higher opposition to abortion). To be sure, Evangelicals hold more traditional moral values on average (see column (5) of table 2.3), but the decline in export did not make this pattern stronger. Instead, the positive effect of the decline in exports on religiosity (column 1) is accompanied by more negative attitudes towards the

	(1)	(2)	(3)	(4)	(5)	(6)
DV:	Religiosity	Like PT supporters	Rousseff's impeachment was unfair	Redistribution	Trad. Morality	Anti-establ.
ΔEPW$_{2018}$	0.0287	-0.0233	-0.0573*	0.0484**	0.0492	0.00700
	(0.0332)	(0.0221)	(0.0298)	(0.0240)	(0.0422)	(0.0234)
Evangelical × ΔEPW$_{2018}$	-0.0684**	0.119**	0.101**	-0.0147	-0.0363	-0.124*
	(0.0313)	(0.0538)	(0.0471)	(0.0464)	(0.0480)	(0.0680)
Evangelical	0.751***	-0.0934	-0.113*	-0.0233	0.589***	-0.0903
	(0.0623)	(0.0566)	(0.0601)	(0.0633)	(0.0633)	(0.0678)
Observations	1070	1071	1081	1084	1065	1055
Adjusted R^2	0.178	0.0372	0.0511	0.00331	0.184	0.0145
State FE	✓	✓	✓	✓	✓	✓
Ind. controls	✓	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓	✓
N of CZs	82	82	82	82	82	82

Note: The table reports the results of regressions of the form as in equation 2.4. The dependent variables are individual-level survey measures of: (1) religiosity (an index measuring church attendance, frequency of prayers and importance of religion); attitudes towards the Worker's Party (PT), specifically (2) the extent to which the respondent likes PT supporters and; (3) thinks that the impeachment of President Dilma Roussef (PT) was unfair; (4) attitude towards redistribution, specifically the extent to which respondents think that the State should act to reduce inequality of opportunity and, finally (6) anti-establishment attitudes, which is an index including items asking pride in the political system, respect in political institutions, trust in different branches of government and whether political leaders are interested in what people think. More information about the indices used in these models can be found in appendix 2.A.5. All variables are standardized to facilitate interpretation. The Evangelical dummy is measured at the individual level, i.e., whether respondents declare to be Evangelical. All modes include state FE and CZ-level controls (share of workers in the export sector, log GDP per capita and log population) as well as pre-treatment individual-level controls (age, gender, race and educational level). Data is sources from LAPOP's AmericasBarometer 2017. Only data from Brazil is included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.3: Individual-Level Estimates: Interaction with Evangelical Dummy

PT (columns 2 and 3). These results suggest that the mechanism behind the increased anti-PT sentiment is not changes in preferences and values as a result of the decline in exports. Instead, the results are more consistent with religious elites sending cues to more dependent church members (i.e., an "organizational broker" effect).

2.10 Conclusion

The progressive integration of national economies increases economic volatility and creates winners and losers (Rodrik, 1998; Autor, Dorn and Hanson, 2013; Dix-Carneiro, 2014). Rational theories of voting behavior posit that voters who bear the costs of economic globalization support parties that propose expanding the welfare state (Meltzer and Richard, 1981). However, the empirical evidence is mixed. On the one hand, a number of studies confirm these expectations (e.g., Walter, 2010; Scheve and Slaughter, 2004; Scheve and Serlin, 2022). On the other hand, other work provides empirical evidence that globalization can also lead globalization's losers to turn to nationalist, authoritarian and far-right parties (e.g., Colantone and Stanig, 2018*b*; Ballard-Rosa et al., 2021; Ballard-Rosa, Jensen and Scheve, 2022). Such contrasting findings highlight the need to identify the scope conditions underlying the causal relation between exposure to economic globalization and support for the welfare state.

In this paper, I focus on one crucial aspect of citizens' material experience: insurance systems. In developed countries, state capacity is high and the state plays by far the most essential role in providing public goods and services. By contrast, in the Global South, non-state organizations — such as churches and gangs — are more relevant (Gough et al., 2004; Lessing and Willis, 2019). In these contexts, the negative effect of globalization might make voters more dependent upon insurance systems provided by non-state organizations and, hence, more susceptible to the political persuasion of "organizational brokers" (Holland and Palmer-Rubin, 2015).

I exploit a sharp decline in exports from Brazil to test this argument. I show that exposure to the negative effects of globalization reduced support for parties defending the expansion of the welfare state. I also show that this effect is stronger in commuting zones (CZs) with a high share of Evangelicals. Evangelical churches are an increasingly important source of insurance and compensation to voters. They provide financial resources and access to services (e.g., access to rehabilitation centers) in exchange for donations and compliance with strict behavioral rules (Spyer, 2020). These heterogeneous results of the decline in exports by share of Evangelicals at the CZ level are, however, observed only in the election that Evangelical leaders cohesively turned against the left. By analyzing survey data, I provide evidence of the underlying mechanism. Specifically, Evangelicals in CZs more exposed to the drop in exports pray and attend church services more often and also report higher importance of religion in their lives. Furthermore, Evangelicals more exposed to the drop in exports also report more negative attitudes towards the Worker's Party (PT), but do not oppose redistribution more or hold more conservative moral values. Overall, the evidence is consistent with the argument that, in the Global South, an economic decline caused by globalization shocks can increase the dependency of poor communities toward informal insurance systems. In turn, such increased dependency gives organizational leaders more persuasive power and, hence, leverage to succeed in their brokerage efforts.

Much work remains to be done on the contingencies underlying the political consequences of globalization. A fruitful way forward is to analyze how globalization shocks interact with other types of informal insurance systems in the Global South. In Latin America, especial attention should be paid to organized crime. Another promising way forward is to examine whether informal insurance systems make economic liberalization more politically palatable in the Global South, by providing support to the poor without increasing taxes on the rich.

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Appendix

2.A Descriptive Statistics

2.A.1 Variation in Exports

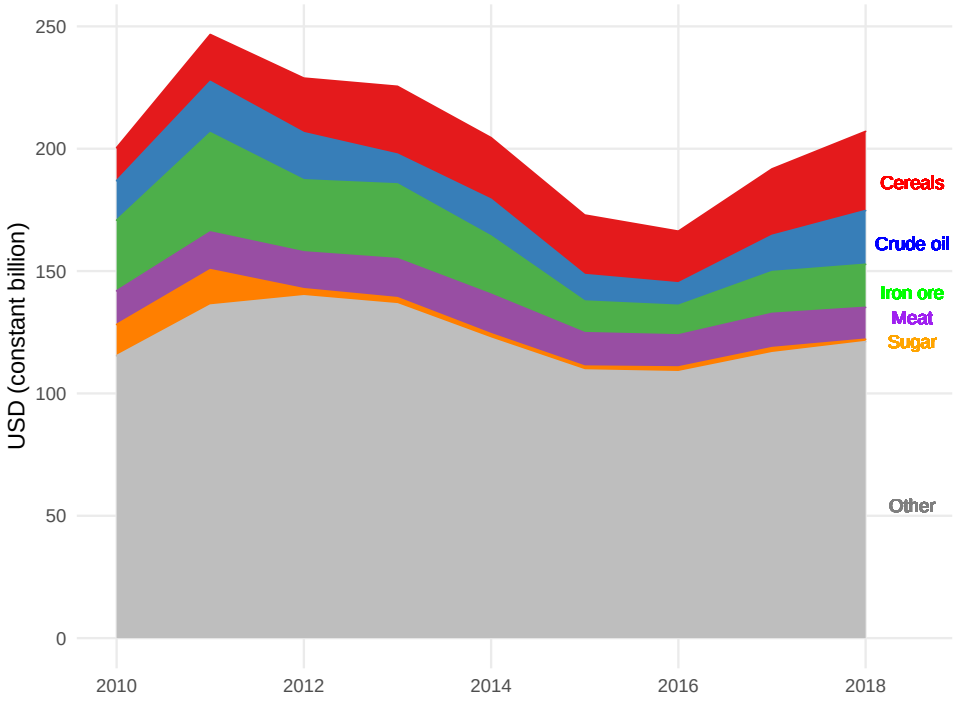


Figure 2.A.1: Evolution of Exports by ISIC Category (1995-2018)

Note: Export data comes from Comex Stat. Export values are in billions of constant USD.

2.A.2 Variation in Imports

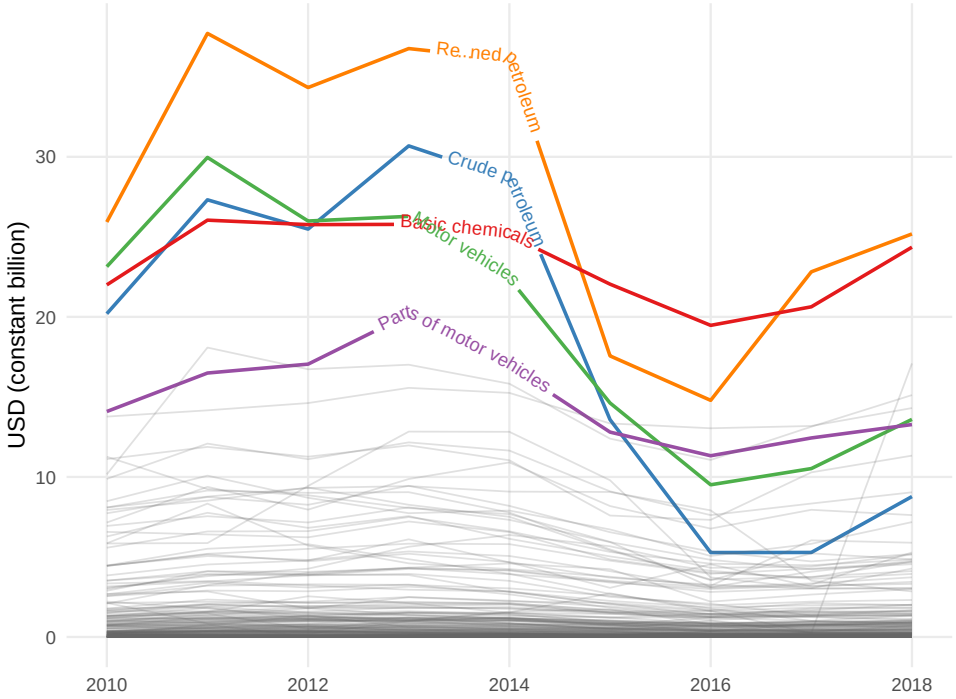


Figure 2.A.2: Evolution of Imports by ISIC Category (1995-2018)

Note: Import data comes from Comex Stat. Import values are in billions of constant USD.

2.A.3 Changes in exports by ISIC 4.0 Rev. classes

ISIC Code	ISIC 4.0 Rev. Description	Δ exports 2010-2014	Δ exports 2010-2018
0111	Growing of cereals (except rice), leguminous crops and oil seeds	1170182	1886466
0112	Growing of rice	8853	16662
0115	Growing of tobacco	-374	-1702
0116	Growing of fibre crops	42651	64588
0121	Growing of grapes	-7490	-5645
0122	Growing of tropical and subtropical fruits	-1546	-2883
0123	Growing of citrus fruits	2788	1945
0124	Growing of pome fruits and stone fruits	-2600	-970
0127	Growing of beverage crops	43137	-136414
0141	Raising of cattle and buffaloes	-3220	-19732
0142	Raising of horses and other equines	35	326
0144	Raising of sheep and goats	866	523
0145	Raising of swine/pigs	106	370
0146	Raising of poultry	1642	3269
0149	Raising of other animals	3562	2838
0170	Hunting, trapping and related service activities	0	0
0220	Logging	1740	5090
0311	Marine fishing	94	1910
0510	Mining of hard coal	16	13
0520	Mining of lignite	11	1
0610	Extraction of crude petroleum	-110297	581742
0620	Extraction of natural gas	0	0
0710	Mining of iron ores	-511416	-1127601
0729	Mining of other non-ferrous metal ores	45103	106145
0891	Mining of chemical and fertilizer minerals	317	426
0892	Extraction of peat	-5	-13
0893	Extraction of salt	378	24
0899	Other mining and quarrying n.e.c.	5972	6552
1010	Processing and preserving of meat	239609	-71998
1020	Processing and preserving of fish, crustaceans and molluscs	-2738	-40

Table 2.A.1: Changes in exports by ISIC Rev. 4 classification
Continued on next page...

ISIC Code	ISIC 4.0 Rev. Description	Δ exports 2010-2014	Δ exports 2010-2018
1040	Manufacture of vegetable and animal oils and fats	149068	55008
1050	Manufacture of dairy products	17185	-8331
1061	Manufacture of grain mill products	8206	4892
1062	Manufacture of starches and starch products	-735	-1047
1072	Manufacture of sugar	-406520	-708939
1073	Manufacture of cocoa, chocolate and sugar confectionery	-15360	-20929
1074	Manufacture of macaroni, noodles, couscous and similar farinaceous products	1497	-91
1080	Manufacture of prepared animal feeds	8299	10631
1101	Distilling, rectifying and blending of spirits	1049	-168
1103	Manufacture of malt liquors and malt	4327	4032
1104	Manufacture of soft drinks; production of mineral waters and other bottled waters	-166	-361
1200	Manufacture of tobacco products	-43997	-98169
1311	Preparation and spinning of textile fibres	115	-2385
1391	Manufacture of knitted and crocheted fabrics	-96	-868
1393	Manufacture of carpets and rugs	-650	-728
1394	Manufacture of cordage, rope, twine and netting	778	-617
1410	Manufacture of wearing apparel, except fur apparel	-5009	-5671
1420	Manufacture of articles of fur	32	-34
1430	Manufacture of knitted and crocheted apparel	-81	67
1520	Manufacture of footwear	-51044	-65874
1610	Sawmilling and planing of wood	-3812	23038
1621	Manufacture of veneer sheets and wood-based panels	8931	49989
1622	Manufacture of builders' carpentry and joinery	1615	5175
1623	Manufacture of wooden containers	2765	-319
1701	Manufacture of pulp, paper and paperboard	-10843	220046
1702	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	2174	2044
1812	Service activities related to printing	-101	-86
2012	Manufacture of fertilizers and nitrogen compounds	2057	-14249
2013	Manufacture of plastics and synthetic rubber in primary forms	-1368	-24916
2021	Manufacture of pesticides and other agrochemical products	-12506	-15357

Table 2.A.1: Changes in exports by ISIC Rev. 4 classification

Continued on next page...

ISIC Code	ISIC 4.0 Rev. Description	Δ exports 2010-2014	Δ exports 2010-2018
2022	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	-1260	-5475
2023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	-11448	-22093
2030	Manufacture of man-made fibres	-4998	-6476
2211	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres	-15620	-32528
2310	Manufacture of glass and glass products	-9514	-10085
2391	Manufacture of refractory products	1929	1938
2393	Manufacture of other porcelain and ceramic products	-1725	-1152
2394	Manufacture of cement, lime and plaster	359	-124
2395	Manufacture of articles of concrete, cement and plaster	7998	-4431
2396	Cutting, shaping and finishing of stone	19802	-6455
2399	Manufacture of other non-metallic mineral products n.e.c.	2792	-2916
2410	Manufacture of basic iron and steel	95546	216958
2511	Manufacture of structural metal products	632	-3278
2512	Manufacture of tanks, reservoirs and containers of metal	2713	-1087
2513	Manufacture of steam generators, except central heating hot water boilers	-1694	-3866
2520	Manufacture of weapons and ammunition	-2731	-1548
2620	Manufacture of computers and peripheral equipment	-6013	3413
2652	Manufacture of watches and clocks	33	122
2660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	491	1343
2680	Manufacture of magnetic and optical media	-304	-148
2720	Manufacture of batteries and accumulators	-1855	-2041
2732	Manufacture of other electronic and electric wires and cables	-9302	229
2750	Manufacture of domestic appliances	-20785	-21694
2813	Manufacture of other pumps, compressors, taps and valves	-12808	-40561
2814	Manufacture of bearings, gears, gearing and driving elements	-10996	-15433
2818	Manufacture of power-driven hand tools	-3963	-2641
2821	Manufacture of agricultural and forestry machinery	-16657	-34669

Table 2.A.1: Changes in exports by ISIC Rev. 4 classification
Continued on next page...

ISIC Code	ISIC 4.0 Rev. Description	Δ exports 2010-2014	Δ exports 2010-2018
2823	Manufacture of machinery for metallurgy	-2817	-6023
2824	Manufacture of machinery for mining, quarrying and construction	38984	87398
2825	Manufacture of machinery for food, beverage and tobacco processing	-2981	-3133
2910	Manufacture of motor vehicles	-230297	24351
2920	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	-5146	-4561
3012	Building of pleasure and sporting boats	-2668	-1182
3091	Manufacture of motorcycles	1797	-2632
3099	Manufacture of other transport equipment n.e.c.	159	228
3220	Manufacture of musical instruments	-72	-125
3240	Manufacture of games and toys	-752	-623
3510	Electric power generation, transmission and distribution	-34684	-34684
3520	Manufacture of gas; distribution of gaseous fuels through mains	0	0
3811	Collection of non-hazardous waste	550	-1
5310	Postal activities	0	7
9102	Museums activities and operation of historical sites and buildings	-9	56

Table 2.A.1: Changes in exports by ISIC Rev. 4 classification

2.A.4 Summary Statistics of Main Variables

	Mean	SD	Min	Max
Export Shock	0.083	0.766	−11.956	7.547
% Evangelical	0.188	0.080	0.043	0.434
% BF	0.093	0.060	0.003	0.229
% Emp. in exp	0.072	0.079	0.000	0.433
ln Population (2010)	17.246	0.972	13.068	21.665
ln GDP per capita (2010	9.251	0.662	7.924	11.706
ΔPT Vote Share	−0.088	0.108	−0.525	0.153
Ideology (PRS)	0.177	0.177	−0.181	0.714
Ideology (CMP)	7.497	10.215	−5.005	42.932
Establishment Score	0.024	0.048	−0.076	0.094
Trad. Morality (Pos.)	0.092	0.299	−0.298	0.998
Trad. Morality (Sal.)	0.110	0.194	−0.282	0.645
Welfare (Pos.)	−0.427	0.585	−1.837	0.589
Welfare (Sal.)	−0.099	0.206	−0.611	0.556

Table 2.A.2: Summary Statistics of Regional-level Variables

	Mean	SD	Min	Max
Cash Transfers	0.000	0.834	−1.437	1.535
Supp. Pol. establishment	0.000	0.838	−1.184	3.297
Like PT supporters	3.899	2.912	1.000	10.000
Religiosity	0.000	0.764	−1.885	1.022
Traditional Morality	0.000	0.794	−1.140	1.523
Gender	0.498	0.500	0.000	1.000
Age	39.101	15.907	16.000	89.000
Income Index	0.000	0.857	−1.533	1.153
Education (Years)	8.491	3.885	0.000	17.000

Table 2.A.3: Summary Statistics of Individual-level Variables

2.A.5 Indices (Individual-level)

Pol. Establishment		
Factor loading		
Variable	Factor 1 (loading)	Uniqueness
Respect for Political Institutions	0.4842	0.7535
Pride in Political System	0.6556	0.5572
Trust in the National Legislature	0.6844	0.5292
Trust in Political Parties	0.7375	0.4554
Trust in Executive	0.6779	0.5094
Trust in Elections	0.6377	0.5894
Leaders Are Interested in What People Think	0.3567	0.8577
Impeachment of Dilma Rousseff Was Fair	0.0550	0.9123
Amount of corruption among politicians	-0.3350	0.8637
Bartlett test of sphericity		
Chi-square = 2976.171		
Degrees of freedom = 36		
p-value = 0.000		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		
KMO = 0.879		
Test scale		
Average interitem covariance: .8163401		
Number of items in the scale: 9		
Scale reliability coefficient: 0.7414		

Table 2.A.4: Political Establishment

Religiosity		
Factor loading		
Variable	Factor 1 (loading)	Uniqueness
Attendance at Meetings of Religious Organization	0.6019	0.6377
Attendance at Religious Services	0.6627	0.5609
Importance of Religion	0.4856	0.7642
Bartlett test of sphericity		
Chi-square = 682.050		
Degrees of freedom = 3		
p-value = 0.000		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		
KMO = 0.623		
Test scale		
Average interitem covariance: .5170831		
Number of items in the scale: 3		
Scale reliability coefficient: 0.6425		

Table 2.A.5: Religiosity

Trad. Morality		
Factor loading		
Variable	Factor 1 (loading)	Uniqueness
I support the right of homosexuals to apply to jobs in the public sector	0.7222	0.4784
I support same-sex marriage	0.7104	0.4953
Men are better leaders than women	0.2219	0.9508
Bartlett test of sphericity		
Chi-square = 763.347		
Degrees of freedom = 3		
p-value = 0.000		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		
KMO = 0.528		
Test scale		
Average interitem covariance: 2.938136		
Number of items in the scale: 3		
Scale reliability coefficient: 0.6031		

Table 2.A.6: Traditional Morality

2.B Notes on Data Source and Cleaning Procedures

2.B.1 Sectoral Crosswalk (NCM and CNAE 2.0)

Description of the procedure: sectors in the export data are classified according to the the *"Nomenclatura Comum do Mercosul 2012"* (NCM 2012). RAIS classifies sectors according to the "Classificaćão Nacional de Atividades Econômicas (CNAE). In RAIS 2010 and subsequent databases, CNAE 2.0 classes and subclasses are included.

I convert NCM and CNAE 2.0 into ISIC Rev. 4 because ISIC Rev. 4 is more general and easily combined with both of classification systems. In order to do that, I use the conversion tables provided by the Brazilian Statistical Office.

The major problem that I found in constructing the crosswalk between NCM 2012 and ISIC Rev 4 is that 95 NCM classes that are included in the export database in the period that I analyze (2010-2018) are classified in the NCM2012-ISIC Rev. 4 conversion table as "8999-Not classified". Moreover, exports in deflated USD FOB (USD Free On Board, which I deflated for baseline year, i.e. 2010) decreased more in the analyzed period than for the other NCM 9251 sectors included in the export database.

I partially solve this problem by converting NCM 2012 classified as "8999-Not classified" into CNAE 2.0 and then converting CNAE 2.0 into ISIC Rev. 4 based on the conversion tables provided by the Brazilian Statistical Office. By doing that, I reduced the NCM 2012 unclassified sectors from 95 to 38. I exported these 38 remaining sectors into an excel file, so that I can manually link them to ISIC Rev. 4. later. However, this procedure is necessary since t-tests indicate that the null hypothesis that the means of export changes in the period analyzed is the same for matched and unmatched sectors.

A last note on this matter is that, at a first glance, it might seem more straightforward to convert NCM 2012 into CNAE 2.0 and then directly merge to RAIS' database. However, many sectors that are present in the export database are not preset in the NCM 2012 - CNAE 2.0 conversion table provided by the Brazilian Statistical Office. Namely, out of the 9346 sectors in the export database, 1200 are not included in this conversion table. Therefore, using ISIC Rev. 4. is preferable because it prevents a more serious loss of information. Since constructing this crosswalk requires multiple steps, I manually checked a random sample of the resulting conversion table.

Data sources:

- CNAE 2.0. classification table comes from the Brazilian Statistical Office (`https://concla.ibge.gov.br/classificacoes/correspondencias/atividades-economicas.html`).

- ISIC 4.0 classification table is sourced from the United Nations statistics website (`https://unstats.un.org/unsd/classifications/Econ`). I also use a detailed description of ISIC 4.0 classes (`https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf`) to check the crosswalks that I construct as explained above.

2.B.2 Computing number of jobs using RAIS

RAIS is a database at the contract level, i.e., each row contains information about a contract. Among other details, the database contains information about in which months of a given year a contract was active. I divide the number of months for which a contact is active in a given year by 12. I then sum this value by sector and microregion to get the number of jobs by sector and microregion L_{srt}.

