# Autocrats in crisis mode: Strategic favoritism during economic shocks

Jose Morales-Arilla *[1]

[1]Research Professor, Escuela de Gobierno y Transformacion Publica, Tecnologico de Monterrey

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**Abstract**

This paper introduces a theory of autocratic redistribution and regime stability during economic downturns. It predicts that negative shocks induce autocrats to favor supporters in order to limit the scope of protests to the opposition. I provide evidence consistent with the theory's predictions from two empirical settings. First, I focus on the Venezuelan blackouts of 2019. The Maduro regime was more likely to spare regime-supporting regions affected by the blackout from rationing. Blackout-induced protests and repression fatalities were limited to opposition-leaning regions. I then focus on negative rainfall shocks in Sub-Saharan Africa. National droughts magnify differences in development, protests and state-coercion outcomes in favor of leaders' home regions.

**Keywords:** Autocracy, Economic shocks, Favoritism, Repression, Conflict.
**JEL Codes:** D7, H4, O1.

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*Address: Av. Revolución 756, Nonoalco, Benito Juárez, 03730 Ciudad de México, CDMX. Email: josemoralesarilla@tec.mx. Phone: +1-609-258-8157. I am indebted to Alberto Alesina, Melissa Dell, Edward Glaeser, Ricardo Hausmann, Horacio Larreguy and Nathan Nunn for all their advice and attention. Luis Da Silva, Ana Ibarra and Rui Alleyne provided excellent research assistance. The Growth Lab at Harvard University provided key financial support. I thank insightful suggestions from Marcella Alsan, Peter Buisseret, Jeffry Frieden, Rema Hanna, Alisha Holland, Gabriel Kreindler, Asim Kwaja, Dan Levy, Francisco Monaldi, Mateo Montenegro, Pia Raffler, Leonard Wantchekon, Jaya Wen and David Yang. I am also thankful for participants' comments in Harvard's Economics Department Development Seminar, Development Workshop and Political Economy and Culture Workshop; Harvard's Government Department Political Economy and Political Violence Workshops; Harvard's Growth Lab Seminar; Princeton's Political Economy Research Seminar; the Causal Inference with Spatial Data Workshop at RWI Essen; the 2022 LACEA-LAMES Conference and the 2022 NEUDC Conference. All errors are my own.

# 1 Introduction

Autocrats tend to favor their supporters.[1] While such behavior is often attributed to leaders' preferences (Hodler and Raschky, 2014b), it is unclear whether in-group favors are strategic for regime stability. Favoring supporters may help retain their backing (Padró i Miquel, 2007), but directing benefits towards opponents could prevent the spark of a destabilizing wave of protests (DeNardo, 1985). This latter logic seems especially relevant during economic crises, as downturns broaden grievances across society and enable the coordination of dissent.[2] Economic shocks also impose budgetary constraints on the regime - just as broad citizen demands and grievances peak. Do autocrats respond to shocks hoping to prevent the spark of dissent, or do they aim at just retaining supporters' loyalty? Who do autocrats favor during economic crises?

In this paper, I argue that strategic autocrats balancing these trade-offs as they attempt to remain in office should become more likely to favor their supporters as economic conditions worsen. In good times, economic grievances are low, and autocrats are able to deter protests with moderate investments in repressive capacity. During an economic contraction, autocrats' worst possible outcome is a revolution with broad popular support. One way to avoid such outcome is to appease the opposition by spending on repressive deterrence and targeted favors. Autocrats could also avert a broad revolution by moderating supporters' exposure to the shock. This latter approach saves on appeasement costs, but allows for the opposition to confront the regime in street protest, which may lead to regime change. As the economy tanks and autocrats' resources dwindle, favoring supporters to save on appeasement costs becomes relatively attractive despite protests.

To formalize this argument, I introduce a simple model of redistribution, repression and dissent during economic shocks. Downturns induce shared economic grievances that

[1] There is broad empirical evidence that autocratic leaders favor regions, groups or citizens affiliated with the regime. Franck and Rainer (2012); Kramon and Posner (2013); De Luca et al. (2018); Dickens (2018) provide extensive evidence on ethnic favoritism based on relative health, education, wealth and local development outcomes. Furthermore, Hodler and Raschky (2014b) show evidence of regional favoritism towards autocrats' home regions.

[2] The idea that downturns are destabilizing because they enable the coordination of dissent has