2.C Robustness

	DV: Δ PT Vote Shares				
	(1)	(2)	(3)	(4)	(5)
ΔEPW$_t$	0.0120	0.0230	0.0201	0.0154	-0.0133
	(0.0221)	(0.0152)	(0.0134)	(0.0124)	(0.0483)
Evangelicals (dummy)	-0.0550	-0.0550	-0.0511	-0.0566	-0.0508
	(0.0696)	(0.0693)	(0.0685)	(0.0697)	(0.0706)
Evangelicals (dummy)	0.0614**	0.0590**	0.0597**	0.0624**	0.0713***
× ΔEPW$_t$	(0.0257)	(0.0253)	(0.0249)	(0.0254)	(0.0273)
Catholics (dummy)	-0.0757	-0.0787	-0.0791	-0.0793	-0.0732
	(0.0578)	(0.0572)	(0.0567)	(0.0573)	(0.0581)
Observations	1114	1114	1114	1114	1114
Adjusted R^2	0.821	0.820	0.821	0.821	0.820
Initial % of jobs × year	Iron ore	Crude oil	Meat	Cereals	All
Evangelicals (dummy) × year	✓	✓	✓	✓	✓
State × year FE	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓

Note: Stacked first difference estimates at the commuting zone (CZ) level. Columns (1) to (4) control for share of jobs by election-year in one of the following industries: iron ore, crude oil, meat and cereals, respectively. Column (5) control for the shares of jobs by time in all these four industries. All models include state by year fixed effects and the following CZ-level controls: share of workers in export sectors, log GDP per capita and log population in base year. All variables are standardized. Standard errors clustered at the meso-region by year level in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.C.1: Effects of Export Decline on Votes for the PT (2010–2018) with Controls for Trends in CZs with Similar Labor Market Specialization in Export Industries in the Base Year

	DV: Δ PT Vote Shares (2006-2010)				
	(1)	(2)	(3)	(4)	(5)
ΔEPW_{t+8}	0.00917	0.0164	0.0103	-0.00533	0.00898
	(0.0114)	(0.0129)	(0.0110)	(0.0173)	(0.0109)
Evangelicals (dummy)				-0.0443	
				(0.0624)	
Evangelicals (dummy) ×		-0.0194			
ΔEPW_{t+8}		(0.0198)			
Catholics (dummy)		0.0902			
		(0.0593)			
Evangelicals (cont.)			0.0329		-0.0516
			(0.0827)		(0.0658)
Evangelicals (cont.)×			-0.00465		
ΔEPW_{t+8}			(0.00982)		
Catholics (cont.)			0.00551		-0.0719
			(0.0604)		(0.0654)
Catholics (dummy) ×				0.0220	
ΔEPW_{t+8}				(0.0213)	
Catholics (cont.) ×					0.00859
ΔEPW_{t+8}					(0.00998)
Observations	1114	1114	1114	1114	1114
Adjusted R^2	0.799	0.802	0.803	0.801	0.803
Evangelicals (dummy) × year		✓			
Evangelicals (cont.) × year			✓		
Catholics (dummy) × year				✓	
Catholics (cont.) × year					✓
State × year FE	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓

Note: Stacked first difference estimates at the commuting zone (CZ) level. The dependent variable is the lagged changes in vote share for the PT at CZ level. Changes in vote shares are computed as the difference between the percentage of valid votes cast for the PT in 2006 or 2010 minus 2002. Models (2) and (3) include interaction between the export shock and the percentage of Evangelicals at the CZ level as a dummy and a continuous variable, respectively. Columns (4) and (5) do the same but with the concentration of Catholics. All models include state by year fixed effects and the following CZ-level controls: share of workers in export sectors, log GDP per capita and log population in base year. All variables are standardized. Standard errors clustered at the meso-region by year level in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.C.2: Robustness: Leads

2.D Random-Shifts

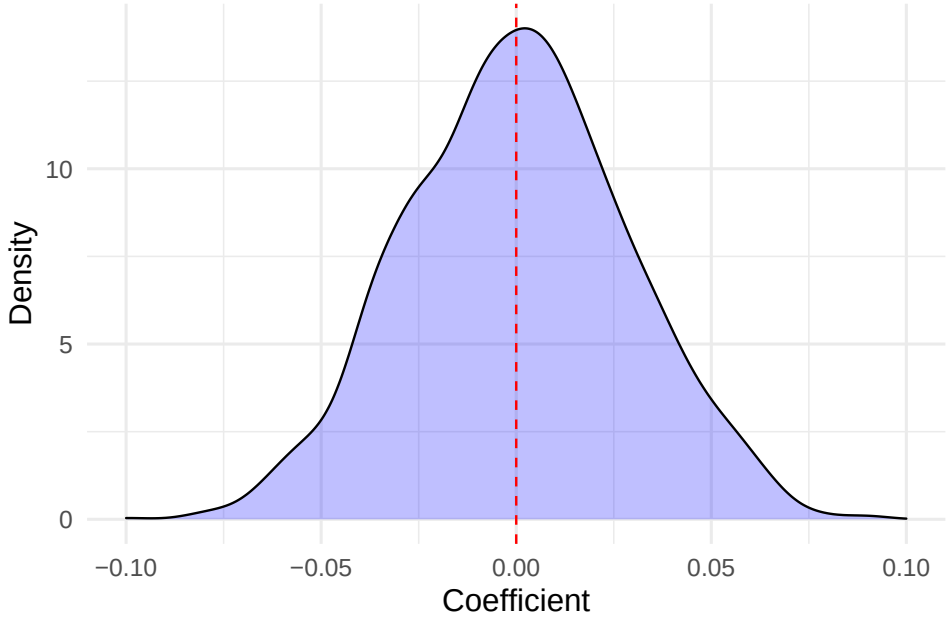


Figure 2.D.1: Estimates Distribution for Interaction between Random Shifts Placebo by Evangelicals

Note: The figure plots the distribution of estimates for 10k iterations of the coefficient of the interaction between the shift-share placebo (in which real shares are interacted with a normally distributed random shift variable) and the Evangelical dummy. The rest of the specification is as in equation 2.3. This is a test proposed by Adão, Kolesár and Morales (2019) to evaluate the concern that in shift-share designs residuals of units with similar shares have correlated residuals. They point out that if the share of statistically significant coefficients with a 95% confidence level is expressively superior to 5%, this suggests overrejection of the null hypotheis, representing a threat to inference. In my test, 5.5% of the coefficients are statistically significant at the 95% confidence level, suggesting that there is no overrejection problem.

2.E Linearity

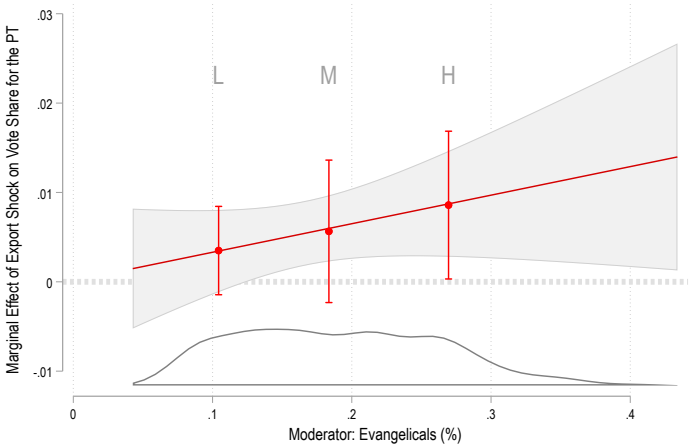


Figure 2.E.1: Evaluating the linearity assumption

Note: These figures plot the both the marginal effect of the Export Shock on vote share for the PT, conditional on the level of Evangelicals. The vertical lines plot the binning estimator proposed by Hainmueller, Mummolo and Xu (2018) to evaluate the linearity assumption.

2.F Effects of the Export Shock on Voting Behavior by Concentration of Beneficiaries of State Programs

	DV: Δ PT Vote Shares			
	(1)	(2)	(3)	(4)
ΔEPW$_t$	0.0269*	0.0316**	0.0337	0.0379**
	(0.0150)	(0.0138)	(0.0232)	(0.0153)
BF (dummy) × ΔEPW$_t$	0.00297			
	(0.0295)			
BF (dummy)	0.134**			
	(0.0523)			
BF (cont.) × ΔEPW$_t$		-0.00905		
		(0.0134)		
BF (cont.)		0.194***		
		(0.0462)		
Pensions (dummy) × ΔEPW$_t$			0.000445	
			(0.0295)	
Pensions (dummy)			-0.0591	
			(0.0425)	
Pensions (cont.) × ΔEPW$_t$				-0.00220
				(0.0105)
Pensions (cont.)				-0.00508
				(0.0336)
Observations	1114	1114	1114	1114
Adjusted R^2	0.832	0.838	0.820	0.819
BF (dummy) × year	✓			
BF (cont.) × year		✓		
Pensions (dummy) × year			✓	
Pensions (cont.) × year				✓
State × year FE	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓

Note: Stacked first difference estimates at the commuting zone (CZ) level. Models (2) and (3) include interaction between the export shock and level of *Bolsa Família* (BF) beneficiaries at the CZ level as a dummy and a continuous variable, respectively. Columns (4) and (5) do the same but with the levels of pensioners. All models include state by year fixed effects and the following CZ-level controls: share of workers in export sectors, log GDP per capita and log population in base year. All variables are standardized. Standard errors clustered at the meso-region by year level in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.F.1: Effects of Export Decline on Votes for the PT by Concentration of *Bolsa Família Beneficiaries and Pensioners*, commuting–zone level estimates (2010–2018)

	(1)	(2)	(3)	(4)	(5)	(6)
	Religiosity	Like PT supporters	Rousseff's impeachment was unfair	Redistribution	Trad. Morality	Anti-establ.
ΔEPW_{2018}	0.0461	-0.00425	-0.0262	0.0461	0.0312	-0.0905***
	(0.0476)	(0.0283)	(0.0476)	(0.0292)	(0.0608)	(0.0304)
BF beneficiary ×	-0.0738	0.0189	-0.0157	-0.00256	0.0204	0.149***
ΔEPW_{2018}	(0.0444)	(0.0592)	(0.0522)	(0.0564)	(0.0721)	(0.0452)
BF beneficiary	0.0798	0.131	0.0299	-0.0722	-0.0113	-0.182**
	(0.0608)	(0.0784)	(0.0778)	(0.0910)	(0.0704)	(0.0771)
Observations	1070	1071	1081	1084	1065	1055
Adjusted R^2	0.179	0.0347	0.0492	0.00327	0.184	0.0174
State FE	✓	✓	✓	✓	✓	✓
Ind. controls	✓	✓	✓	✓	✓	✓
CZ controls	✓	✓	✓	✓	✓	✓
N of CZs	82	82	82	82	82	82

Note: The table reports the results of regressions of the form as in equation 2.4. The dependent variables are individual-level survey measures of: (1) religiosity (an index measuring church attendance, frequency of prayers and importance of religion); attitudes towards the Worker's Party (PT), specifically (2) the extent to which the respondent likes PT supporters and; (3) thinks that the impeachment of President Dilma Roussef (PT) was unfair; (4) attitude towards redistribution, specifically the extent to which respondents think that the State should act to reduce inequality of opportunity and, finally (6) anti-establishment attitudes, which is an index including items asking pride in the political system, respect in political institutions, trust in different branches of government and whether political leaders are interested in what people think. More information about the indices used in these models can be found in appendix 2.A.5. All variables are standardized to facilitate interpretation. The BF dummy is measured at the individual level, i.e., whether respondents declare to be a beneficiary of the Conditional Cash Transfer Program *Bolda Família*. All modes include state FE and CZ-level controls (share of workers in the export sector, log GDP per capita and log population) as well as pre-treatment individual-level controls (age, gender, race and education level). Data is sources from LAPOP's AmericasBarometer 2017. Only data from Brazil is included. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.F.2: Individual-Level Estimates: Interaction with BF Dummy

Chapter 3

Hot Takes: The Divergent Effects of Wildfires on Support for Green Political Platforms in Brazil

Silvia Pianta & Paula Rettl

Climatic disturbances have influenced and hampered plant-distribution in many ways. The ups and downs in their struggle for existence have modified the distribution of animals in every conceivable manner; and among men, in particular, the struggle for space still continues to produce disturbing effects.

—Paul Vidal de la Blache, 1918

3.1 Introduction

Wildfires are a significant source of greenhouse gas emissions in tropical countries (Van Der Werf et al., 2003; Van der Werf et al., 2010). Every year, wildfires destroy large extensions of tropical forests, jeopardizing their capacity to absorb carbon and become a key element in global climate mitigation strategies. Tropical forests can potentially

achieve one-quarter to one-third of the mitigation required to meet climate stabilization targets by 2030, with relatively low costs (Busch and Engelmann, 2017; Roe et al., 2019; Shukla et al., 2019). The Amazon forest, which is the largest tropical forest on Earth, has the potential to absorb billions of tons of carbon dioxide every year. It also plays a crucial role in global biodiversity conservation, water cycle regulation, and the protection of the livelihood of many indigenous peoples. Beyond tropical forests, wildfires also threaten other biomes in the tropics and beyond. Last year, the Cerrado (the Brazilian tropical savanna) experienced the largest wildfires in a decade (Watanabe, 2021; Viegas et al., 2021). Elsewhere, bush fires from Australia to California destroy wildlife and increase pollution levels.

Policies to prevent wild and bush fires are key for global environmental preservation, climate change mitigation, and the protection of indigenous and traditional communities. How does support for such policies emerge among the mass public? Conventional wisdom holds that experiencing natural disasters first-hand makes citizens care more about environmental issues and shift their attitudes towards more progressive views on environmental policy (Hazlett and Mildenberger, 2020; Baccini and Leemann, 2021; Hoffmann et al., 2022). In this paper, we argue that the effect of environmental disasters on voting behavior is conditional upon distributive concerns. Although natural disasters are often deemed to be unambiguously costly for the populations affected, they can also generate profits. This is the case when natural disasters, by destroying the native vegetation and wildlife, make areas more readily available for extractive economic activities, such as mining and agriculture. By focusing predominantly on developed countries, where such extractive economic activities are relatively less important, the literature on the effect of natural disasters on support for green candidates and policies overlooks the role played by distributional concerns.

We build on previous work that shows that public opinion about policies designed to mitigate or adapt to climate change are shaped by material self-interest. For example,

Bechtel, Genovese and Scheve (2019) show that, in developed countries, support for climate co-opration is less likely among individuals employed in highly polluting industries. Bush and Clayton (2022) show that support for climate change mitigation depends on perceived costs and benefits. We extend this work for the case of natural disasters. Specifically, we posit that natural disasters increase support for green candidates only when the costs outweigh the benefits.

We test our argument in the case of Brazil. As approximately 60 percent of the Amazon forest and 12 percent of the total world's forest area is located in the country, Brazilian voters are uniquely positioned to influence policies that can preserve tropical natural environments and biodiversity. While past Brazilian governments have approved legislation that greatly contributed to reducing deforestation and wildfires (Weisse, 2019).

Despite their adverse environmental impacts, wildfires might benefit part of the local population. By destroying the natural environment, wildfires facilitate land-grabbing and increase the availability of farming and grazing land. Fires can be particularly beneficial to the cattle and soy farming sectors. Historically, the production of soy and cattle – two of Brazil's most significant exports – has expanded over tropical forests, savannas, and wetlands that were previously preserved. Hence, we hypothesize that the local economic dependence on the soy and cattle sectors decreases the positive effect of fires on support for green political platforms.

We test our argument using two identification strategies and multiple data sources. We measure the exposure of Brazilian municipalities to fires based on the *" Queimadas"* database made available by the Brazilian Agency of Space Research (*Instituto Nacional de Pesquisas Espaciais*, INPE), which provides information on the location and radiative power of all fires detected in Brazil from 2018 onward. We then match these data with electoral returns at the municipality level in Brazilian Presidential elections. To measure local economic dependence on soy and cattle, we compute the pre-fire exposure share of

the local labor force employed in those sectors based on administrative data.[1]

Assessing the causal impact of fires on political behavior is challenging because fires do not happen completely at random but are influenced by a complex interaction of environmental and anthropogenic factors. Indeed, fire occurrence might be correlated with different economic and social factors. Also, fires are often intentionally set to expand land available for pasture and crops. We address this concern in two different ways. First, we use an instrumental variable based on the fact that the fire ignition and spreading are affected by weather conditions (Shikwambana and Kganyago, 2021; Li et al., 2021). Specifically, we instrument fire radiative power with fire risk, a formula developed by INPE that takes into account the precipitation levels in the previous days. Aware of the challenges of using weather instruments in the social sciences, we follow the recent literature and rely on short term variations in weather conditions while controlling for longer-term weather patterns (Cooperman, 2017; Mellon, 2021). Second, we construct a stacked differences-in-differences design. We compare municipalities affected by fires in the seven days before the 2018 election day with municipalities where no fires were registered in the 180 before that same day.

In line with our expectations, we find that exposure to fires in the week before the election increases the vote share of Marina Silva – the presidential candidate with the most advanced pro-environment platform – but only in municipalities with low levels of employment in the soy and cattle sectors. In fact, in municipalities with high levels of employment in these industries, the effect of fires on support for Marina Silva is negative. By analyzing the effects of fire exposure on electoral returns of other candidates, we provide evidence regarding the underlying mechanisms. Exposure to fires reduce the vote share of the main center-left party (the Worker's Party, PT) and increases the vote share of Jair Bolsonaro, the far-right and anti-environment candidate that won the 2018 Presidential election. Our findings suggest that fires increase the salience of the environment as a

[1]Data come from the *Relação Anual de Informações Sociais, RAIS*)

political issue causing a shift in votes from center-left to green candidates (McAllister and bin Oslan, 2021). These results also indicate that, as in the case of climate adaptation policies in developed countries, natural disasters can lead to green polarization (Otteni and Weisskircher, 2021).

Our main contribution is to show that the documented effects of natural disasters on support for green policies and candidates are conditional upon material self-interest. In places where a large share of the population is employed in extractive sectors and hence likely to benefit from the destruction of native vegetation and wildlife, fires actually decrease support for green candidates. While previous research using data from developed countries shows that first-hand experience of natural disasters make the electorate more "green" (Hazlett and Mildenberger, 2020; Baccini and Leemann, 2021; Hoffmann et al., 2022), our results provide a more bleak picture. Namely, when the costs do not out-weight the benefits, first-hand experience of natural disasters is unlikely to change support for green candidates and policies. Such a scenario can occur either when individuals have something to gain from natural disasters or when they have little to lose, for example when households are privately insured against environmental risk (Pahontu, 2020).

We also contribute to the debate about the extent to which material self-interest and values shape public opinion and political behavior. Building off of prior scholarship (Bechtel, Genovese and Scheve, 2019; Bush and Clayton, 2022), we demonstrate that individual preferences on environmental policy are not only shaped by values and norms (Inglehart, 1995), but also by material self-interest. Finally, we contribute to the literature on Latin American politics by showing under which conditions voters select programmatic parties when party systems are dominated by personalistic parties with weak brands (Roberts, 2013; Singer and Tafoya, 2020; Zucco and Power, 2021).

3.2 Natural Disasters and Material Self-Interest

A growing body of research studies how natural disasters affect political behavior. Early work draws on the retrospective voting literature by considering natural disasters as a particular case of a negative shock. Overall, these studies show that natural hazards decrease support for incumbents among the affected populations, but such effect can be offset by disaster relief policies (Healy and Malhotra, 2009; Bechtel and Hainmueller, 2011; Gasper and Reeves, 2011). In more general terms, voters take into account variations in their and their communities' welfare when casting a ballot. Under which conditions they do it in a myopic – punishing or rewarding incumbents for shocks exogenous to government performance – or rational fashion is still debated (Healy and Malhotra, 2013).

More recently, scholars have inquired how the experience of natural disasters shape preferences for green policies. For example, McAllister and bin Oslan (2021) argue that bush fires increase the salience of environmental issues, benefiting the party that "owns" this issue. They test their hypotheses with state-level data from Australia. Their results suggest that bush fires increase support for the green party (the Australian Greens) while reducing the vote share of its main competitor: the mainstream left party (the Australian Labor Party, ALP). Hoffmann et al. (2022) show that temperature anomalies, heatwaves, and dry spells in the 12 months before the European parliamentary elections increase the vote share of green parties in such elections, particularly in wealthier sub-national regions. Hazlett and Mildenberger (2020) and Baccini and Leemann (2021), analyze referenda data from California and Switzerland, respectively, and show that natural disasters increase support for green policies. In both studies, heterogeneity analyses provide evidence that these results are driven by regions where larger shares of the population are more likely to believe that climate change has anthropic causes.

An extensive interdisciplinary literature analyzes the effect of local weather abnormalities and climate-related natural disasters on environmental attitudes as reported in

survey data. Overall, this literature shows that temperature abnormalities foster belief in and concern about anthropogenic climate change, at least in the short-term (Bergquist and Warshaw, 2019; Weber, 2016; Egan and Mullin, 2012; Hamilton and Stampone, 2013; Kaufmann et al., 2017; Konisky, Hughes and Kaylor, 2016). Extreme events and temperature abnormalities have been also shown to impact social media activity about climate change (Sisco, Bosetti and Weber, 2017) and internet search activity (Kirilenko, Molodtsova and Stepchenkova, 2015; Lang, 2014).

Overall, the take-away message is that natural disasters and abnormal weather events provide voters with accessible information about the environmental risks to which they are exposed. As a consequence, voters reconsider the importance of the environment as a political issue and their positions on environmental policies. Importantly, this new acquired information through first-hand experience of natural conditions interacts with pre-existing beliefs and identities (Myers et al., 2013). As the climatic and environmental crisis becomes more acute, it is important to understand under which conditions experiencing its consequences first-hand fosters support for green policies. In this paper, we consider the role played by material self-interest in defining how voters respond to wildfires.

Our argument builds on a related body of literature that examines how distributive concerns shapes support for climate adaptation and mitigation. For example, Bechtel, Genovese and Scheve (2019) show that support for climate mitigation policies in developed countries is higher among workers employed in industries with low emission levels of greenhouse gases. Bush and Clayton (2022) shows that individuals that have more polluting consumption habits (usually men in developed countries) oppose more climate mitigation policies due to the higher costs these policies involve for them. We extend this literature by considering how natural disasters interact with material self-interest.

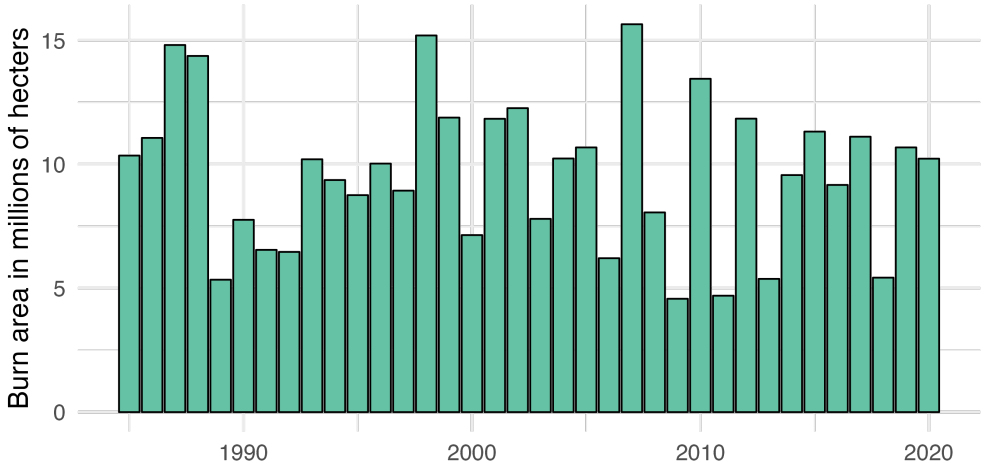
We argue that in countries where extractive industries represent a larger share of the economy, some types of natural disasters facilitate economic activity, thereby yielding profits for certain groups. To the best of our knowledge, the literature on the electoral

consequences of natural disasters has so far considered natural disasters as indiscriminately bad. We instead argue that natural disasters have distributive implications. As such, natural disasters too create winners and losers. By arguing that, our work also builds on a much larger literature on the role of material-self interest and distributive concerns on political behavior (Becker, 1976; Meltzer and Richard, 1981; Olson, 1965).

3.3 Wildfires and their Distributive Consequences in Brazil

Wildfires in Brazil's natural areas and especially in the Amazon region have made international headlines in the last couple of years (Landau and Phillips, 2020; Pedroso and Reverdosa, 2020; Alessi, 2021). Despite the recent international attention to the problem, wildfires in Brazilian natural environments – such as in the Amazon and Atlantic forests, tropical savannas, and wetlands – are far from new. Figure 1 plots the annual magnitude (in millions of hectares) of fire-burn scarring across Brazil's natural areas. While the causes of wildfires in Brazil are multiple and complex, a drier climate caused by climate change has contributed to this pattern, as has higher levels of deforestation (Eloy et al., 2019).

While fire can be an important land management tool, fires that get out of control can cause significant damage to nearby communities in a variety of direct and indirect ways. For example, fires can harm public health. It is well-documented that exposure to wildfire smoke increases the incidence of cardiovascular diseases (Requia et al., 2021). Fires that get out of control have economic costs too. For example, de Oliveira et al. (2019) provide evidence that fires in the Amazon reduce the economic returns of sustainable logging production. Moreover, Bowman, Amacher and Merry (2008) discuss how the propensity of traditional households to engage in fire prevention depends on the extent to which they rely on standing forest resources for non-timber products.



Notes: the figure shows the number of hectares (in millions) of natural areas in which fire scars were detected by satellite images in a given year. Data is sourced from MapBiomas Project (2021).

Figure 1: Natural Burn Area in Brazil, 1985–2020

However, by destroying natural vegetation and "clearing" land, fires may also bring economic opportunities. In Brazil, vast areas are subject to land grabbing. Land grabbing is an illegal practice that consists of the use of unoccupied public land for crop and ranching and simulate, often through falsified documents, a longer private occupation of the land. Land grabbing allows individuals to acquire property rights over public land and profit through agriculture, ranching and real estate speculation. Large parts of the areas where land grabbing tends to occur are covered by forest and this is why converting forest into pasture remains a widely recognized way to acquire land (Faminow et al., 1998; Hoelle, 2015). Besides the value of the land itself, increasing prices of beef and soy (driven both by higher domestic and international demand) contribute to make this practice profitable (Faminow et al., 1998). Therefore, wildfires that get out of control can facilitate land grabbing, a practice that is more common among soy producers and, especially, ranchers (Barona et al., 2010).

3.4 Environmental Politics in Brazil

Brazil has a presidential political system with a highly fragmented party system. Such fragmentation does not always reflect political cleavages or programmatic differences (Zucco and Power, 2019). Indeed, few parties are programmatic. The Workers' Party (Partido dos Trabalhadores, PT) and, arguably, the Sustainability Network (Rede Sustentabilitade, REDE) are exceptions in this respect. The first is associated with a social-democratic agenda (Samuels and Zucco, 2018) and the second with a markedly pro-environmental political platform.

Even before co-founding REDE, Marina Silva was at the forefront of the Green movement in Brazil. Beginning after Brazil's re-democratization, Silva was as a member of the PT where she stayed until 2009. She gained more public prominence when she served as the Minister of the Environment during President Lula's (PT) first and second terms. But due to disagreements regarding environmental and energy policy, Silva left the government in 2008 and the PT shortly thereafter. As one of the most public figures within the Green movement, Silva ran for president to promote the Green agenda under the banners of a variety of parties in 2010 and 2014. Ultimately, she and other members of the Green movement in Brazil came together to found REDE, which was registered in 2015. Silva ran again for president in 2018, this time with REDE.

Also in 2018, Jair Bolsonaro ran as presidential candidate of the Partido Social Liberal (PSL). Under his leadership, the party embraced a nationalist, economically liberal, an anti-environmental platform. Bolsonaro was then elected president in the second round of the 2018 elections.

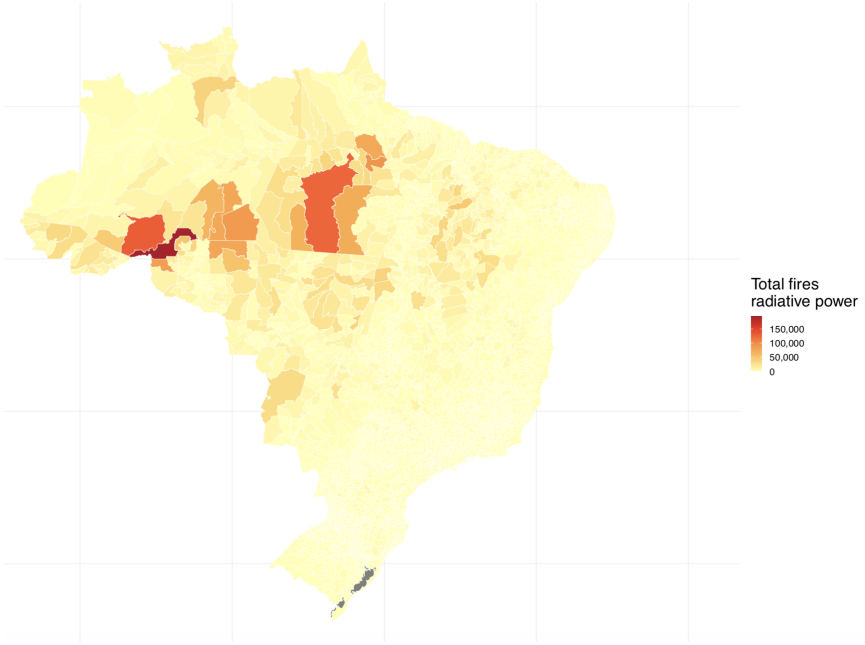
Our expectation is that fires increase the vote share of the main environmentalist political leader in Brazil: Marina Silva. Moreover, we expect this effect to be decreasing on the share of the population employed in soy and cattle, two industries that, as we argue in section 3.3, tend to benefit from fires. Building on previous research (McAllister and bin

Oslan, 2021), we hypothesize that part of such positive effect on Silva's electoral returns is due to PT voters shifting to a pro-environment political platform. As a consequence, we expect that fires have a negative effect on PT's electoral return. Finally, we expect that, by increasing the salience of the environment issue, fires can also increase the vote share of candidates with strong anti-environmentalist political platforms among voters who lean right. Hence, we expect that fires also increase the vote share of Jair Bolsonaro in 2018.

3.5 Data

3.5.1 Fires data

In order to estimate the effect of exposure to fires on voting behavior in Brazilian municipalities, we construct a measure of the cumulative radiative power of fires in each muncipality in the week and month leading up to first round of the 2018 presidential election. Fire radiative power (FRP) is defined as the radiant energy released per time unit by burning vegetation. We obtained data on fires from *Queimadas* database, maintained by the Brazilian Agency of Space Research (INPE). This database provides information on the location of all fires detected in Brazil by the NASA satellites Terra and Aqua (INPE, 2022). Figure 2 displays the intensity of fires across all Brazilian municipalities in 2018. In order to demonstrate that our results are not driven by small fires we separately test the impact of big fires only. We define "big fires" as those with an FRP above the median. This is important because small fires can be correlated with economic activities (e.g., field burning to clear cropland) which may be associated with voting patterns. "Big fires", instead, are more likely to be fires that went out of control and spread beyond where they were initially initiated.



Note: This figure plots the sum of fire radiative power of at the municipality in 2018. Data is sourced from (INPE, 2022).

Figure 2: Sum of radiative power of fires in Brazilian municipalities, 2018

3.5.2 Weather data

We employ daily high-resolution gridded observational data on precipitation made available by INPE. We employ these raster data to create a daily municipality-level dataset of rainfall. We then compute different measures that we employ as controls in our analyses. We construct three control variables from these data. First, we control for the 5-year mean level of precipitation at the municipality level in order to account for longer-term differences caused by municipalities that tend to experience more or less rain on average. Second, we control for precipitation on election day, as previous studies show its effect on turnout (Cooperman, 2017). Third and finally, we also include a measure of how much recent precipitation patterns deviate from a typical year. Failing to control for this could pose a threat to our identification strategy if the lack of rain—rather than the presence of fire—influences voting behavior. We therefore compute the deviation of the mean precipitation levels for the 250 days prior to the election day from the mean level for the

previous 5 years. Specifically, we subtract the 250-day mean from the 5-year mean and divide by the 5-year mean.[2]

3.5.3 Fire risk data

We employ a measure of fire risk defined and computed by INPE as an instrumental variable to exploit the variation in fires produced by weather and environmental conditions. The computation of fire risk is mainly based on the consideration of rain patterns in the previous 120, where more recent precipitation receives greater weight. However, it also considers temperature, relative humidity, vegetation type, the occurrence of fire in the area, and topographic elevation and latitude (Setzer, Sismanoglu and Martins dos Santos, 2019). We employ daily high-resolution gridded observational data made available by INPE to create a daily, municipality-level fire risk dataset. We use these data to compute aggregate measures of fire risk for the week and month prior to election day.

3.5.4 Electoral data

We use Brazilian electoral data made available by the Superior Electoral Court (*Tribunal Superior Eleitoral*, TSE). In Brazil, Federal and state elections occur every four years, on the first Sunday of October. In these elections, Brazilians elect the President, one-third of members of the Federal Senate, all members of the Chamber of Deputies, State Governors, and the members of the State Legislative Assemblies. The President and State Governors are elected through a two-round system, with the second round being held on the last Sunday of October. Municipal elections take place every four years and are usually held in October, two years after federal and state elections.

We perform our analyses focusing on the most recent Presidential election, which occurred in 2018. Our outcome variables are the vote share of Marina Silva, the PT, and

[2]Results are robust to other operationalizations of this concept, such as deviations from the municipality mean in the 7 days leading up to the election.

Jair Bolsonaro (the PSL). In our differences-in-differences design, we also use data from the 2014 and 2018 presidential elections for Marina Silva and the PT, (as Bolsonaro did not ran as a Presidential candidate in 2014). Importantly, Marina Silva ran for president in 2010, 2014 and 2018, but each time with a different party. In 2014 she ran with the Brazilian Socialist Party (PSB) and in 2010 with the Green Party (PV). Given the fluidity of the Brazilian party system, we focus on the vote share for Silva in each election, regardless of the party with which she runs.

3.5.5 Labor market data

We hypothesize that the effect of fires on vote choice will depend on the potential economic costs (or benefits) stemming from them. As we argued above, soy and cattle sectors tend to benefit from the clearance of land due to wildfires. We therefore expect voters in municipalities that do not depend on those sectors for employment to be more supportive of Green political platforms in response to fires. We employ the *Relação Anual de Informações Sociais* (RAIS) dataset to compute the share of jobs in the soy and cattle farming sectors in each municipality in 2017 (one year before the 2018 election). RAIS is an administrative dataset collected annually by the Brazilian Ministry of the Economy. It contains information on the universe of formal contracts in Brazil, including a detailed sectoral classification. The de-identified data is publicly available on the website of the Ministry of the Economy.[3]

3.6 Empirical Framework

In our main empirical strategy, we estimate the impact of exposure to fires on the vote shares of Marina Silva, Jair Bolsonaro and the PT at the municipality-level. Contrary to other extreme events, fires are not exogenous to human activity and might be correlated

[3]The website (`ftp://ftp.mtps.gov.br/`) is accessible only from Brazil.

with social and political factors that affect voting behavior. Anthropogenic factors such as logging and land-use practices can impact fire ignition and spread. Furthermore, fires are often intentionally set to increase land available for agricultural and livestock production and to facilitate land grabbing. This implies that simple OLS estimates of the impact of fires on voting behavior might suffer from omitted variable biases. In particular, anthropogenic factors that predict the presence of fires are likely to be correlated with anti-environmentalism sentiment. Hence, we might expect that OLS estimates of the impact of fires on green voting suffer from a bias toward zero. We address this issue in two distinct ways. First, we instrument for the strength of fires using a fire risk variable that exploits short-term variation in weather patterns. Second, we use a difference-in-differences estimator to estimate the effect of fires on vote patterns in municipalities affected by fires in the days immediately preceding the 2018 election.

3.6.1 Instrumental Variable

Our instrumental variable (IV) strategy exploits variation in fire radiative power produced by short-term weather conditions. Specifically, we instrument our measure of fire radiative power by the fire risk measure constructed by INPE, which is mostly defined by precipitation levels in the 120 preceding days. For more information about this measure, see section 3.5. To build a convincing specification, we need to define an instrumental variable that is valid (i.e., it needs to significantly predict the variation in fire activity) and plausibly respects the exclusion restriction (i.e., influence voting behavior only through its impact on fires, and not through other channels).

As number of studies have shown that weather impacts local economic conditions, which could, in turn, influence voting behavior (e.g., Gasper and Reeves, 2011). Hence, there might be a risk of exclusion restriction violation due to the impact of weather conditions on voting behavior through channels different from fires. We address this issue in two complementary ways. First, we exploit only short-term variation in our

measure of fire risk (fire risk in the same period as our fire treatment period). Second, we control for precipitation patterns in the five years before the treatment period. Moreover, as precipitation on the election day has been shown to influence voting behavior, and especially turnout (Gomez, Hansford and Krause, 2007), we also control for rainfall on the election day. The overall idea is that, when longer-term weather patters and whether on election day are controlled for, fire risk in the week before elections is exogenous and not likely to impact voting behavior through channels other than the actual occurrence of fire in the week before elections.

In summary, we run our analyses employing both (1) ordinary least squares (OLS) and (2) two-stage least squares regression (2SLS). Our main explanatory variable is fire radiative power in the seven days before the election. In the 2SLS specification, we instrument for the occurrence of fires using the average fire risk in the seven days preceding the election day, excluding the election day itself. We thus first estimate the following first-stage equation:

$$\text{Fire}_{jk} = \tau \text{FireRisk}_{jk} + \beta \mathbf{X}_{jk} + \phi_k + \varepsilon_{jk} \tag{3.1}$$

And in the second stage we estimate,

$$\text{Y}_{jk} = \pi \widehat{\text{Fire}}_{jk} + \beta \mathbf{X}_{jk} + \phi_k + \varepsilon_{jk} \tag{3.2}$$

where j indexes municipalities in microregions k. Microregions are territorial units defined for statistical purposes by The Brazilian Institute of Geography and Statistics.[4] They are defined based on spatial patterns of economic activities and natural features. In Brazil, there are 5,570 municipalities clustered into 558 microregions. Y_{jk} represents vote share for a given party (Marina, PT, or PSL) in municipality j in microregion k in the 2018 Presidential election. Fire_{jk} denotes fire radiative power in the week before the election.

[4]For the official definition, see the Brazilian Institute of Geography and Statistics glossary: `https://censo2010.ibge.gov.br/apps/atlas/pdf/209_213_Glossario_ATLASDEMO`

As the distribution of the variable is highly skewed with many zeros, we transform the variable using the inverse hyperbolic sine.[5] FireRisk_{jk} is the fire risk in the seven days preceding the election. $\mathbf{X}$ is a vector of three control variable. The first measures the mean precipitation pattern for the last five years (beginning from the week prior to the election). Second, we control the recent deviations in precipitation levels from the 5-year mean. This is meant to account for any abnormal dry spells that may influence vote choice.[6] Third, in order to control for the impact of election day's weather on voting behavior, we include precipitation on the election day ($\text{ElectionPrecip}_{jk}$). Finally, we include fixed effects at the microregional level, ϕ_k. Adding microregion fixed-effects allows us to control for time-invariant factors that might confound our estimates. For example, the occurrence of fires in one state or region might increase media coverage about natural disasters in regional and state TV channels. Moreover, fire presence, spread, and intensity might be correlated with environmental and labor market characteristics which might, in turn, correlate with voting behavior. Finally, standard errors are clustered at the microregional level.

While we examine the effect of fires in voting behavior in the short-term (7 days) in order to account for findings of recency bias in the literature on the political impacts of extreme weather events (Baddeley and Hitch, 1993), our findings are also robust to a 30 day window.

3.6.2 Differences-in-Differences

We also examine the impact of fires on the vote shares for Marina and the PT using a stacked differences-in-differences approach. We are not able to conduct the same analysis with vote share for Jair Bolsonaro (PSL) because he did not run in the 2010 and 2014

[5]The results are consistent when we do not transform this measure, see Table 3.A.6.

[6]Following Hazlett and Mildenberger (2020), this variable is defined as the mean precipitation level for the 250 days prior to the (week before the) election minus the 5-year mean, divided by the 5 year mean.

presidential elections. Our main specification is the following:

$$\mathrm{Y}_{jt} = \beta \mathrm{Fire}_{j,t=2018} \times \mathrm{Year}_{2014} + \gamma \mathrm{Fire}_{j,t=2018} \times \mathrm{Year}_{2018} + \delta_j + \omega_t + \varepsilon_{jt} \tag{3.3}$$

where j indexes municipalities and t election-years. Y_{jt} is the vote share for either Marina Silva or the PT in the first round of presidential election t, which might be 2010, 2014 or 2018. The first time Marina Silva ran as a presidential candidate was 2010, because of that, we are unable to go further in the past in our analysis. The $\mathrm{Fire}_{jt=(2018)}$ variable is equal to one if in municipality j there was at least one fire registered in the seven days preceding the first round of the 2018 presidential elections and zero if there were no fires in the one hundred and eighty days preceding the election day (municipalities that experienced a fire between day 8 and 180 are excluded from the analyses). We also construct a similar measure limited only to the incidence of big fires (i.e. a fire with an above-median level of radiative power) in the seven days prior to the 2018 election. This is meant to demonstrate that our results are not driven by small fires that might be intentionally initiated for farming purposes. Finally, δ_j and ω_t denote municipality- and year-fixed effects, and ε_{jt} is the error term. We cluster standard errors at the municipality level.

3.7 The Effect of Exposure to Fires on Voting Behavior

We first assess the impact of fires that occurred in week before the election day on the vote share of Marina Silva, the PT, and the Jair Bolsonaro in the first round of the 2018 presidential elections using an instrumental variable (IV) design. We also discuss the sensitivity of our results to potential violations of the exclusion restriction. We then proceed by describing our results from the differences-in-differences (DiD) design.

3.7.1 Evidence from the IV design

Table 1 displays the results from the IV design where the outcome is vote shares for Marina Silva, the PT and Jair Bolsonaro. Columns (2) and (4) and (6) report the results of the 2SLS regression. Columns (1), (3) and (4) report the results of OLS regressions for comparison. In Panel A the main explanatory variable is fire radiative power in the seven days before the 2018 Presidential election ($\text{Fire}_{\text{7 days prior}}$), while in Panel B we replace it by fire radiative power in the thirty days prior to the election ($\text{Fire}_{\text{30 days prior}}$) in order to test the sensitivity of the results to other temporal thresholds. Elasticities are computed following Bellemare and Wichman (2020) and reported in the bottom of each panel.

Overall, our IV results indicate that exposure to fires increased the vote share of Marina Silva (the green candidate) and Jair Bolsonaro (the anti-environment, far right candidate) in the 2018 Presidential election, but decreased the electoral returns of the main center left party: the PT. The corresponding elasticities indicate sizable effects. Results in Panel A indicate that a 10% increase in exposure to fires, increases Marina Silva's by 1% (mean 6.9% and std dev. 8.8%). As expected, the effects for other candidates whose political platform is not centered on the environment are much smaller. A 10% increase in fire exposure, decreases the vote share for the PT by 0.5% (mean 19.6 and std. dev. 19.6) and increases the vote share for Jair Bolsonaro by 0.6% (mean 38.7 and std. dev. 19.0). The elasticities indicated in panel B are substantively similar. These results are consistent with the argument that natural disasters increase the salience of environmental issues, causing voters to prefer parties with a clear environmental platform. Hence, voters that lean to the left switch from left-wing to green parties and voters that lean to the right prefer right-wing candidates with clear anti-environment platforms, usually represented by the far right (McAllister and bin Oslan, 2021; Otteni and Weisskircher, 2021).

As discussed in section 3.6, we expected that anthropic fire ignition in more environmentally conservative areas would bias our results toward zero. Columns (1), (3) and

Panel A: Fire power 7 days prior to the election						
DV: Vote share	M. Silva		PT		J. Bolsonaro	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Fire}_{\text{7 days prior}}$	0.004	0.082**	−0.165*	−3.504***	0.174**	3.942***
	(0.003)	(0.035)	(0.092)	(1.313)	(0.076)	(1.284)
Elasticity	0.005	0.102**	−0.003*	−0.053***	0.003**	0.064***
	(0.004)	(0.043)	(0.001)	(0.02)	(0.001)	(0.021)
Observations	5,527	5,523	5,563	5,559	5,563	5,559
Microregion FE	✓	✓	✓	✓	✓	✓
F-stat		24.005		23.944		23.944

Panel B: Fire power 30 days prior to the election						
DV: Vote share	M. Silva		PT		J. Bolsonaro	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Fire}_{\text{30 days prior}}$	0.007***	0.053***	−0.156***	−1.685**	0.120**	2.112***
	(0.002)	(0.018)	(0.060)	(0.672)	(0.053)	(0.691)
Elasticity	0.012***	0.095***	-0.003***	-0.037**	0.003**	0.049***
	(0.003)	(0.032)	(0.001)	(0.015)	(0.001)	(0.016)
Observations	5,527	5,523	5,563	5,559	5,563	5,559
Microregion FE	✓	✓	✓	✓	✓	✓
F-stat		44.592		44.687		44.687

Note: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the seven (or thirty) days prior to the election. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election; deviation in precipitation levels between the last 250 days and the last 5 years; and precipitation on the election day. IV specifications employ the INPE measure of fire risk in the week before elections as an instrument for the Fire variables. Elasticities are calculated using method recommended by Bellemare and Wichman (2020). Kleibergen Paap F-statistics are for weak identification. Full results can be found in Tables 3.A.1 (Panel A) and 3.A.2 (Panel B).

Table 1: Effect of Fire Exposure on the Vote Shares of M. Silva, PT and Jair Bolsonaro in the 2018 Presidential Election

(5) of Panel A and B show that the results of OLS regressions generally yield coefficients smaller in magnitude than their 2SLS counterparts. The F-statistics on the bottom of Panel A and B confirm the relevance of our instrument for our explanatory variable of interest. In the next section, we discuss the extent to which our results are sensitive to potential violantions of the exlusion restriction.

Sensitivity analysis

A key assumption of our instrumental variable strategy is the "exclusion restriction:" that our instrument, fire risk, will only affect our outcome through our proposed channel, fires. In our analyses above, we attempt to control for possible alternative mechanisms through which fire risk may influence vote choice (such as long and short term precipitation patterns), but there may nevertheless remain some unobserved factor through which fire risk may influence voting. While it is impossible to definitively rule out any and all possible violations of the exclusion restriction, we can assess how sensitive our estimate of π (from equation 3.2) is to *potential* violations. To do this, we take advantage of the fact that π can be derived from the reduced form of our 2SLS estimates. We can thus assess the sensitivity of our causal estimate by evaluating the sensitivity of our reduced form model to omitted variable bias. That is, was simulate how our reduced-form estimate would change if we were to add into the model some unobserved factor that is correlated with the fire risk and vote choice at varying levels and would therefore violate the exclusion restriction. We begin by using OLS to estimate the following reduced form version of our structural model given above,

$$\mathrm{Y}_{jk} = \psi \mathrm{FireRisk}_{jk} + \beta \mathbf{X}_{jk} + \phi_k + \varepsilon_{jk} \tag{3.4}$$

The results of the reduced form regression are given in Table 2. Perhaps most worrying is the risk that abnormally low levels of precipitation will generate dry spells that lead

DV: Vote Share	M. Silva	PT	J. Bolsonaro
	(1)	(2)	(3)
Fire Risk$_{7 \text{ days prior}}$	0.110***	−4.660***	5.242***
	(0.036)	(1.285)	(1.124)
Long Precip.	0.042***	−0.603	0.682
	(0.014)	(0.482)	(0.421)
Election Precip.	−0.001	0.000	0.008
	(0.001)	(0.023)	(0.020)
Precip. Deviation	0.004	−2.020	0.791
	(0.046)	(1.623)	(1.419)
Observations	5.523	5.559	5.559
Microregion FE	✓	✓	✓
Adj. R^2	0.592	0.858	0.862

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 2: Reduced Form Estimates

to *both* heightened fire risk as well impact environmental concern and support for green parties (Hoffmann et al., 2022). Instead, we find that Precipitation Deviation is a highly insignificant predictor of voting behavior across all outcomes, suggesting that historically abnormal levels of precipitation are not driving our results.[7] Next we use sensitivity analysis recommended by Cinelli and Hazlett (2020) to identify how much an omitted variable would have to be correlated with the treatment and outcome in order to drive our estimate of ψ to 0. This affects our main causal estimate as π is equal to the ratio of ψ to τ (from Equation 3.1). So as ψ falls to 0, so does π. Figure 3 plots how our estimate of ψ would change given the hypothetical inclusion of some unobserved Z with varying levels of partial R^2s between it and the outcome and treatment. To ease interpretation of this figure, we include adjusted estimates depending on the inclusion of an unobserved Z with that account for residual variation in the treatment and outcome at two or four times that of Long Precipitation (denoted by the the red diamonds). As shown below, in order to drive our estimate down to 0, a hypothetical omitted variable would have to have a partial R^2 of roughly 4 times that of the the 5-year average of municipality-level

[7]Hazlett and Mildenberger (2020) find a similar result.

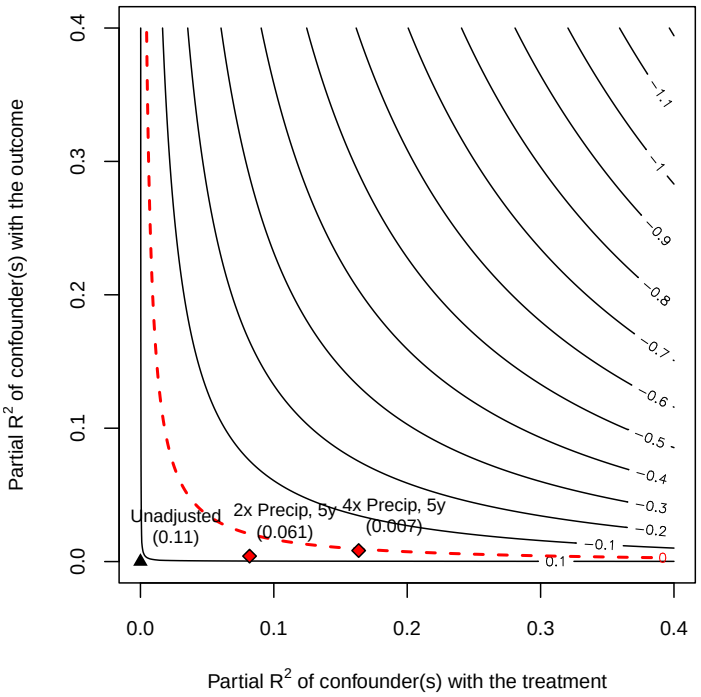
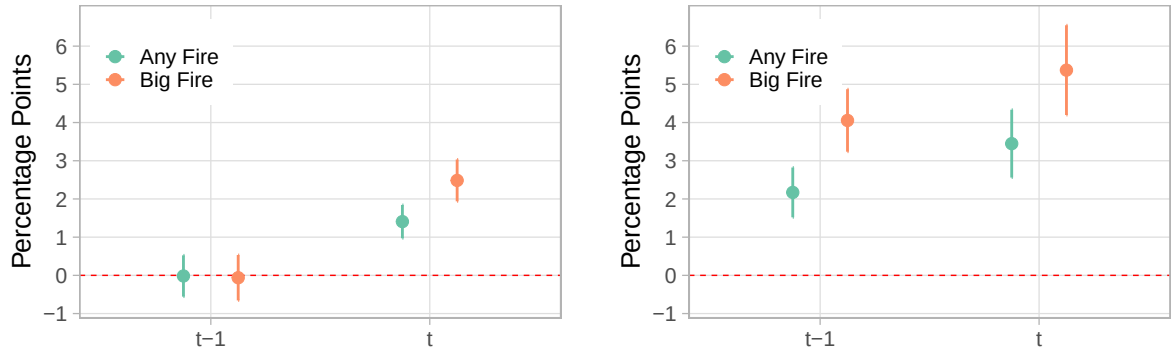


Figure 3: Sensitivity of the estimated effect of Fire Risk on Marina Vote Share to varying levels of omitted variable bias

precipitation. An omitted variable twice as strong would cause our estimate to fall to .061.

3.7.2 Evidence from DiD

Figure 4 plots the estimates from our DiD specification (see section 3.6). We report the results for specifications where the treatment group is defied either as municipalities where any fire (green) or big fires (radiative power above 50) was registered in the seven days preceding the 2018 election. The reference point is the vote share for Marina Silva (Panel A) or the PT (Panel B) in 2010. The estimates reported as t-1 represent the change in vote shares between 2010 and 2014 in municipalities affected by fires in 2018 as compared to those not affected in the same year. The results in figure 4a Panel A, indicate that municipalities affected and unaffected by fires, conditional on the controls indicated in equation 3.3, followed parallel trends in terms of vote share for Marina Silva before 2018.



(a) M. Silva Vote Share

(b) PT Vote Share

Notes: dots represent coefficients from TWFE specifications (see equation 3.3) with 95% confidence intervals. Standard errors are clustered at the municipality level.

Figure 4: Estimated Effect of Fire on Vote Share for Marina and PT from DiD design

In 2018, municipalities affected by any fire voted 0.2 std. dev. more to Marina Silva. Restricting the treatment group to municipalities affected by big fires, the effect of fire exposure foes up to 0.3 std. dev. Panel B indicated that municipalities affected by fires in 2018 already followed an upward trend on vote shares for the PT as compared to those not affected. Hence, we conclude that our DiD design is invalid for estimating the effect of fires in 2018 on vote shares for the PT in the same year.

3.8 Heterogeneity by Share of Employment in Cattle and Soy

In section 3.2, we hypothesized that natural disasters drive up vote shares for green candidates only when the costs of such disasters out-weight the benefits. In section 3.3 we discussed the costs and benefits of wildfires in Brazil for different groups of the population. In particular, we argued that wildfires, generally, generate health and economic costs for most of the affected populations. An exception are individuals that work with soy and cattle. As wildfires destroy natural vegetation, they facilitate land grabbing, which is done through the transformation of unoccupied land in soy field and, especially, pasture.

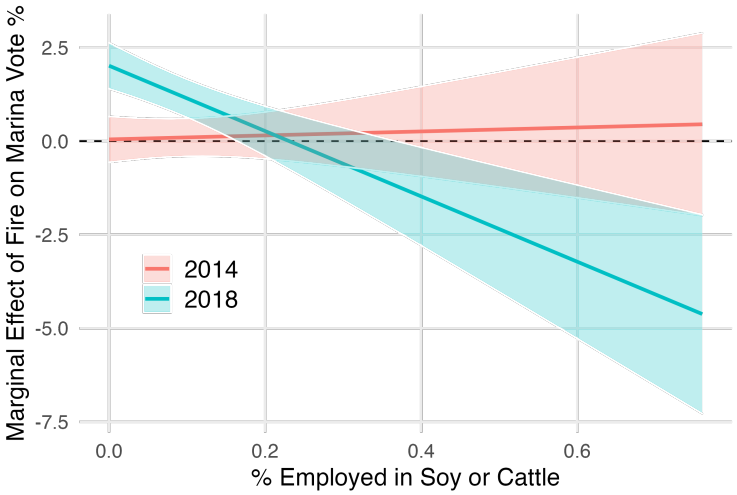
DV: Vote share	M. Silva	PT	J. Bolsonaro
	(1)	(2)	(3)
$\text{Fire}_{\text{7 days prior}}$	0.111***	−3.990***	4.468***
	(0.042)	(1.526)	(1.544)
Cattle & Soy Emp.	−0.207	25.976***	−21.463***
	(0.140)	(5.511)	(5.488)
Fire × Cattle & Soy Emp.	−0.211**	1.973	−2.595
	(0.093)	(2.984)	(3.082)
Observations	5,523	5,559	5,559
Microregion FE	✓	✓	✓
F-statistics			
Fire	17.256	17.302	17.302
Fire × Cattle & Soy Emp.	23.423	23.532	23.532

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. Reports coefficients from IV specifications employing the INPE measure of fire risk in the week before elections as an instrument for $\text{Fire}_{\text{7 days prior}}$. "Cattle & Soy Emp." measures the share local population employed in the cattle or soy industries. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification. Full results reported in Tables 3.A.3, 3.A.4, 3.A.5.

Table 3: Effects of Fire Exposure on Outcomes by Share of Employees Working with Cattle and Soy

In this section, we show the heterogeneity of our results by share of employment in cattle and soy using both the IV and the DiD designs.

Table 3 show the results for the IV design. As the share of employees working with soy and cattle increase, the positive effect of fire exposure on the vote share of Marina Silva decrease (column 1). The interaction between fire exposure in the last seven days and employment in the soy and cattle sector is not statistically significant for the other outcomes (columns 2 and 3). Figure 5 plots the marginal effects of exposure to big fires in 2018 on the electoral returns of Marina Silva in 2014 (red) and 2018 (green) by share of the population employed in the soy and cattle sectors. The figure shows that, as expected, the effect of fire exposure in 2018 has no statistically significant effect on the vote share of Marina Silva in the 2014 election. In 2018, the positive effect of big fire exposure on the



Notes: the figure presents the marginal effect of the presence of big fires in the seven days prior to the 2018 election in vote share for Marina Silva in the 2014 and 2018 Presidential elections at different levels of employment in soy and cattle sectors with 95 percent confidence intervals.

Figure 5: Marginal Effect of Big Fire, Conditional on Municipality Share of Cattle & Soy Employment (DiD)

electoral returns of Marina Silva is decreasing on the share of employment on the cattle and soy industries and even become negative for extreme values of employment in these sectors. Our results are consistent with our argument that natural disasters increase the electoral returns of green candidates and parties only when the costs of such disasters outweigh the benefits.

3.9 Conclusion

Policies that prevent and control wildfires are crucial to the global fight against climate change as they ensure that forests and other natural environments continue acting as carbon sinks and providing essential environmental services. To achieve this objective, it is critical to understand which factors can impact the incentives of politicians to implement ambitious environmental policies, especially in low- and middle-income countries. In democracies, an important part of such incentives comes from how citizens express their demands at the ballot box. As a result, a growing body of literature examines the

determinants of support for parties with progressive environmental platforms.

In this paper, we investigate the effect of experiencing fires first-hand on voting behavior in Brazil. We find a positive impact of fires on the vote shares of Marina Silva, the presidential candidate with the most advanced pro-environmental platform in the 2018 presidential election. We also find that the main center-left party, the PT, loses support in municipalities affected by fires, suggesting that salient environmental disasters might shift some voters from traditional left-wing parties to parties with more marked pro-environmental platforms. A likely underlying mechanism is a combination of wildfires raising the salience of environmental issues and the fact that green parties have issue-ownership over natural hazards. On the other hand, fires also increase the vote share of Jair Bolsonaro's party, the PSL, whose platform was markedly anti-environmental, suggesting that the increased salience of environmental issues produced by fires might have a polarizing effect, increasing the vote share of candidates with both pro-environmental and anti-environmental platforms. We go beyond existing literature on the political consequences of natural hazards by showing that the effect of fires on support for green candidates is conditional upon material self-interest. In particular, we show municipalities with high levels of employment in economic sectors benefiting from wildfires (i.e., cattle and soy) do not support more Marina Silva when exposed to fires. In short, environmental concern and material self-interested closely interact, especially when economies are reliant on extractive sectors. Future research should investigate how different groups, including parts of economic elites, benefit from natural disasters and climate change and what are the related political and general welfare implications.

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Appendix

3.A Full Tables for Results Reported in Main Text

DV: Vote share	M. Silva		PT		J. Bolsonaro	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Second stage:						
$\text{Fire}_{\text{7 days prior}}$	0.004	0.082**	−0.165*	−3.504***	0.174**	3.942***
	(0.003)	(0.035)	(0.092)	(1.313)	(0.076)	(1.284)
Long Precip.	0.034**	0.050**	−0.273	−0.963	0.307	1.087
	(0.017)	(0.020)	(0.686)	(0.834)	(0.632)	(0.839)
Election Precip.	−0.001*	−0.001*	0.000	0.006	0.008	0.001
	(0.001)	(0.001)	(0.027)	(0.029)	(0.030)	(0.032)
Precip. Dev.	−0.007	0.061	−1.605	−4.431	0.304	3.504
	(0.051)	(0.069)	(2.269)	(3.086)	(1.991)	(2.892)
First Stage:						
Fire Risk		1.335***		1.330***		1.330***
		(0.272)		(0.272)		(0.272)
Long Precip.		−0.106		−0.103		−0.103
		(0.106)		(0.106)		(0.106)
Election Precip.		0.002		0.002		0.002
		(0.004)		(0.004)		(0.004)
Precip. Dev.		−0.689*		−0.688*		−0.688
		(0.405)		(0.404)		(0.202)
Observations	5,527	5,523	5,563	5,559	5,563	5,559
Microregion FE	✓	✓	✓	✓	✓	✓
F-stat		24.005		23.944		23.944

Note: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the seven days prior to the election. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.1: Full Results for Table 1, Panel A

DV: Vote share	M. Silva		PT		J. Bolsonaro	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Second stage:						
$\text{Fire}_{\text{30 days prior}}$	0.007***	0.053***	−0.156***	−1.685**	0.120**	2.112***
	(0.002)	(0.018)	(0.060)	(0.672)	(0.053)	(0.691)
Long Precip.	0.036**	0.055***	−0.305	−0.945	0.321	1.157
	(0.017)	(0.020)	(0.689)	(0.753)	(0.635)	(0.787)
Election Precip.	−0.001*	−0.001*	0.000	0.001	0.008	0.007
	(0.000)	(0.001)	(0.027)	(0.031)	(0.030)	(0.035)
Precip. Dev.	0.000	0.075	−1.715	−4.132	0.347	3.513
	(0.051)	(0.068)	(2.270)	(2.632)	(1.993)	(2.428)
First Stage:						
Fire Risk		3.732***		3.756***		3.956***
		(0.559)		(0.562)		(0.562)
Long Precip.		−0.169		−0.174		−0.174
		(0.184)		(0.183)		(0.183)
Election Precip.		0.002		0.001		0.001
		(0.008)		(0.008)		(0.008)
Precip. Dev.		−1.028*		−1.040*		−1.040*
		(0.589)		(0.591)		(0.591)
Observations	5.527	5.523	5.563	5.559	5.563	5.559
Microregion FE	✓	✓	✓	✓	✓	✓
F-stat		44.592		44.687		44.687

Note: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the thirty days prior to the election. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.2: Full Results for Table 1, Panel B

	First Stage		Second Stage
DV:	Fires	Fires × Cattle & Soy Emp.	M. Silva Vote Share
$\text{Fire}_{\text{7 days prior}}$			0.111***
			(0.042)
Fire × Cattle & Soy Emp.			−0.211**
			(0.093)
Fire Risk	0.952***	−0.124**	
	(0.262)	(0.050)	
Fire Risk × Cattle & Soy Emp.	4.552***	3.352***	
	(1.224)	(0.494)	
Cattle & Soy Emp.	−2.139***	−0.419	−0.207
	(0.600)	(0.260)	(0.140)
Long Precip.	−0.107	−0.023	0.051**
	(0.104)	(0.015)	(0.021)
Election Precip.	0.002	0.000	−0.001**
	(0.004)	(0.001)	(0.001)
Precip. Dev.	−0.690*	−0.111**	0.053
	(0.397)	(0.050)	(0.072)
Observations	5,523	5,523	5,523
Microregion FE	✓	✓	✓
F-statistics			
Fires			17.256
Fires × Cattle & Soy Emp.			23.423

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. Reports coefficients from first- and second-stage regressions. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the seven days prior to the election. "Cattle & Soy Emp." measures the share local population employed in the cattle or soy industries. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.3: Full results for coefficients reported in Table 3, Column 1

	First Stage		Second Stage
DV:	Fires	Fires × Cattle & Soy Emp.	PT Vote Share
$\text{Fire}_{\text{7 days prior}}$			−3.990***
			(1.526)
Fire × Cattle & Soy Emp.			1.973
			(2.984)
Fire Risk	0.946***	−0.125**	
	(0.261)	(0.050)	
Fire Risk × Cattle & Soy Emp.	4.566***	3.354***	
	(1.221)	(0.494)	
Cattle & Soy Emp.	−2.144***	−0.422	25.976***
	(0.597)	(0.259)	(5.511)
Long Precip.	−0.105	−0.022	−1.113
	(0.104)	(0.014)	(0.821)
Election Precip.	0.002	0.000	0.012
	(0.004)	(0.001)	(0.032)
Precip. Dev.	−0.689*	−0.111**	−4.254
	(0.396)	(0.049)	(3.040)
Observations	5,559	5,559	5,559
Microregion FE	✓	✓	✓
F-statistics			
Fires			17.302
Fires × Cattle & Soy Emp.			23.532

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. Reports coefficients from first- and second-stage regressions. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the seven days prior to the election. "Cattle & Soy Emp." measures the share local population employed in the cattle or soy industries. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.4: Full results for coefficients reported in Table 3, Column 2

	First Stage		Second Stage
DV:	Fires	Fires × Cattle & Soy Emp.	J. Bolsonaro Vote Share
$\text{Fire}_{\text{7 days prior}}$			4.468***
			(1.544)
Fire × Cattle & Soy Emp.			−2.595
			(3.082)
Fire Risk	0.946***	−0.125**	
	(0.261)	(0.050)	
Fire Risk × Cattle & Soy Emp.	4.566***	3.354***	
	(1.221)	(0.494)	
Cattle & Soy Emp.	−2.144***	−0.422	−21.463***
	(0.597)	(0.259)	(5.488)
Long Precip.	−0.105	−0.022	1.210
	(0.104)	(0.014)	(0.832)
Election Precip.	0.002	0.000	−0.004
	(0.004)	(0.001)	(0.034)
Precip. Dev.	−0.689*	−0.111**	3.325
	(0.396)	(0.049)	(2.884)
Observations	5,559	5,559	5,559
Microregio FE	✓	✓	✓
F-statistics			
Fires			17.302
Fires × Cattle & Soy Emp.			23.532

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. Reports coefficients from first- and second-stage regressions. "Fire" is the inverse hyperbolic sine transformation of the municipality-level sum of the fire radiative power of detected fires in the seven days prior to the election. "Cattle & Soy Emp." measures the share local population employed in the cattle or soy industries. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.5: Full results for coefficients reported in Table 3, Column 3

DV: Vote Share	M. Silva	PT	J. Bolsonaro
	(1)	(2)	(3)
Second stage:			
$\text{Fire}_{\text{7 days prior}}$	0.001**	−0.036**	0.041***
	(0.000)	(0.014)	(0.015)
Long Precip.	0.073**	−1.933*	2.179*
	(0.030)	(1.116)	(1.135)
Election Precip.	−0.001	0.013	−0.007
	(0.001)	(0.035)	(0.039)
Precip. Dev.	0.113	−6.669*	6.021
	(0.094)	(3.758)	(3.701)
Elasticity	0.072**	−0.038**	0.045***
	(0.037)	(0.015)	(0.017)
First Stage:			
Fire Risk	130.154***	129.317***	129.317***
	(42.402)	(42.240)	(42.240)
Long Precip.	−37.234*	−36.926**	−36.926**
	(14.477)	(15.401)	(15.401)
Election Precip.	0.359	0.353	0.353
	(0.693)	(0.683)	(0.683)
Precip. Dev.	−129.328**	−129.009**	−129.009**
	(60.152)	(59.995)	(59.995)
Observations	5,523	5,559	5,559
Microregion FE	✓	✓	✓
F-stat	9.422	9.373	9.373

Note: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the microregion-level in parentheses. "Fire" measures the municipality-level sum of the fire radiative power of detected fires in the seven days prior to the election. All regressions include controls for municipality-level precipitation in the five years prior to the week before the election as well as precipitation on the election day. Kleibergen Paap F-statistics are for weak identification.

Table 3.A.6: 2SLS regression results using raw values of fire radiative power

Chapter 4

Words Can Hurt: How Political Communication can Change the Pace of an Epidemic

Jessica Gagete-Miranda, Lucas Mariani & Paula Rettl

Egoism is a fiction of moral theoreticians...Only complete emotional deafness, an automatism without accompanying consciousness, would be purely egoistic: the short circuit between sensory stimulation and will, without interposing an emotional connection to the world.

—Robert Musil, 1913

4.1 Introduction

An extensive body of scholarship investigates when and how political elites influence citizens' reasoning and opinions about politics (see Bullock, 2020, for a recent review). Because of the implications that such influence can have on accountability and responsiveness in democratic settings, the attention this topic has received is well deserved. On the one hand, party, candidate, and leader cues (henceforth, political elite cues) may

help individuals make decisions consistent with their values and self-interests with very little effort (Lupia et al., 1998). On the other hand, if citizens blindly follow such cues, elected politicians can potentially engender the very opinions and evaluations to which they are supposed to be responsive and accountable (Bakker, Lelkes and Malka, 2020; Groenendyk, 2013; Lodge and Taber, 2013).

This debate becomes even more relevant if political elites influence opinions on highly salient and important issues that are more likely to influence electoral results (e.g., Slothuus and Bisgaard, 2021). A major determinant of issue importance is the extent to which individuals perceive it as directly influencing their lives. Issues involving personal matters are those that directly affect one's income, rights, lifestyle, or privileges (Apsler and Sears, 1968; Boninger, Krosnick and Berent, 1995; Mullinix, 2016). However, there are only few cases in which researchers have causally identified the effect of political elites' cues related to personal matters (e.g., Bisbee and Lee, 2021; Slothuus and Bisgaard, 2021).

At least two methodological challenges explain the lack of scholarship on this matter. First, decisions that involve personal matters are more credible in naturally occurring settings. However, longitudinal data on citizens' opinions or behaviors that spans before and after a party or political leader took or changed a position are rare (Slothuus and Bisgaard, 2021). Second, experimental studies tend to focus on issues of low salience because researchers consider that attitudes related to these issues are easier to manipulate (Arceneaux and Vander Wielen, 2017; Carsey and Layman, 2006; Groenendyk, 2013). This fact implies that most studies identify an upper bound of political elite cues' effects.[1]

In this paper, we analyze *how* and *why* Brazilians responded to President Bolsonaro's dismissive cues about the risks represented by COVID-19 (a virus that, although in different ways and magnitudes, affected everyone's life). To overcome the methodological

[1]Indeed, previous research relying on incentivized experiments shows that when individuals are rewarded for correct responses, the effect of party cues on opinion formation is smaller (Bullock, 2011; Prior, Sood and Khanna, 2015).

challenges mentioned above, we leverage a combination of natural and survey experiments and conduct two studies. In our first study, we take advantage of the longitudinal and fine-grained availability of data on COVID-19-related behavior (i.e., social distancing) and its consequences (e.g., excess mortality) to analyze *how* Bolsonaro's supporters and opponents responded to his cues. More specifically, we exploit an arguably unexpected shift in President Bolsonaro's stance on social distancing that took place during country-wide demonstrations in a difference-in-differences design. By comparing municipalities with different levels of support for the President, we observe a divergence in trends of COVID-19 cases, hospitalizations, ICU occupation, and deaths starting a few days after the demonstrations. Moreover, by analyzing Google COVID-19 Community Mobility Reports data, we show a divergence in social distancing trends between pro- and against-Bolsonaro municipalities starting right after the demonstrations and persisting thereafter. These results are robust to a series of specifications, controls, and placebo tests.

In our second study, we overcome the ecological inference limitations of our first study and provide evidence of the *why* question. Because our first study relies on comparing aggregate data at the municipality level, we are unable to identify whether the cue effects we observe are driven by the persuasion of Bolsonaro's supporters or a backlash among his opponents. In fact, previous experimental studies in the US context show that leader cues may cause polarization between Republicans and Democrats not because in-groups follow their leader, but because out-groups take the opposite positions (Nicholson, 2012). Similarly, analyzing the effect of party cues in Brazil, Samuels and Zucco Jr (2014) and Samuels and Zucco (2018) document the effect of party cues both on partisans and anti-partisans.

Another limitation of our first study is that it is unable to shed light on *why* people change their views regarding COVID-19 in response to Bolsonaro's cues. Previous research posits that individuals have two reasons to follow political elites' cues. First, individuals may follow cues to reduce effort in decision making, i.e., as a heuristics mechanism or

shortcut (Lupia et al., 1998). Given that issues related to COVID-19 risks and prevention measures can be very complex and technical, it is likely that citizens will rely on heuristics to make up their minds about them. Second, individuals may follow cues as a way to comply with group norms and signal group membership. In other words, individuals gain utility from expressing their political identity (Bakker, Lelkes and Malka, 2020; Lodge and Taber, 2013). However, this type of motive tends to be stronger when the consequences of a decision are somewhat remote, as is the case with voting (Groenendyk, 2013). By contrast, deciding whether to wear a mask or practice social distancing has direct effects on one's life.

To overcome ecological inference issues and test which motives drive Bolsonaro supporters and opponents, we conducted two pre-registered survey experiments in Brazil.[2] We randomly assigned Bolsonaro supporters and opponents to a control condition or Bolsonaro cue condition. In both conditions, respondents receive a short paragraph about how the scientific community perceives either the potential of a new and unapproved treatment for COVID-19 (experiment 1) or the need for practicing social distancing to protect oneself against COVID-19 (experiment 2). In the control condition, participants were exposed to the opinion of "a Brazilian politician" about the matter at hand. In the treatment condition, we disclose that this opinion is Bolsonaro's.[3] Our results show a polarizing effect of Bolsonaro's cues, with his supporters and opponents responding in opposite ways.

To distinguish between heuristics and expressive utility, we follow the approach by Bakker, Lelkes and Malka (2020), who posit that the heuristics mechanism for cue-following implies that cues should have smaller effects for individuals with high cognitive ability. By contrast, the expressive utility mechanism implies that individuals with strong political identity and higher cognitive ability should be the ones for which cue effects are

[2]In our PAP (`https://osf.io/m9wnc/?view_only=2bf90b93064a47bcb81813a3c5362080`), we pre-registered the hypotheses and related rationale, data pre-processing, regression specifications, inferential rules, and exploratory analysis.

[3]We do not engage in deception and our treatments are based on newspaper articles.

the strongest. Heterogeneous treatment effects that consider participants' strength of political social identity and performance in a cognitive resource test (CRT) (all measured pre-treatment) show that while heuristics drive the reaction of Bolsonaro opponents to his cues, the willingness to comply with group norms drives the reactions of his supporters.

Overall, our contribution to the literature on party cues and, more generally, elite effects on political behavior[4] is threefold. First, we show with a natural and a survey experiment that leader cues are powerful, even in one of the most unlikely political scenarios, i.e., when the decision at hand directly impacts individuals' lives and well-being (Groenendyk, 2013). Second, we provide evidence of the conditions under which different psychological mechanisms drive cue receptivity. Namely, our results suggest that heuristics and willingness to comply with group norms explain cue-receptivity among outgroups and in-groups, respectively. Third, we demonstrate that political social identity constructed around a political leader, as opposed to a party, has the potential to influence opinion and behaviors. We are able to show that because President Jair Bolsonaro did not belong to any party during the period we analyze. This finding is particularly relevant to scholars working on contexts where personalism is strong, such as in Latin America, Eastern Europe, and Southeast Asia and increasingly in Western Europe and the US (Frantz et al., 2021). Moreover, our research contributes to the growing body of literature, primarily focused on the US, that shows that partisanship shapes attitudes and behavior related to COVID-19 (e.g., Bisbee and Lee, 2021; Gadarian K., Goodman and Pepinsky, 2022).

4.2 Political elites' cues: moderators and mechanisms

How and why political elites influence public opinion and behaviors are questions that directly affect the quality of the democratic processes. On the one hand, uninformed

[4]A growing body of literature focuses on the effect of media and media bias on political behavior (e.g., Martin and Yurukoglu, 2017; Foos and Bischof, 2021).

citizens might use political elites' cues as shortcuts to reach self-interest and value consistent opinions with reduced effort (Lupia et al., 1998). On the other, individuals strongly attached to their political identities may follow cues that are inconsistent with their self-interest and values in order to express group membership (Groenendyk, 2013; Lodge and Taber, 2013; Petersen et al., 2013). This debate becomes even more relevant when issues that have the potential to define electoral outcomes are concerned. This is the case with salient and important issues that have direct implications on individual lives (Slothuus and Bisgaard, 2021), such as those related to COVID-19 and related policies.

This paper aims to investigate how and why Brazilians responded to President Bolsonaro's cues about COVID-19. A vast literature investigates how political elites' cues influence public opinion, but also leaves a number of open questions. First, as Bullock (2020) points out, although party cue effects are well documented, their magnitude range from 3% to 43% of the scale on which attitudes or preferences are measured. Characteristics of the party systems, the sources of the cues, and informational environment partly explains such variation. For example, the impact of party cues seems to be stronger in stable party systems, in which parties are easily distinguishable and political elites are polarized (Brader and Tucker, 2012; Druckman, Peterson and Slothuus, 2013). In addition, cues by polarizing political figures may potentially provoke stronger effects than party cues because politicians represent less abstract entities than parties (Nicholson, 2012; Nisbett and Ross, 1980). While the literature has identified some moderators of elite cues, more research is needed to understand how much each of them counts and how they interact.

As we discuss in detail in the "Context" section, the case we analyze is characterized by a series of features that should reduce the power of political elites' cues. Indeed, the Brazilian party system is fluid and fragmented (Zucco, Power et al., 2021), and most parties in the country are non-programmatic and hardly distinguishable (Samuels and Zucco, 2018). Hence, the characteristics of its party system make Brazil an unlikely

context for political elite cues to influence public opinion (Samuels and Zucco Jr, 2014). However, President Bolsonaro is, arguably, a highly polarizing figure (Amaral, 2020), which can amplify cue effects (Nicholson, 2011).

Moreover, two main types of models explain why individuals react to political elites' cues: dual-processing and motivated reasoning. The dual-processing perspective posits that individuals process information either systematically or by relying on shortcuts (heuristics). When processing information systematically, individuals analyze the internal consistency of a message and compare it with what they know about the matter. Hence, systematic information processing requires high cognitive capacity and effort. Alternatively, individuals may rely on simple rules, such as source cues, to make decisions (Arceneaux and Vander Wielen, 2017; Kam, 2005; Lupia, 1994).

In turn, the motivated reasoning perspective contends that when individuals reason about a problem, they have two main motives in mind: an accuracy motive and a directional one. Accuracy motives prompt individuals to reach accurate conclusions and should be particularly strong when individuals have a personal stake involved in the decision. By contrast, directional motives lead individuals to reach conclusions that are consistent with their identity or prior beliefs (Groenendyk, 2013; Lodge and Taber, 2013). This perspective implies that cue-taking is driven by directional motives. Because reasoning to reach a specific conclusion requires individuals to engage in effortful thinking, this perspective implies that cue-following is stronger among individuals who are motivated to defend and rationalize their political views or identity, as well as have the incentives to do so (Bakker, Lelkes and Malka, 2020; Lodge and Taber, 2013; Petersen et al., 2013).

Both perspectives imply that when citizens reason about personal issues, such as whether practice social distancing, political elite cues should be less powerful. Indeed, opinions and behaviors related to COVID-19 prevention measures and treatments directly impact individual lives by influencing their day to day habits and decisions. By contrast, political elites' cues should have a more powerful influence on opinions about more re-

mote political issues that impact one's life only indirectly (e.g., macro-economic policy) (Groenendyk, 2013). According to the dual-processing perspective, we should expect that when issues involve personal matters, citizens will be more inclined to process information systematically. In turn, the motivated reasoning perspective predicts that in such contexts, accuracy motives will prevail.

Nevertheless, the two perspectives yield different predictions in regards to which individuals are more likely to be influenced by political elite cues in any issue environment. The dual-processing perspective implies that cue-receptivity will be higher among individuals with limited cognitive resources and who are therefore less able to process information systematically. By contrast, the motivated reasoning perspective entails that cue-receptivity is a function of motivation to follow the cue (in this case, the strength of political social identity) and the capacity to rationalize and justify opinion change (which can be measured by the level of cognitive resources) (Bakker, Lelkes and Malka, 2020). Under which conditions each of these perspectives better explains the effects of political elites' cues on opinions and behaviors is an unsettled debate (Arceneaux and Vander Wielen, 2017; Bakker, Lelkes and Malka, 2020; Bullock, 2020). In our second study, we analyze which of these two perspectives is driving cue-receptivity in the case we analyze.

4.3 Context

Two main factors make Brazil an unlikely case for party identification to shape attitudes and behavior (Samuels and Zucco Jr, 2014). First, Brazil is a young democracy where the party system is highly unstable and fractionalized (Zucco, Power et al., 2021). Moreover, the open-list system for legislative elections weakens party labels and enhances the importance of individual politicians (Ames, 2001; Samuels, 2003). These factors make it hard for voters to identify what each party stands for. Second, when social cleavages

map into partisanship, party attachments tend to be stronger and more stable (Campbell et al., 1980; Lipset and Rokkan, 1967). However, historically in Brazil, this has not been the case (Mainwaring and Scully, 1995). Yet party cues still shape attitudes of partisans and anti-partisans in Brazil, especially if the source of the cue is one of the two most competitive parties in presidential elections since re-democratization: the Worker's Party (*Partido dos Trabalhadores*, PT) and the Brazilian Social Democracy Party (*Partido da Social Democracia Brasileira*, PSDB) (Samuels and Zucco Jr, 2014; Samuels and Zucco, 2018).

However, Bolsonaro's election in 2018 challenged the centrality of dispute between the PT and the PSDB in presidential elections. Bolsonaro was neither a member of the PT nor of the PSDB. Instead, he ran under the label of a small party that he had joined for the purposes of running for president in 2018: the Social Liberal Party (*Partido Social Liberal*, PSL). Eleven months into his first year in the presidency, Bolsonaro exited this party and only joined another one in December 2021, in anticipation of the 2022 Presidential election.[5] Therefore, by the time the first COVID-19 case was identified on February 26, 2020, Bolsonaro had no party. This fact allows us to confidently interpret our results as the effect of his cues alone and not as a combined effect of leader and party cues.

Moreover, the identification strategy of our first study relies on a sudden change in Bolsonaro's public stance towards COVID-19. At the beginning of the health crisis in February 2020, the President sent mixed signals on the risks associated with COVID-19. On March 10, he said that the "destruction potential" of COVID-19 was being overestimated. Two days later, he declared that the Brazilian health system has a limited capacity to treat patients and that the government was paying attention to and monitoring the evolution of COVID-19 in the country. At that time, about four hundred people had tested positive in the country (Folha de São Paulo, 2021).

[5]In Brazil, candidates must be registered into a party to run any type of election.

On March 15, organized street demonstrations took place in about two hundred and fifty municipalities. In a move that surprised the media, the public, and the health minister, President Bolsonaro joined the protests in Brasília, the country's capital, to meet, greet, and shake hands with demonstrators. On this day, the President himself was supposed to be self-isolating since he had been exposed to staff members who had tested positive for COVID-19 (Marshall, 2020). After March 15, President Bolsonaro decidedly shifted his attitudes towards COVID-19. His discourse became consistently dismissive towards social distancing measures and mask-wearing.[6]

4.4 Study 1: Evidence from a natural experiment

To estimate the impact of President Bolsonaro's cues on COVID-19-related behavior, we assemble data from different sources for virtually all Brazilian Municipalities.[7] We use this data in a difference-in-differences design that exploits Bolsonaro's change in position regarding the risks represented by COVID-19 during the country-wide demonstrations that took place in early days of the pandemic in Brazil.

4.4.1 Measuring social distancing and COVID-19 prevalence

We use four different indicators to measure the pace of the epidemic diffusion in Brazil. First, we use data on COVID-19 cases from daily reports of the State Health Secretariats.[8] A drawback of this measure is that the official number of COVID-19 cases is underreported. While this applies to all countries that did not test a random sample of the population, underreporting in Brazil is particularly problematic (de Souza et al., 2020).[9]

[6] A timeline of Bolsonaro's declarations and measures on COVID-19 was constructed by (Rosa et al., 2020) (in Portuguese).

[7] Our sample comprises 4,887 municipalities out of 5,570.

[8] This information was compiled by Cota (2021) and Justen (2022)

[9] Based on two seroprevalence surveys conducted in May and June 2020, Hallal et al. (2020) estimate that only one in ten COVID-19 cases and deaths were officially reported as such in Brazil.

To address this concern, we use data on excess mortality, hospitalization, and admission to ICU due to flu-like illness, by date and municipality of residence. Individuals in Brazil necessarily vote in their municipality of residence but might be hospitalized, admitted to ICU, or die in a different municipality than the one where they usually reside. Thus, for our purposes, using the municipality of residence is more appropriate. These data come from the Influenza Epidemiological Surveillance Information System (*Sistema de Informação de Vigilância Epidemiológica da Gripe*), which is managed by the Brazilian Secretariat of Health Surveillance (*InfoGripe).* It collects information from detailed reports filled out in all hospitals in the country about patients with flu-like illnesses. This database includes anyone who shows up at a public or private hospital with fever and cough or sore throat and at least one of the following symptoms: shortness of breath, oxygen saturation below 95%, or respiratory distress. These symptoms are typical of SARS-CoV-2 (Huang et al., 2020; de Souza et al., 2020). Moreover, the database includes information about people who died with these symptoms, whether they were hospitalized or not. We use data ranging from the beginning of 2014 to mid-April 2020.[10]

These measures have the advantage of being accurate in terms of time and geography. We have information about the exact day that a new hospitalization, admission to ICU, or death due to flu-like illness occurred. Also, since hospitals collect information on each patient's municipality of residence, we can measure the prevalence of COVID-19, even in places where no hospitals exist. This is important for comparisons across space in a relatively short time. In contrast, differences in the number of cases are not as accurate because testing results are usually released days after exposure to the contagion, and testing capacity varies across municipalities.

While we can be sure about the number of hospitalizations, admission into ICU, and deaths due to flu-like illness in a given municipality and day, the same cannot be said about

[10]One of the aims of this database is to provide nearly real-time information about epidemics linked to flu-like diseases. The data we used in this manuscript was deemed stable by the time we downloaded it (between 28 and 31 July 2020).

whether COVID-19 indeed caused them. In fact, other respiratory viruses were circulating in the country in the period we analyze (de Souza et al., 2020). This is a common issue in the literature that analyzes the impact of shocks - such as extreme temperatures - on health outcomes, particularly on mortality (e.g., Toulemon and Barbieri, 2008; Heutel, Miller and Molitor, 2020).

A widely accepted way to address this issue is to compute excess mortality, which is meant to capture the "exceptional" number of deaths that occur in a specific time interval compared to a reference point. Excess mortality has been used to compare the impact of COVID-19 on subnational regions (e.g., Zhou et al., 2021) as well as to quantify the effectiveness of non-pharmaceutical interventions in controlling the COVID-19 epidemic (Basellini et al., 2020). Based on previous literature, we define excess mortality as the difference between the cumulative number of deaths in a municipality m between January 1, 2020, and day t, and the average cumulative death in municipality m between January 1 and day t of the five previous years (*i.e.,* 2015 to 2019).[11] We then extend this same measure to the number of hospitalizations and admissions to ICU (henceforth excess hospitalization and excess ICU).

Once infected by COVID-19, most people will not develop strong symptoms. Hence, the majority of those infected by COVID-19 are unlikely to look for a hospital. Furthermore, the estimated incubation period of COVID-19 is from 2 to 14 days (mean of around 5 days). Moreover, the estimated mean time from illness onset to hospital admission is estimated to be 3 to 4 days. Nevertheless, in some cases, clinical conditions deteriorate quickly, and a small share of individuals die within a week of symptoms onset (Linton et al., 2020; Verity et al., 2020).

To test whether social distancing is a mechanism in place, we use the Community Mobility Reports released by Google for 133 countries. These reports are created with

[11] Formally, let t denote the day of the year: $\text{Excess mortality}_{m,t,2020} = \sum_{i=Jan1,2020}^{t} \text{deaths}_{m,i} - \frac{1}{5}\sum_{y=2015}^{2019}\sum_{i=Jan1,y}^{t} \text{deaths}_{m,i}$.

anonymized data from users' mobile devices aggregated at the municipal level. These data contain six measures of social distancing, namely visits to retail and recreation, grocery and pharmacy, parks, public transportation, and workplaces, as well as staying in one's residential area. As the data is anonymized, Google does not make it available if the number of users is below a certain threshold. This is especially true for smaller municipalities during the weekends, and for certain types of places that do not have a high number of users.[12] Keeping these shortcomings in mind, we focus on the two variables that register the least amount of missing data: visits to workplaces and staying in one's residential area during weekdays. We ignore municipalities with missing data.[13] Google calculates these measures as deviations from their daily median value from the five weeks between Jan 3 and Feb 6, 2020, and reported such deviations in percentage points.

4.4.2 Other data sources and measures

We use the 2018 Presidential election results to measure support for President Bolsonaro in a given municipality.[14] Brazilian Presidential elections are run under a dual-ballot system. For each municipality, we use the first-round results to define support for President Bolsonaro. Results from the first round are preferable because in multi-party systems (such as in Brazil), individuals tend to vote more sincerely in first rounds than in runoffs (Fujiwara et al., 2011). We measure support at the municipality level as a binary variable that equals one if the then-candidate Jair Bolsonaro received the majority of valid votes in the first round; otherwise, it is 0. As shown in Table A.1, this is the case for 53% of the municipalities in our sample. We choose to measure support for the president as a binary

[12]For more details about these issues, see Google (2022).

[13]Missing data in this context is a signal of a low number of users, therefore lower mobility. Using the municipalities with missing data would, therefore, severely bias our results. Our final balanced panel for these specific measures comprises 415 municipalities. The results from a balanced panel in all the Google Community Mobility Reports variables, with 215 municipalities, align with the results here and are available upon request.

[14]Electoral results at the municipal level come from Superior Electoral Court (*Tribunal Superior Eleitoral*).

variable because it makes the interpretation of the dynamic effects easier. However, in the Online Appendix, we present the results by deciles of support for the president.

In some of our specifications, we also use the most recent Demographic Census data available (from 2010) to measure the share of individuals older than 60, of illiterate people (a proxy for education), and of women at the municipality level. In addition, we gather data on municipalities' area (in km^2) and population in 2018 (the most recent release) from the Brazilian Bureau of Statistics (*Instituto Brasileiro de Geografia e Estatística*). Moreover, we leverage data on the location of March 15$^{\text{th}}$ demonstrations from a document circulated by the organizers ("*Movimento Avança Brasil*") listing all the municipalities where protests were confirmed to happen.[15]

4.4.3 Identification Strategy

We exploit the facts described in the section "Context" to estimate the impact of President Bolsonaro's cues on the spread of COVID-19. More specifically, we identify the day of the demonstrations (*i.e.* March 15$^{\text{th}}$), when the President joined the masses to greet his supporters, as a marked change in his public stance towards the risk represented by COVID-19. Therefore, we analyze trends in COVID-19 cases around this date, comparing municipalities with higher and lower support for President Bolsonaro. The idea behind this strategy is that pro-Bolsonaro municipalities respond to his cues differently than anti-Bolsonaro municipalities.

We focus on March 15$^{\text{th}}$ as opposed to considering the later dates in which President Bolsonaro sent dismissive messages about COVID-19 for methodological reasons. Specifically, if the behavior of the President on March 15 had an effect on social distancing, we can no longer assume parallel trends between pro- and anti- Bolsonaro municipalities after this day.

[15]For the complete list of municipalities where protests tool place see Gazeta do Povo (2020). Out of the 257 municipalities listed in this document, 236 are included in our specification.

Thus, our identification strategy is a difference-in-differences design, described by the following estimation:

$$y_{i,s,t} = \alpha_i + X'_{i,s,t}\beta_t + \delta \times I(\textit{Pro-Bolsonaro}_i) \times I(\textit{Post-March 15}_t) + \epsilon_{i,s,t}, \qquad (4.1)$$

where $y_{i,s,t}$ is the measure of COVID-19 incidence (number of cases, excess hospitalization, excess ICU, and excess death) in municipality i, in commuting zone s, on day t.[16] To make municipalities comparable, we control for time-varying unobserved heterogeneity, such as trends among municipalities with similar characteristics. Due to the highly contagious nature of COVID-19, it is important to consider both population density and individuals' movements across municipalities to account for local spillovers. Hence, besides controlling our estimations for municipality fixed effects, α_i, we also control them for common trends in municipalities with similar population density and within the same commuting zones. We do this by adding vector $X_{i,s,t}$, which controls for time trends interacted with population density and commuting zones. The latter also absorbs the effect of non-pharmaceutical measures implemented by governors.[17] Moreover, vector $X_{i,s,t}$ also controls for interactions between time trends and the number of cases on March 14. This absorbs common trends among municipalities with the same initial number of infected people. We cluster the standard errors of our estimations by municipality level to account for autocorrelation across time, and by commuting zone $\times$ time FE level to account for spatial correlations among municipalities.

Our parameter of interest is δ. The variable "*Pro-Bolsonaro*" is defined as a binary variable indicating that Bolsonaro had the majority of votes in a municipality in the first round of the 2018 presidential election. The variable "*Post-March 15*" is a binary

[16]The Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE) commuting zones are aggregations of cities around a common regional center (usually a metropolis).

[17]The roll-out of shelter-in-place mandates was staggered, with states restricting physical movement at different times. Our sample includes all states, as shown in Figure A.1, in the Online Appendix.

variable equal to one after March 15 and zero otherwise. We use the inverse hyperbolic sine transformation of our dependent variables in Equation 4.1. Thus, δ can be interpreted as the difference in percentage of the growth in the number of cases in municipalities with higher support for President Bolsonaro after the demonstrations on March 15.[18]

The validity of this identification relies on the assumption that Bolsonaro supporters were not able to learn about his attitude towards COVID-19 before the protests on March 15. The fact that the President sent mixed signals about COVID-19 before the demonstrations reinforces this argument. Still, we test this assumption by looking at the dynamic effects of Bolsonaro's cues before and after March 15. We implement the following specification:

$$y_{i,s,t} = \alpha_i + X_i'\beta_t + \sum_{k=-15}^{31} \delta_k \times I(\textit{Pro-Bolsonaro}_i) \times I(\textit{Post-March 15}_k) + \epsilon_{i,s,t} \quad (4.2)$$

, where $I(\textit{Post-March 15}_k)$ is a binary variable indicating the k^{th} day after the demonstrations. We look at a window of fifteen days before and a month after March 15.

4.4.4 Results

Table 1 presents the results of our main estimation using the specification in Equation (4.1). Column (1) presents the results for confirmed COVID-19 cases while columns (2), (3), and (4) present the results for excess hospitalization, ICU use, and death due to flu-like disease, respectively. The results show that after March 15, municipalities in which the President has greater support had a higher prevalence of COVID-19. More specifically, pro-Bolsonaro municipalities experienced a number of COVID-19 cases 16.2% higher relative to anti-Bolsonaro municipalities. Similarly, pro-Bolsonaro municipalities also had higher excess hospitalization, admission to ICU, and deaths (22.0%, 13.1%, and

[18]The inverse hyperbolic sine transformation is defined as $ln(x + \sqrt{1 + x^2})$ and is a standard transformation in the literature in cases when there are many zeros and negative values (see Bellemare and Wichman, 2020).

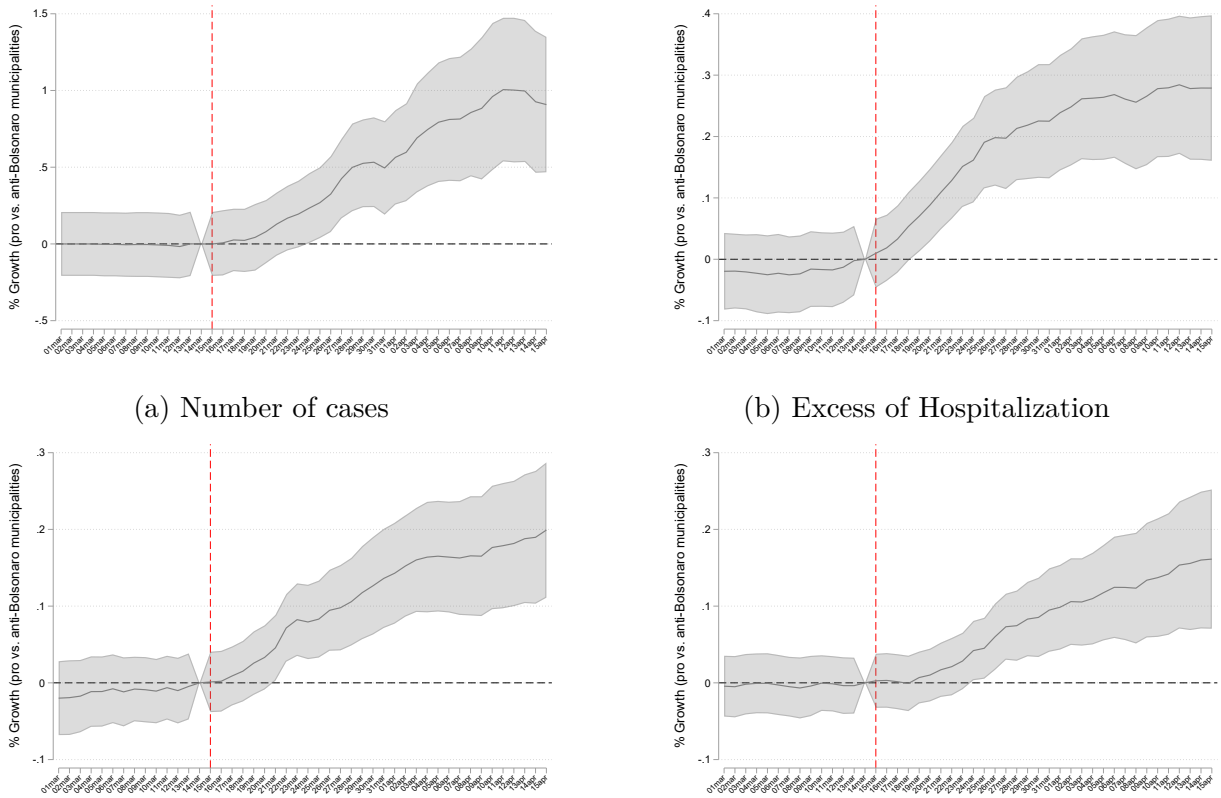
	(1) Confirmed cases	(2) Excess hospitalization	(3) Excess ICU	(4) Excess death
Post March 15 × Pro-Bolsonaro	0.162***	0.220***	0.131***	0.082***
	(0.025)	(0.035)	(0.025)	(0.019)
Observations	224,342	224,342	224,342	224,342
R Squared	0.69	0.85	0.84	0.73
Municipality FE	✓	✓	✓	✓
Commuting zone x Time FE	✓	✓	✓	✓
Pre-demo number of cases x Time FE	✓	✓	✓	✓
Population Density x Time FE	✓	✓	✓	✓

Notes: (i) Standard errors clustered at municipality level and commuting zone x Time FE level; (ii) * p<0.10, * p<0.05, ** p<0.01; (iii) Each dependent variable in this table is the Inverse Hyperbolic Sine Transformation of the original variable.; (iv) On March 15 Bolsonaro supporters marched against the Congress and Bolsonaro ignored coronavirus warnings to join them; (v) Estimations based on a sample of 4,887 municipalities.

Table 1: Disproportional Growth in COVID-19 spread on Pro-Bolsonaro municipalities after demonstrations on March 15

8.2%, respectively). In the Online Appendix, we report the results by decile of support for the President. Overall, the magnitude of the results increase with the support for the President.

Figure 1 shows the dynamic results coming from Equation 4.2 for our variables related to COVID-19 spread. It shows that pro- and against-Bolsonaro municipalities have the same incidence of COVID-19 before the demonstrations and also for a few days after. More precisely, the trends of COVID-19 cases, excess hospitalization, admission into ICU and deaths in pro- and against-Bolsonaro municipalities become statistically different at 5% confidence level on March 23, 18, 21 and 24, respectively. Moreover, ten days after the demonstrations (i.e., by March 25), all the measures of COVID-19 diffusion are persistently higher in pro-Bolsonaro municipalities. Overall, this is in line with the clinical characteristics of the disease (see section "Measuring social distancing and COVID-19 prevalence" for more details about the clinical characteristics of COVID-19). Importantly, our estimates indicate that the effect on cases occurs after the effect on hospitalizations. This is most likely due to the fact that while hospitalizations, ICU occupation and excess



(a) Number of cases

(b) Excess of Hospitalization

(c) Excess ICU

(d) Excess of Deaths

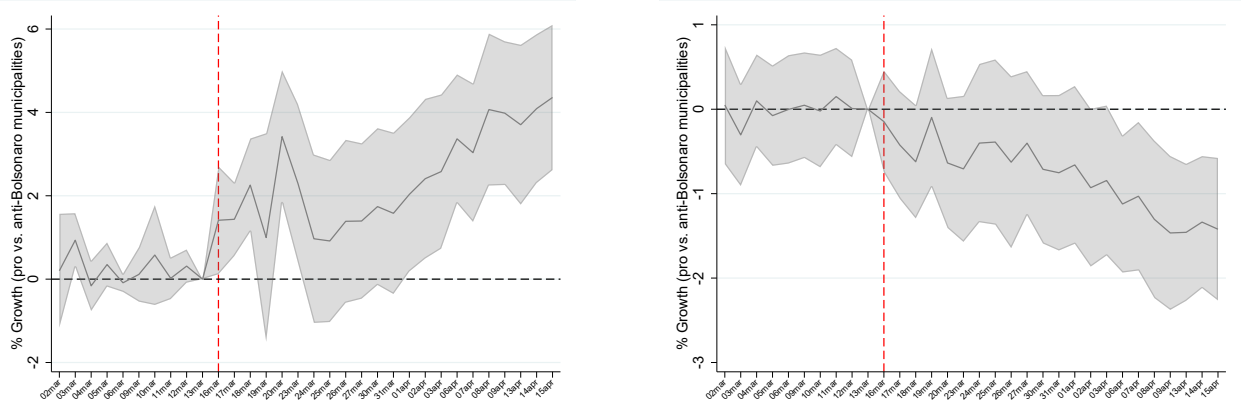
Notes: (i) Reported 95% confidence intervals are based on standard-errors clustered at municipality level and commuting zone x Time FE level; (ii) Dashed line indicates the demonstrations on March 15. (iii) Regression controls for time interactions with population density, number of cases before the demonstrations, and fixed-effects for commuting zone-date and municipality; (iv) Estimations based on a sample of 4,887 municipalities.

Figure 1: Disproportional COVID-19 spread on Pro-Bolsonaro municipalities

deaths are registered in real time, cases are reported with significant delay (see section "Measuring social distancing and COVID-19 prevalence" for more details).

We perform a similar specification in Figure 2 with the Google Community Mobility Reports data for workplaces and residential places to check if the divergence in the COVID-19 spread presented in Figure 1 was due to changes in mobility after the demonstrations on March 15^{th}.[19] To do that, we run estimations on the balanced sample of

[19]Our analysis complements a paper by Ajzenman, Cavalcanti and Da Mata (2021) showing that compliance with social distancing was lower in pro-Bolsonaro municipalities after the President's dismissive declarations. We complement this work by showing that this is also the case for different measures of compliance with social distancing, namely traveling to work and shelter in place, and that such a decrease in isolation increased COVID-19 incidence in pro-Bolsonaro municipalities. Moreover, to the best of our



(a) Mobility - Workplaces

(b) Mobility - Residential Places

Notes: (i) Data source:Google Community Mobility Reports (ii) Reported 95% confidence intervals are based on standard-errors clustered at municipality level and commuting zone x Time FE level; (iii) Dashed line indicates the demonstrations on March 15. (iv) Regression controls for time interactions with population density, number of cases before the demonstrations, and fixed-effects for state-date. (v) The first week of March is the baseline value in this specification; (vi) Estimations based on a sample of 415 municipalities.

Figure 2: Disproportional Changes in Mobility

municipalities without missing information on these two mobility measures produced by Google. The results, displayed in Figure 2a, show a decrease in social isolation right after the demonstrations measured by the mobility in workplaces. This implies that the effect of the President's cues on social isolation is observed immediately after the demonstrations, and the effect persists until at least one month after the event. When we look at the effects on mobility in residential places, we see that Pro-Bolsonaro municipalities started to diverge and stayed less at home after the demonstrations. However, these effects only became statistically significant on April 2^{nd}. Altogether, our results provide evidence that cities with more and fewer supporters of the President started to behave differently in terms of social isolation and mobility after the demonstrations.

knowledge, we are the first to investigate the mechanisms behind such change in behavior. Namely, we show that Bolsonaro supporters react to the President's cues in a cue-consistent way in order to express their political social identity, and, in turn, Bolsonaro opponents use his cues as a shortcut and update their beliefs in the opposite direction of the cue.

4.4.5 Robustness checks

These results are robust for a number of checks. First, as shown in Table A.1 in the Online Appendix, pro- and anti-Bolsoaro municipalities were at different stages of COVID-19 spread before the demonstrations. The excess of hospitalization, ICU use, and mortality due to flu-like symptoms were higher in pro-Bolsonaro municipalities already on March 1. This is probably driven by the fact that our sample contains municipalities that did not have a single case of COVID-19 in the time-frame analyzed and most of the municipalities with zero cases within this time-frame are anti-Bolsonaro municipalities. This problem is not too worrisome since we observe in Figure 1 common trends in the spread of COVID-19 before the demonstrations, but we nevertheless check whether the results displayed in Table 1 hold for a more comparable sample of municipalities. Therefore, we restrict our sample to municipalities that had at least one COVID-19 case before April 15. As presented in Table A.3 in the Online Appendix, pro- and anti-Bolsonaro municipalities in this sub-sample were at the same stage of the spread of COVID-19 and hence are more comparable. Table A.4 in the Online Appendix reproduces the estimations from Table 1 for this sub-sample, and we can see that, if anything, the results are of greater magnitude than the results for the whole sample.

Second, as shown in Table A.1 in the Online Appendix, pro-Bolsonaro municipalities are different than anti-Bolsonaro municipalities in several characteristics that might affect the spread of COVID-19. Pro-Bolsonaro municipalities have a higher population density and size, a higher share of the elderly, and a lower share of illiterate individuals. All our estimations include municipality fixed effects to control for such differences. Still, Table A.5 in the Online Appendix presents estimations controlling for other non-linear trends. In column (1), we control the estimations for trends in municipalities within the same quartile in the population distribution; in columns (2), (3), and (4), we control for trends in municipalities within the same quartile of the distributions of the elderly

population (people older than 60), women, and illiterates, respectively; finally, in column (5), we control for trends in municipalities within the same quartile of the GDP per capita distribution. Again, the results are fairly consistent throughout all estimations and for all measures of COVID-19 spread.

Moreover, there are at least two other possible confounders of the results presented above. First, pre-existing characteristics of Bolsonaro supporters might be correlated with compliance with non-pharmaceutical interventions. One example of such characteristics is trust in institutions. Second, agglomerations during the demonstrations that took place on March 15 might have been more common in municipalities that concentrate Bolsonaro supporters. In turn, gatherings during the demonstrations might have caused an increase in COVID-19 transmissions.

To address the first concern, we analyze the effects of the 2019 flu vaccination campaigns.[20] If voters' pre-existing characteristics are the main drivers of our results, we should expect that President Bolsonaro's supporters comply less with the vaccination campaign even in the absence of leader cues. Hence, vaccination take-up should be smaller in pro-Bolsonaro municipalities when compared to anti-Bolsonaro municipalities. If this is the case, we should also observe higher levels of hospitalization, admissions to ICU, and deaths due to flu-like illnesses during the influenza peak season in 2019 in pro-Bolsonaro municipalities. In the Online Appendix, we show that this is not the case, suggesting that pre-existing characteristics between Bolsonaro supporters and opponents are unlikely to be the driving force behind our results.

We then run a series of regressions to address the second concern, namely that gatherings during the demonstrations are driving our results. Table A.2 presents exercises that take into account possible impacts coming directly from the demonstrations. In the first exercise (columns (1), (3), (5), and (7)), we control for common trends among municipalities that hosted demonstrations on March 15. In the second exercise (columns (2), (4),

[20] This is a known public health policy that has encountered problems with compliance in many countries (e.g., Chen and Toxvaerd, 2014).

(6), and (8)), we estimate the same specification with a restricted sample in which we include only the municipalities where pro-government demonstrations did not take place on March 15.[21]

If agglomeration during the demonstrations was the only driver of the faster spread of COVID-19 observed in pro-Bolsonaro municipalities after March 15, the results would vanish when controlling for their presence or restricting the sample to localities where they were absent. However, the results persist in both cases. This provides further evidence that our results are driven by Bolsonaro's cues.[22]

4.5 Study 2: Evidence from survey experiments

To overcome the ecological inference issues of our first study and provide evidence of the motivations of Bolsonaro's supporters and opponents to respond to his cues, we conduct two experiments following the standard design used in the party cue literature (e.g., Bakker, Lelkes and Malka, 2020; Brader and Tucker, 2012; Samuels and Zucco Jr, 2014; Slothuus and Bisgaard, 2021). Both of our experiments are embedded in the same online survey with a sample (N=2,992) that is approximately representative of the Brazilian population in terms of State of residence, gender, and age.[23] The data collection was carried out by NetQuest, a market research company, in September 2021. Ahead of data collection, we received IRB approval and pre-registered the hypotheses, pre-treatment questions, experimental manipulations, outcome variables, inferential rules, power analysis, data pre-processing, and regression equations.[24] When discussing the analysis and

[21]Table A.6, in the Online Appendix, also presents the effects in the sub-sample of municipalities that did not host demonstrations.

[22]Table A.6 in the Online Appendix also presents evidence of heterogeneous effects where we interact the support for Bolsonaro with the occurrence of demonstrations. This exercise should be read with caution since pro-government demonstrations are endogenous to support for the President. Nevertheless, the comparison between the effect of the demonstrations in pro- and anti-Bolsonaro municipalities provides evidence of the direct impact of people gathering during protests.

[23]Descriptive statistics containing the distribution of respondents along socio-demographic variables can be found in the Online Appendix.

[24]See link for PAP in footnote 2.

results, we note any deviations from the pre-analysis plan. Furthermore, in the Online Appendix, we report results of tests that were pre-registered but could not be included in the main text due to space constraints.

4.5.1 Experimental design and measures

Our experiments are divided in three main parts: (1) pre-treatment questions followed by an attention check; (2) two experimental manipulations followed by the relevant outcomes separated by a filler and; (3) post-survey information on how to prevent COVID-19 infection retrieved from official sources, such as the World Health Organization (WHO). Besides collecting information on age, gender, race, State of residence, education, and religion of the respondents, we also ask batteries of questions on the following topics (specific item wording is available in the Online Appendix):

Political social identity and its strength: we adapt Bankert, Huddy and Rosema (2017)'s battery to our context. Specifically, we first ask whether respondents identify as Bolsonaro supporters ("*Bolsonaristas*") or opponents ("*Anti-bolsonaristas*"). If participants select "neither," we ask a follow up questions on whether they feel definitively or perhaps closer to one of these two groups. Following previous research (e.g., Bakker, Lelkes and Malka, 2020), we exclude participants who do not identify or lean towards any of these two groups. We then proceed to measure the strength of political social identity. Specifically, we include four questions adapted from Bankert, Huddy and Rosema (2017) that measure the strength of "*Bolsonarismo*" and "*anti-Bolsonarismo*" as political social identities. As pre-registered, we create an index averaging the four items for Bolsonaro supporters (alpha=0.80, mean = 0.53, std. = 0.23) and opponents (alpha=0.73, mean = 0.57, std. = 0.24).

Cognitive resources: we use four items from the cognitive resource test battery developed by Thomson and Oppenheimer (see 2016).[25] We measure cognitive resources

[25]We had to adapt one question for the Brazilian context. We discuss this in the Online Appendix.

as the percentage of correct answers (mean = 0.47, std. = 0.25).

After responding to the pre-treatment questions and passing an attention check,[26] respondents are assigned to two source cue experiments separated by a filler.[27] To avoid contamination across experiments, the order of the experiments was randomized. For the same reason, we opted for assigning respondents to the same condition in both experiments (e.g., respondents assigned to the control condition in one experiment are also assigned to the control condition in the other experiment).

In the first experiment, we provide the information that scientists warn that the results of trials testing the efficiency of the nasal spray EXO-CD24 as a treatment for COVID-19 are unreliable. Respondents then read that either "some Brazilian politicians are" (control condition) or "President Bolsonaro is" (treatment condition) very optimistic about this new experimental treatment. Our outcome is an index constructed from a battery of questions on attitudes towards the nasal spray as a treatment for COVID-19 (alpha = 0.89, mean = -0.00, std = 0.94).

In the second experiment, we provide information that scientists recommend individuals to continue complying with COVID-19 prevention measures, such as mask wearing and social distancing. Respondents then read that a campaign to encourage compliance with such measures was approved thanks to either "some Brazilian politicians" (control condition) or "President Bolsonaro" (treatment condition).[28] We build our outcome measure as an index based on a battery of questions on attitudes towards COVID-19 prevention measures (alpha = 0.88, mean = -0.00, std. = 0.96).

4.5.2 Results

Figure 3 and Table 2 present the treatment effect of the experiments for the sample of Bolsonaro supporters and opponents separately. We can observe in panel (a) of Figure 3

[26]See the Online Appendix for information about how many participants were screened out.
[27]See the Online Appendix for details about the filler exercise.
[28]Details about wording of the experimental manipulation can be found in the Online Appendix.

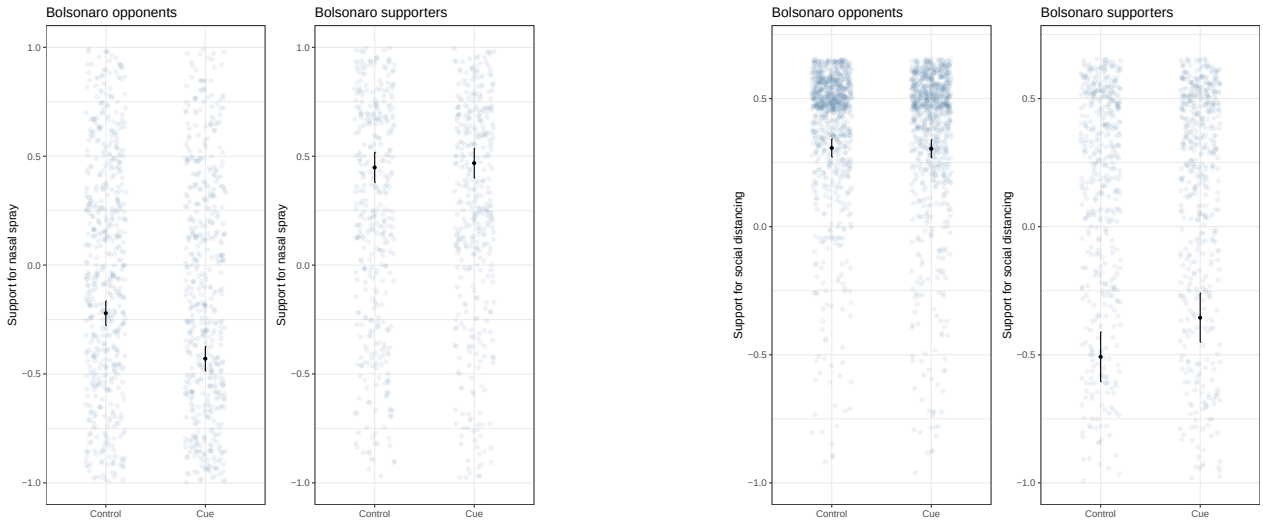
Table 2: Effects of Bolsonaro's cues on Bolsonaro opponents and supporters

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents (1)	Bolsonaro supporters (2)	Bolsonaro opponents (3)	Bolsonaro supporters (4)
Cue nasal spray	-0.203***	0.025		
	(0.041)	(0.050)		
Cue campaign			0.000	0.142**
			(0.026)	(0.069)
N	1752	1240	1750	1239
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.064	0.054	0.041	0.096

Notes: (i) Estimations include the following covariates: gender, race, religion, State of residence, age, and FE for the day when individuals answered the survey; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

that, even in the absence of Bolsonaro's cue, his supporters are already more favorable towards the nasal spray when compared to his opponents. While Bolsonaro's cue does not change his supporters' perception about the nasal spray, it does impact his opponents' perception. More specifically, Table 2 shows that Bolsonaro's cue decreases by 0.20 standard deviations his opponents' approval for the nasal spray. In terms of magnitude, this result is higher than the effect of PT cues on anti-partisans documented by Samuels and Zucco (2018). These authors find that, on average, PT cues decrease support for a policy among PT opponents (anti-partisans) by 0.13 standard deviations.

When we look at participants' support for non-pharmaceutical interventions (such as mask-wearing and social distancing), we observe different patterns. We see in panel (b) of Figure 3 that Bolsonaro opponents highly approve these measures, and Bolsonaro's cue does not change their opinion. Bolsonaro supporters, in turn, tend to perceive social distancing measures much more negatively. In this case, Bolsonaro's positive cue about such measures improves related attitudes among his supporters. In particular, Table 2 shows that Bolsonaro's cue increases by 0.14 standard deviations his supporters' approval for non-pharmaceutical interventions. The magnitude of this effect is considerably smaller



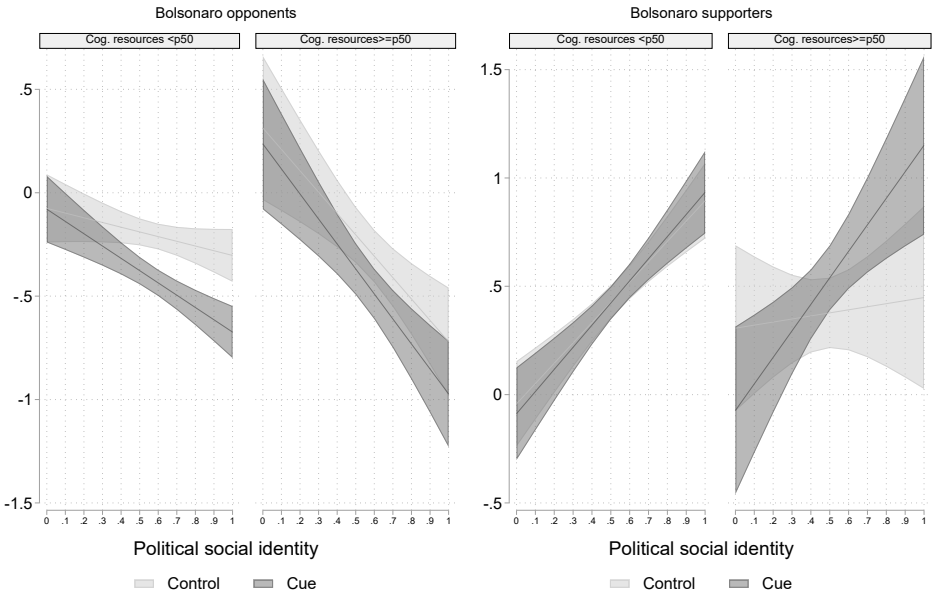
(a) Support for nasal spray (b) Support for social distancing

Notes: The figure presents the 90% of the distribution of dependent variables per treatment condition for Bolsonaro supporters and opponents as well as fitted values with 95% CIs.

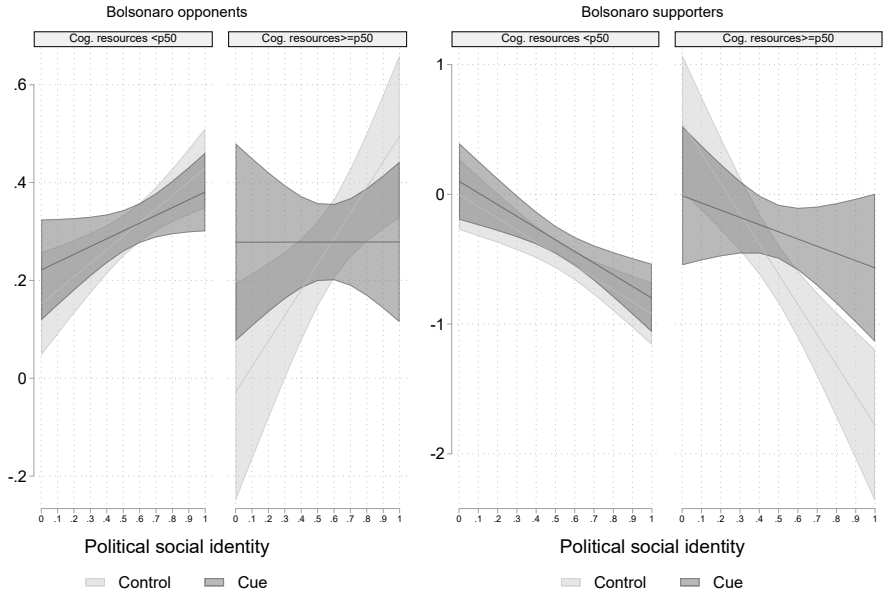
Figure 3: Effects of Bolsonaro's cues on Bolsonaro opponents and supporters

than the effects of PT cues on PT supporters (partisans) estimated by Samuels and Zucco (2018), which was, on average, 0.21. Overall, we find support for our hypothesis that Bolsonaro supporters react in a cue-consistent fashion, while his opponents respond in a cue-inconsistent way. This finding is in line with previous work showing that both in- and out-group cues shape voters' opinion in Brazil (Samuels and Zucco Jr, 2014; Samuels and Zucco, 2018) and elsewhere (e.g., Nicholson, 2012). However, different from their study, which focuses on party cues, we show that this is also the case for leader cues. We also find null effects for our sample of Bolsonaro opponents in experiment one (nasal spray) and supporters in experiment two (social distancing). A hypothesis (not pre-registered) is that such null results are explained by ceiling effects. Notably, Bolsonaro supporters are on average much more positive towards the nasal spray, while his opponents are much more in favor of non-pharmaceutical interventions.

Moving to heterogeneous treatment effects, we observe in panel (b) of figure 4 that the effect of Bolsonaro's cues in the experiment about social distancing is positive and



(a) Support for nasal spray



(b) Support for social distancing

Notes: (i) Graphs based on table A.8 in the Online Appendix, (ii) The figure presents the predicted values for control and treatment groups by level of cognitive resources and strength of political social identity with 95% CIs.

Figure 4: Heterogeneity by strength of political social identity and cognitive resources

statistically significant only among Bolsonaro supporters with high cognitive resources (i.e., above the median) and strong political social identity. In turn, as shown in panel (a), in the experiment about the nasal spray, we find negative and statistically significant results among Bolsonaro opponents with low cognitive resources (i.e., below the median) and strong political social identity, while we find positive and statistically significant results among Bolsonaro supporters with high cognitive resources and strong political social identity.

Hence, our most consistent result is that Bolsonaro supporters with high cognitive resources and strong political social identity respond to his cues in a cue-consistent way. This finding is in line with the theoretical perspective that sees cue-following as a manner to express one's political identity. However, the fact that we find statistically significant results among Bolsonaro opponents with low cognitive resources in the nasal spray experiment may indicate that heuristics drive the response of Bolsonaro opponents to his cues. An ex-post and not pre-registered speculation is that in-group and out-group cues prompt different psychological mechanisms.

4.6 Discussion

Our analyzes advance the understanding of how and why citizens react to political elites' cues when personal matters are at stake. Contrary to theoretical expectations (e.g., Groenendyk, 2013), our results indicate that in-groups may follow political elite cues to protect their political social identity even in situations where issues are salient and the decision at hand directly affects their well-being and way of life. This finding indicates that a strong attachment to political parties and figures may hinder citizens' capacity to make politicians responsive and accountable. In times of high affective polarization, the democratic dilemma might be less about whether citizens can learn what they need to know (Lupia et al., 1998) and more about whether they can put their material self-interest

and values before their attachments to parties and political leaders.

More specifically, we show that President Bolsonaro's dismissive cues about COVID-19 and related policies substantially affect the attitudes and behaviors of his opponents and supporters in Brazil. In our first study, we show that in the days following Bolsonaro's first clear public display of skepticism about the risk represented by COVID-19, there was a higher prevalence of the virus in pro-Bolsonaro as opposed to anti-Bolsonaro municipalities. Specifically, the official number of COVID-19 cases surged by 16%, while excess hospitalization, mortality, and ICU occupation increased by 22%, 13% and 8%, respectively. We also show that this effect is driven by lower levels of social distancing in pro-Bolsonaro municipalities. Our results are consistent with previous research showing that party cues change attitudes and behaviors when citizens have a direct stake in policy (Slothuus and Bisgaard, 2021; Bisbee and Lee, 2021).

Moreover, our survey experiments suggest that these trends were caused both by Bolsonaro supporters following the President's lead and his opponents updating their beliefs in the opposite direction. This finding is consistent with previous research showing that leader cues cause both cue-following among in-groups and a backlash among out-groups (Nicholson, 2012; Samuels and Zucco Jr, 2014; Samuels and Zucco, 2018). Furthermore, we estimate these effects based on data collected one year and a half after the first COVID-19 case registration in Brazil. This fact indicates that political elite cues can influence decisions even when opinions are crystallized and issues are salient.

In addition, we provide evidence of the cognitive processes underlying such cue effects. Specifically, Bolsonaro supporters follow his cues as a way to express their political identity, whereas his opponents use his cues as an informational shortcut. We speculate that in and out-group cues might prompt different psychological processes. Our findings are consistent with recent research conducted in very different contexts showing that the effect of in-party cues, but not of out-party cues, tends to be driven by the desire to express one's partisan social identity (Bakker, Lelkes and Malka, 2020). Overall, our analysis

provides a hard test of the expressive utility perspective for cue-taking by showing that even when we should expect directional motives to weigh little, political elite cues can lead citizens to rationalize opinion change to defend their identity.

An advantage of our analyses is combining administrative, mobility, and survey data with causal inference techniques. Most of the literature on political elite cues, including the work analyzing COVID-19 related behaviors, relies either on survey data on attitudes (e.g., Slothuus and Bisgaard, 2021; Bakker, Lelkes and Malka, 2020) or aggregate data on behavior (e.g., Bisbee and Lee, 2021). Our approach allows us to overcome the limitations of each type of data. Specifically, while the data on excess hospitalization, ICU occupation, and mortality are extremely reliable, they do not measure behavior directly. We overcome this issue by using Google mobility data which, albeit much less reliable, measures change in behavior in real time. The drawback of mobility data is that it is impossible to link it to political identity at the individual level. This is why researchers (including ourselves) aggregate mobility data and match it with electoral results. The shortcoming of inferring individual behavior from aggregate data is to incur ecological fallacies. To address this concern, we rely on two survey experiments that suggest that political elite cues influence COVID-19-related opinions not only among in-groups, but also among out-groups. Of course, survey data measure attitudes instead of behaviors. While no single data source or variable is perfect, we argue that by analyzing several types of data and variables, we can be more confident about our main results and provide suggestive evidence of the underlying micro-level mechanisms.

The limitations of our analysis leave open questions for future research. First, our examination of the cognitive processes underlying cue-taking relies on heterogeneous treatment effects by level of political social identity and cognitive resources, but these variables are not experimentally manipulated. Future research should address this concern by directly manipulating these variables (this point was also made by Bakker, Lelkes and Malka, 2020). Second, previous research applies different measures of cognitive resources.

Some examples are factual knowledge about politics, the need for cognition, and performance on cognitive resource tests. However, it is unclear whether these variables measure the same concept (Bullock, 2020). Future work should investigate this question. Finally, the research on political elite cues has overwhelmingly focused on party cues. Yet, our and previous research show that political leader cues also influence opinions and behaviors (Bisbee and Lee, 2021; Nicholson, 2012). In future work, it is important to theorize and test how party and leader cues differ from each other. In this study, we have shown that Brazilians reacted to the cues of President Bolsonaro during the COVID-19 pandemic and that these cue effects had important implications to their health-related behavior. This evidence illustrates the important real-life consequences of political elite communication.

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Appendix

4.A Descriptive statistics – study 1

Table 4.A.1: Descriptive Statistics for pro- and anti-Bolsonaro municipalities

	(1) All	(2) Pro-Bolsonaro	(3) Anti-Bolsonaro	(4) Diff. ((3)-(2))
Pro-Bolsonaro	0.53	1.00	0.00	
Demonstrations	0.05	0.08	0.01	-0.07***
Confirmed COVID-19 cases (March 1)	0.00	0.00	0.00	-0.00
Excess hospitalization (March 1)	0.41	0.53	0.26	-0.27**
Excess ICU use (March 1)	0.16	0.22	0.09	-0.13**
Excess death (March 1)	0.02	0.04	0.01	-0.03***
Population (2018)	41,124.37	55,806.42	24,749.45	-31,056.98***
Pop. density (pop./km^2) (2018)	133.67	202.62	56.79	-145.82***
Share of people over 60 y.o. (2010)	0.12	0.13	0.11	-0.01***
Share of illiterate (2010)	0.16	0.09	0.24	0.15***
Share of women (2010)	0.50	0.50	0.50	-0.00
GDP/capita (2015)	19.97	27.56	11.49	-16.07***
N	4,887	2,571	2,307	

4.B Complementary results – study 1

4.C Placebo test – 2019 flu vaccination campaign

We explore flu immunization data that contain information on how many flu shots were taken each month in each municipality during the 2019 vaccination campaign. This exercise shows that pro- and anti- municipalities do not present different flu vaccine take-up levels, which supports our claims that the President's cues are driving our results as opposed to pre-existing beliefs about public health measures and authorities. To perform this test, we gather data from the information system of the national immunization program (*Sistema de Informaçoes do Programa Nacional de Imunizaçoes*).

Similarly to social isolation amid the COVID-19 epidemic, low compliance levels with flu vaccination can increase hospitalization, ICU admissions, and deaths due to flu-like

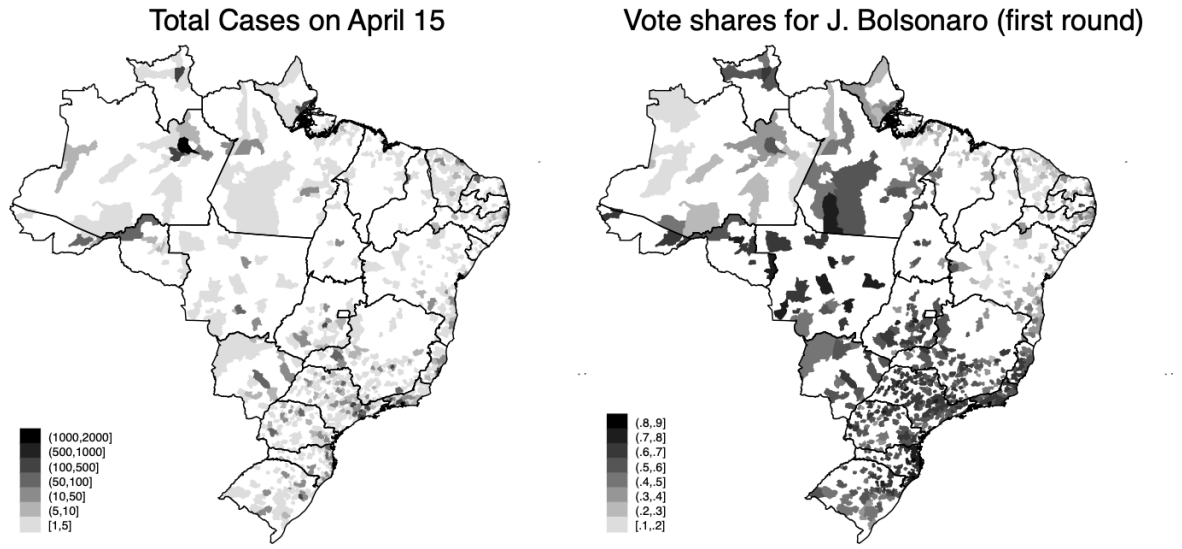


Figure 4.A.1: Geographical distribution of COVID-19 cases and vote shares for Bolsonaro at the first round of the 2018 Presidential Election

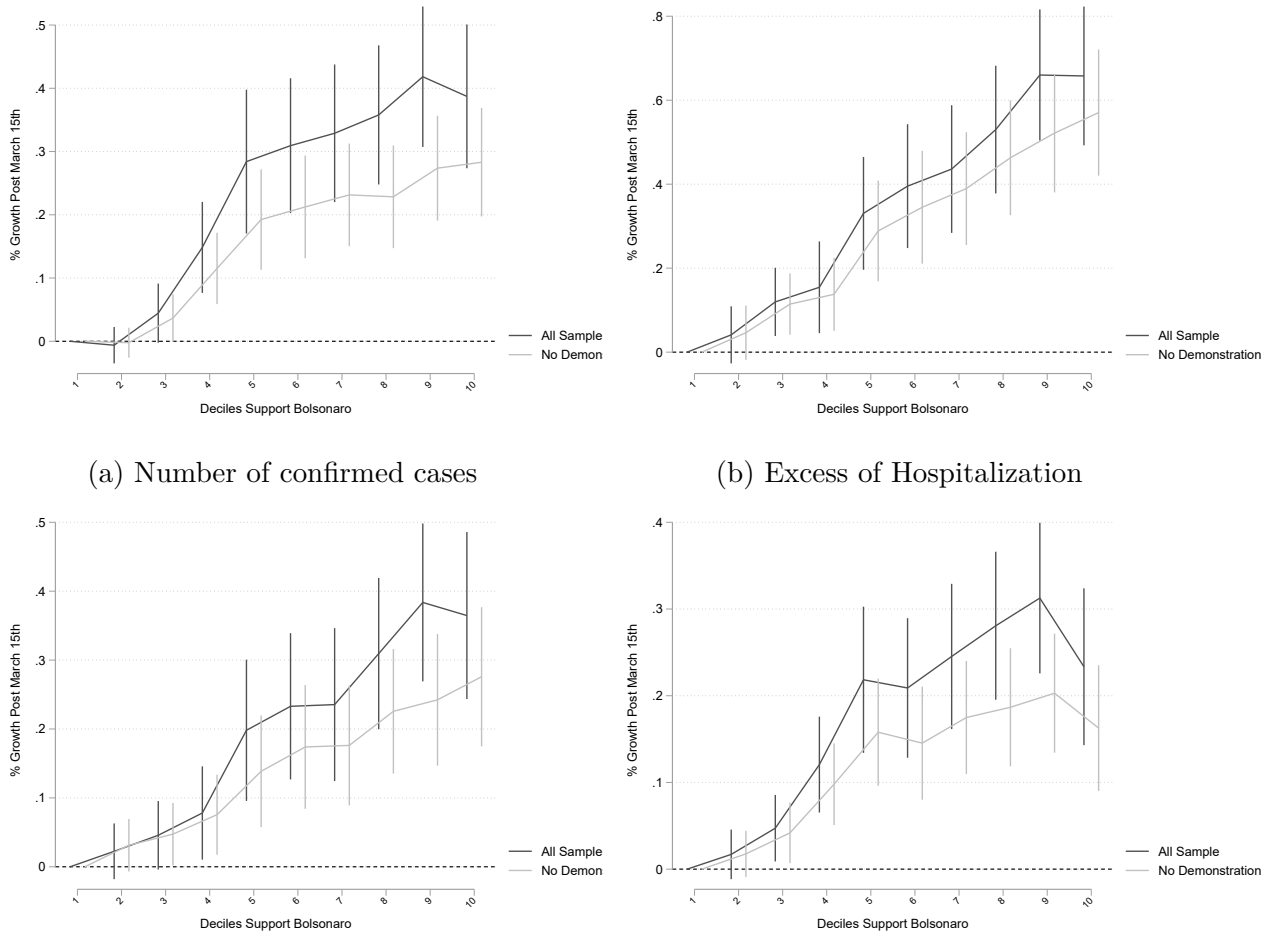
illness.

Country-wide flu vaccination campaigns have been carried out every year in Brazil since 1999, and it has been a relatively successful strategy to reduce serious flu-like illness (Sato et al., 2015). The take-up has increased over the years, reaching 97.1% of the targeted population in 2018 (Ministério da Saúde, 2019). 2019 is the first year of President Bolsonaro's mandate. We analyze take-up in this year to understand if support for the President is correlated with other characteristics that can predict compliance with health measures. Notably, President Bolsonaro did not voice any opposition to or support for this campaign.

Figure 4.C.1 displays exercises comparing pro- and anti-Bolsonaro municipalities around the flu vaccination campaign that began in April of 2019. We look at differences in terms of flu immunization and excess hospitalization, admission to ICU, and mortality due to flu-like illness for each month of 2019.[29] The measure of immunization is the hyperbolic sine transformation of the number of flu shots delivered in each municipality. The measures of excess hospitalization, ICU use, and deaths are built in the same way as described before, but for 2019 instead of 2020. The dashed line in the graphs marks the beginning of the vaccination campaign in April.

[29] According to Alonso et al. (2007), the flu season in Brazil spans from March/April in the North and until the end of July in the South. The authors also show that the flu peaks in June and July.

The results show that Pro-Bolsonaro municipalities did not display lower levels of immunization, or higher levels of flu-like illness in 2019, as compared to municipalities where support for the President is lower. This provides further evidence that our results are driven by the President's cues and not by voters' pre-existing characteristics.



(a) Number of confirmed cases

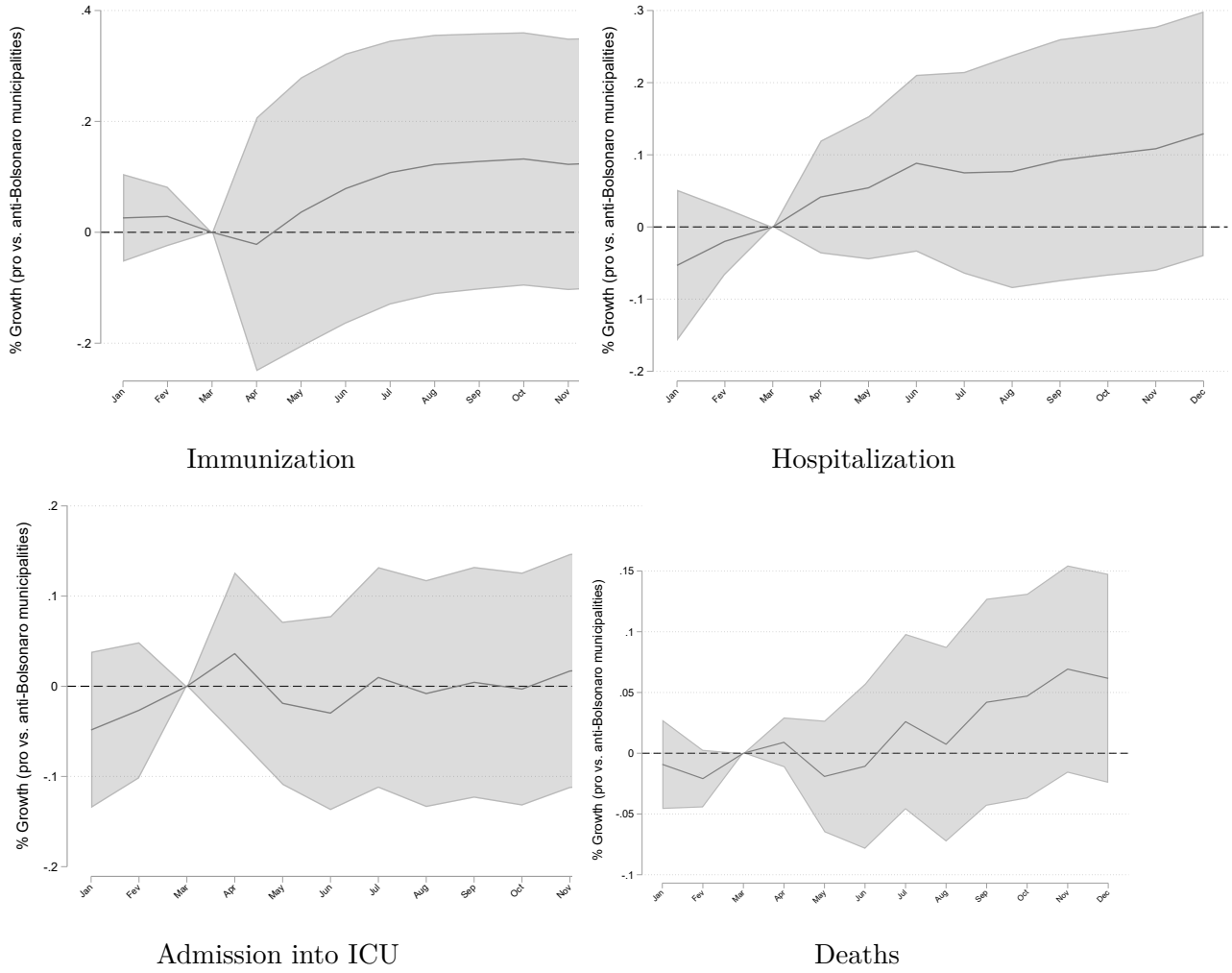
(b) Excess of Hospitalization

(c) Excess ICU

(d) Excess of Deaths

Notes: (i) Each of these graphs show coefficients of estimations of equation 1 for each decile of vote shares for Bolsonaro in the first round of the 2018 Presidential election (ii) Reported 95% confidence intervals are based on standard-errors clustered at municipality level and commuting zone x Time FE level; (iii) Regression controls for time interactions with population density, number of cases before the demonstrations, and fixed-effects for commuting zone-date and municipality.

Figure 4.B.1: Disproportional COVID-19 spread by deciles of Bolsonaro vote shares



Notes: (i) Reported 95% confidence intervals are based on standard-errors clustered at municipality level and commuting zone x Time FE level; (ii) Dashed line indicates thec beginning of vaccinations campaign on April 10 2019. (iii) Regression controls for time interactions with population density, and fixed-effects for commuting zone-date and municipality.

Figure 4.C.1: Placebo tests using flu immunization and excess of hospitalizations, ICU use, and deaths in Pro-Bolsonaro municipalities - compared to anti-Bolsonaro municipalities - after the flu vaccination campaign in 2019

4.D Robustness checks – study 1

	Confirmed cases		Excess hospitalization		Excess ICU		Excess death	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post March 15 × Pro-Bolsonaro	0.123***	0.092***	0.196***	0.181***	0.110***	0.084***	0.059***	0.046***
	(0.022)	(0.018)	(0.041)	(0.038)	(0.028)	(0.024)	(0.018)	(0.016)
Observations	224,342	213,486	224,342	213,486	224,342	213,486	224,342	213,486
R Squared	0.72	0.61	0.84	0.81	0.82	0.80	0.75	0.71
Municipality FE	✓	✓	✓	✓	✓	✓	✓	✓
Commuting zone x Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Pre-demo number of cases x Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Population Density x Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Demonstration x Time FE	✓		✓		✓		✓	
Municipalities with Demonstration	✓		✓		✓		✓	

Notes: (i) Standard errors clustered at municipality level and commuting zone x Time FE level; (ii) * p<0.10, * p<0.05, ** p<0.01; (iii) Each dependent variable in this table is the Inverse Hyperbolic Sine Transformation of the original variable.; (iv) On March 15 Bolsonaro's supporters marched against the Congress and Bolsonaro ignored coronavirus warnings to join them.

Table 4.D.1: Controlling for local demonstrations on March 15 and restricting sample to municipalities without demonstrations

	(1) All	(2) Pro-Bolsonaro	(3) Anti-Bolsonaro	(4) Diff. ((3)-(2))
Confirmed COVID-19 cases (March 1)	0.00	0.00	0.00	-0.00
Excess hospitalization (March 1)	1.51	1.56	1.39	-0.16
Excess ICU use (March 1)	0.59	0.63	0.48	-0.15
Excess death (March 1)	0.08	0.10	0.04	-0.06
N	1,150	789	361	

Table 4.D.2: Descriptive statistics on dependent variables - municipalities with at least one confirmed case before April 15

	(1) Confirmed cases	(2) Excess hospitalization	(3) Excess ICU	(4) Excess death
Post March 15 × Pro-Bolsonaro	0.551***	0.467***	0.370***	0.242***
	(0.113)	(0.132)	(0.113)	(0.090)
Observations	52,486	52,486	52,486	52,486
R Squared	0.79	0.90	0.88	0.80
Municipality FE	✓	✓	✓	✓
Commuting zone x Time FE	✓	✓	✓	✓
Pre-demo number of cases x Time FE	✓	✓	✓	✓
Population Density x Time FE	✓	✓	✓	✓

Notes: (i) Standard errors clustered at municipality level and commuting zone x Time FE level; (ii) * p<0.10, * p<0.05, ** p<0.01; (iii) Each dependent variable in this table is the Inverse Hyperbolic Sine Transformation of the original variable; (iv) On March 15 Bolsonaro supporters marched against the Congress and Bolsonaro ignored coronavirus warnings to join them.

Table 4.D.3: Restricting sample to municipalities with at least one confirmed case before April 15

	(1)	(2)	(3)	(4)	(5)
	Number of confirmed cases				
Post March 15 × Pro-Bolsonaro	0.117***	0.162***	0.126***	0.061***	0.107***
	(0.024)	(0.025)	(0.024)	(0.023)	(0.024)
	Excess hospitalization				
Post March 15 × Pro-Bolsonaro	0.097***	0.222***	0.157***	0.092***	0.143***
	(0.032)	(0.035)	(0.034)	(0.033)	(0.034)
	Excess ICU				
Post March 15 × Pro-Bolsonaro	0.069***	0.132***	0.094***	0.048**	0.082***
	(0.024)	(0.025)	(0.025)	(0.023)	(0.024)
	Excess death				
Post March 15 × Pro-Bolsonaro	0.039**	0.083***	0.055***	0.026	0.046**
	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)
Observations	224,342	224,342	224,342	224,342	224,342
Municipality FE	✓	✓	✓	✓	✓
Commuting zone x Time FE	✓	✓	✓	✓	✓
Pre-demo number of cases x Time FE	✓	✓	✓	✓	✓
Population Density x Time FE	✓	✓	✓	✓	✓
Population x Time FE	✓				
Share of people over 60 y.o. X Time FE		✓			
Share of women x Time FE			✓		
Adult literacy rate x Time FE				✓	
GDP/capita x Time FE					✓

Notes: (i) Standard errors clustered at municipality level and commuting zone x Time FE level; (ii) * p<0.10, * p<0.05, ** p<0.01; (iii) Each dependent variable in this table is the Inverse Hyperbolic Sine Transformation of the original variable.; (iv) On March 15 Bolsonaro supporters marched against the Congress and Bolsonaro ignored coronavirus warnings to join them.

Table 4.D.4: Controlling for non-linear trends in variables related to Covid-19

	(1) Confirmed cases	(2) Excess hosp.	(3) Excess ICU	(4) Excess death
Post March 15 × Local demonstration=0 × Pro-Bolsonaro=1	0.126***	0.191***	0.103***	0.058***
	(0.022)	(0.041)	(0.028)	(0.018)
Post March 15 × Local demonstration=1 × Pro-Bolsonaro=0	0.899***	0.786***	0.415**	0.479**
	(0.282)	(0.276)	(0.179)	(0.215)
Post March 15 × Local demonstration=1 × Pro-Bolsonaro=1	0.860***	1.233***	0.891***	0.576***
	(0.073)	(0.091)	(0.081)	(0.057)
Observations	224,342	224,342	224,342	224,342
R Squared	0.70	0.83	0.82	0.74
Municipality FE	✓	✓	✓	✓
Commuting zone x Time FE	✓	✓	✓	✓
Pre-demo number of cases x Time FE	✓	✓	✓	✓
Population Density x Time FE	✓	✓	✓	✓

Notes: (i) Standard errors clustered at municipality level and commuting zone x Time FE level; (ii) * p<0.10, * p<0.05, ** p<0.01; (iii) Each dependent variable in this table is the Inverse Hyperbolic Sine Transformation of the original variable.; (iv) On March 15 Bolsonaro's supporters marched against the Congress and Bolsonaro ignored coronavirus warnings to join them.

Table 4.D.5: Heterogeneous impacts on municipalities with and without local demonstrations on March 15

4.E Pre-treatment questions – study 2

Strength of political social identity: based on the reported political identity of respondents, we ask: (1) "when people criticize [*Bolsonaristas*] [*anti-Bolsonaristas*], it feels like a personal insult", (2) "I have a lot in common with other [*Bolsonaristas*] [*anti-Bolsonaristas*]", (3) "When I meet someone who [supports] [opposes] Bolsonaro, I feel connected with this person", (4) "When people [praise] [condemn] Bolsonaro, it makes me feel good." Responses are recorded in a four-point scale ranging from "completely agree" to "completely disagree".

Cognitive resources test: (1) If you're running a race and you pass the person in second place, what place are you in? [intuitive answer: first; correct answer: second]; (2) Emilia's father has three daughters. The first two are named Margarida and Rosa. What is the third daughter's name? [intuitive answer: Violeta; correct answer: Emilia]; (3) a bat and a ball cost R$1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost? [intuitive answer: 10 cents; correct answer: 5 cents]; (4) A man buys a pig for R$60, sells it for R$70, buys it back for R$80, and sells it finally for R$90. How much has he made? [intuitive answer: R$10 ; correct answer: R$20]

Item 2 is adapted from the original question "Emily's father has three daughters. The first two are named April and May. What is the third daughter's name? (intuitive answer: June; correct answer: Emily)". We could not use the original question because in Brazil it is not common to name children after months.

For more information about other pre-treatment questions (namely, batteries on: general support for Bolsonaro, trust in science, political knowledge and socio-demographics, see PAP at `https://osf.io/39ajw/?view_only=2bf90b93064a47bcb81813a3c5362080`).

Attention check Before running the experiment, we ask the following attention check (adapted from Campello and Zucco Jr, N.d.): "Some people read newspapers or watch the news frequently. Others do not read newspapers or watch the news. That's the way it is everywhere, but we just want to make sure you're reading the questions until the end. Ignore the following question, select the "other value" option and write the number 5 in the space provided next to that option. Please indicate how often do you read newspapers or watch the news?". Those who did not follow the text's instructions are screened out of the survey.[30]

[30] We accept respondents that selected "other" and wrote in the dedicated text box any string containing: "5", *"cinco"* (five), *"CINCO"* (FIVE) or *"Cinco"* (Five). About 51% of the respondents did not pass the attention check and were screened out. We proceeded with data collection until we reached the necessary number of completes, which according to our pre-registered power analysis was about 3,000.

4.F Filler

Spend 30 seconds writing as many words as you can that start with the letter A" [Text box]

4.G Treatments and outcome – study 2

The first experiment is about an unapproved experimental treatment for COVID-19: the EXO-CD24 nasal spray. More specifically, respondents are asked to read the following text:

EXPERIMENT 1: Nasal Spray

A preliminary study investigated the effectiveness of the EXO-CD24 nasal spray, previously used to treat cancer, in treating patients with severe forms of COVID-19. This study shows that out of 35 patients hospitalized with COVID-19 who were treated with the spray, 31 improved their health and were able to return home about four days after starting the treatment. Scientists caution that this preliminary study is unreliable due to the small number of participants and the lack of randomized, double-blind trials.

[Some Brazilian politicians are] [President Jair Bolsonaro is] very optimistic about using the EXO-CD24 nasal spray to treat COVID-19. [One of them] [President Jair Bolsonaro] said that the spray was 100% effective in curing severe cases of COVID-19 and that it appears to be a miraculous product.

At the end of this vignette, we ask an attention check where we ask respondents to indicate whether the following statement is true or false: “a study analyzing the effectiveness of the EXO-CD24 nasal spray to treat COVID-19 was carried out”.

To test whether Bolsonaro’s cues have an impact in this setting, we present the following statements and provide a seven-point Likert-type scale to access respondents level of agreement:

1. The EXO-CD24 Nasal Spray seems an excellent treatment option for COVID-19.

2. The national health surveillance agency (ANVISA) must authorize the experimental use of the EXO-CD24 nasal spray to treat COVID-19.

3. If a friend or relative were hospitalized with severe COVID-19, I would very much like him or her to be treated with EXO-CD24 nasal spray.

4. I would be willing to participate in a potential scientific study carried out in Brazil as part of the approval process for the EXO-CD24 nasal spray for COVID-19 treatment.

The second setting is a campaign to encourage social distancing and mask use in Brazil. Respondents are asked to read the following text:

EXPERIMENT 2: Campaign about non-pharmaceutical interventions

Scientists say that in the current COVID-19 situation in Brazil, it is very important to wash your hands with soap and water or use alcohol gel, avoid gatherings, keep a safe distance from other people and wear a mask even if you are fully vaccinated.
Last month, a campaign to inform the population about how to be protected against COVID-19 was launched. This campaign was launched thanks to the approval of [some Brazilian politicians] [President Jair Bolsonaro] in response to a new highly contagious variant of COVID-19. The first message in this campaign states:
"Even though more and more people are getting their vaccines against COVID-19, it is very important that we continue to take care of each other. Therefore, always wash your hands with soap and water or use alcohol gel, avoid gatherings, keep a safe distance from other people and wear a mask".

At the end of this text, we perform an attention check where we ask respondents a factual question about the text they just read. This is a true or false question about the following statement: "Last month, a campaign was launched to inform the public about the importance of sanitizing hands, avoiding crowding, and wearing a mask." The outcome questions of this experiment are as follows (responses are provided in a seven-point Likert-type scale on level of agreement):

1. On a scale where 1 represents "strongly disagree" and 7 "strongly agree", to what extent do you agree with the carrying out of the campaign described in the text?
2. Wearing a mask helps to prevent the spread of COVID-19.
3. Hand sanitizing helps to prevent the spread of COVID-19.
4. Keeping a safe distance from one another helps to prevent the spread of COVID-19.
5. I will wear a mask whenever I leave home.
6. I will sanitize my hand whenever I can.
7. I will keep a safe distance from other people whenever I can.
8. I will leave home only when necessary.
9. I will not join social events.

4.H Descriptive statistics – study 2

	All	Cue	Control	Diff.
Gender: Woman	0.47	0.47	0.47	-0.00
Race: White	0.58	0.58	0.59	0.01
Education: more than high school	0.76	0.75	0.77	0.01
Age: 40 or more	0.46	0.47	0.45	-0.01
Bolsonaro supporter	0.42	0.42	0.41	-0.01
Political knowldge	0.85	0.85	0.85	-0.00
Cognitive resources	0.47	0.47	0.47	-0.00
Trust in scientists	0.75	0.75	0.75	-0.00
General support for Bolsonaro	-0.01	0.00	-0.02	-0.02
Political index strenght (Bolsonaro opponents)	0.58	0.57	0.58	0.01
Political index strenght (Bolsonaro supporters)	0.52	0.52	0.52	-0.00
Support for nasal spray	-0.00	-0.05	0.05	0.11***
Support for social distancing	-0.00	0.03	-0.03	-0.06
N	2,997	1,505	1,492	

Table 4.H.1: Descriptive statistics for cue and control conditions

4.I Triple interactions – study 2

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Below p50 cog. resources × Pol. social id × Cue	-0.358**	0.193	-0.182*	0.241
	(0.169)	(0.229)	(0.108)	(0.317)
Above p50 cog. resources × Pol. social id × Cue	-0.265	0.619**	-0.235*	0.862**
	(0.211)	(0.313)	(0.135)	(0.434)
N	1753	1244	1751	1243
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.091	0.101	0.044	0.125

Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey (ii) Estimations also include controls for an indicator for below p50 of cognitive resources, an indicator for cue condition, the political social identity index, and interactions between these variables ; (iii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.I.1: Triple interaction

4.J Other pre-registered analysis – study 2

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Cue nasal spray × Below p50 pol. identity	-0.153***	-0.015		
	(0.053)	(0.067)		
Cue nasal spray × Above p50 pol. identity	-0.276***	0.058		
	(0.063)	(0.072)		
Above p50 pol. identity	-0.166***	0.330***	0.132***	-0.404***
	(0.059)	(0.071)	(0.037)	(0.099)
Cue campaign× Below p50 pol. identity			0.031	0.080
			(0.034)	(0.094)
Cue campaign × Above p50 pol. identity			-0.042	0.227**
			(0.040)	(0.100)
N	1752	1240	1750	1239
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.082	0.095	0.049	0.114

Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.J.1: Strength of Political Identity as Moderator

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Cue nasal spray × Below p50 trust in science	-0.244***	0.050		
	(0.063)	(0.062)		
Cue nasal spray × Above p50 trust in science	-0.172***	-0.019		
	(0.054)	(0.087)		
Above p50 trust in science	-0.055	0.104	0.188***	0.651***
	(0.059)	(0.075)	(0.037)	(0.101)
Cue campaign × Below p50 trust in science			0.076*	0.218***
			(0.039)	(0.083)
Cue campaign × Above p50 trust in science			-0.060*	0.027
			(0.034)	(0.116)
N	1752	1240	1750	1239
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.065	0.055	0.056	0.141

Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.J.2: Trust in Science as Moderator

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Cue nasal spray × Below p50 cog. resources	-0.216***	-0.005		
	(0.046)	(0.056)		
Cue nasal spray × Above p50 cog. resources	-0.148*	0.153		
	(0.090)	(0.114)		
Above p50 cog. resources	-0.083	-0.085	-0.040	-0.043
	(0.073)	(0.094)	(0.046)	(0.129)
Cue campaign × Below p50 cog. resources			0.000	0.113
			(0.029)	(0.077)
Cue campaign × Above p50 cog. resources			0.004	0.260*
			(0.057)	(0.157)
N	1752	1240	1750	1239
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.065	0.055	0.042	0.097

Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.J.3: Cognitive resources as Moderator

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Cue nasal spray × Below p50 pol. knowledge	-0.216***	0.046		
	(0.058)	(0.074)		
Cue nasal spray × Above p50 pol. knowledge	-0.182***	0.011		
	(0.057)	(0.069)		
Above p50 pol. knowledge	-0.152**	0.075	0.001	-0.497***
	(0.060)	(0.075)	(0.038)	(0.102)
Cue campaign × Below p50 pol. knowledge			-0.001	0.046
			(0.037)	(0.100)
Cue campaign × Above p50 pol. knowledge			0.001	0.200**
			(0.036)	(0.094)
N	1752	1240	1750	1239
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.070	0.055	0.041	0.120

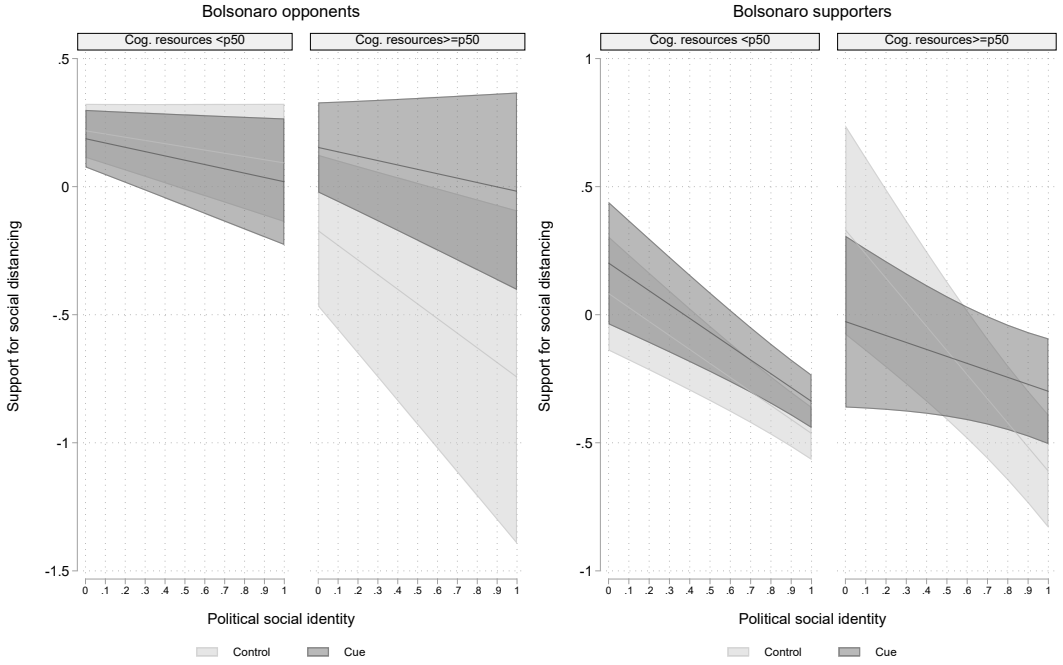
Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.J.4: Political Knowledge as Moderator

	Support for nasal spray		Support for social distancing	
	Bolsonaro opponents	Bolsonaro supporters	Bolsonaro opponents	Bolsonaro supporters
	(1)	(2)	(3)	(4)
Below p50 cog. resources × General support for Bolsonaro × Cue	0.128	0.031	-0.006	0.105
	(0.134)	(0.089)	(0.087)	(0.121)
Above p50 cog. resources × General support for Bolsonaro × Cue	0.063	0.272**	0.020	0.413**
	(0.164)	(0.127)	(0.106)	(0.173)
N	1752	1244	1750	1243
Mean Dep. Var.	-0.325	0.458	0.306	-0.431
R2	0.113	0.089	0.041	0.152

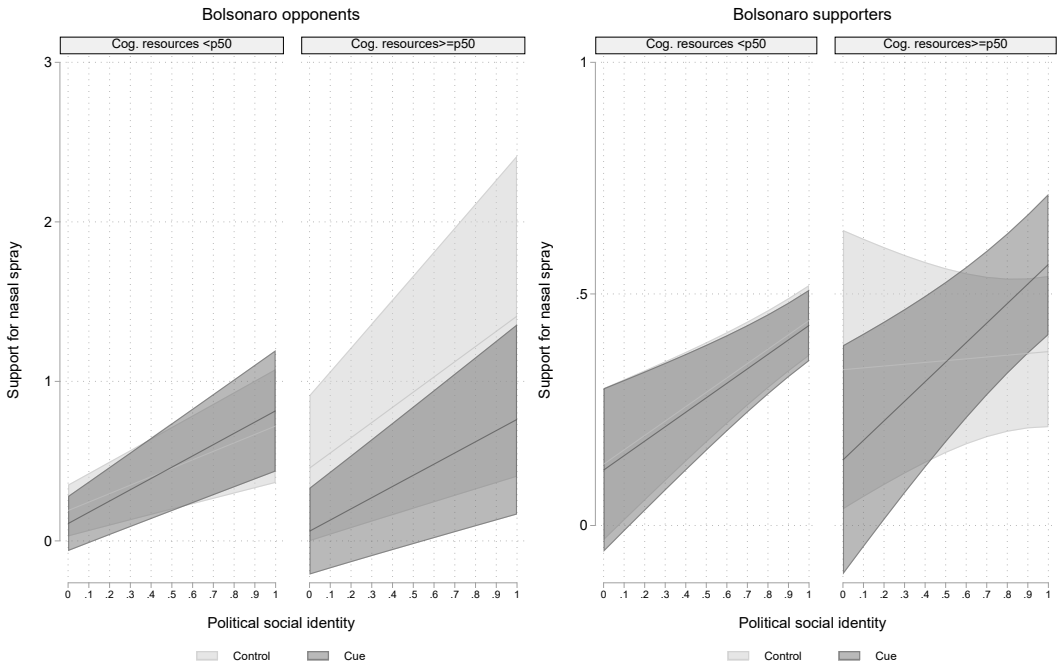
Note: (i) Estimations include controls for gender, race, religion, State of residence, age, and date when individuals answered the survey (ii) Estimations also include controls for an indicator for below p50 of cognitive resources, an indicator for cue condition, the general support for Bolsonaro, and interactions between these variables ; (iii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

Table 4.J.5: Triple interaction – General support for Bolsonaro instead of Pol. social id.



Notes: (i) Graphs based on table 4.J.5, (ii) The figure presents the predicted values for control and treatment groups by level of cognitive resources and strength of political social identity with 95% CIs.

Figure 4.J.1: Heterogeneity by general support for Bolsonaro and cognitive resources – Social distancing



Notes: (i) Graphs based on table 4.J.5, (ii) The figure presents the predicted values for control and treatment groups by level of cognitive resources and strength of political social identity with 95% CIs.

Figure 4.J.2: Heterogeneity by general support for Bolsonaro and cognitive resources – Nasal spray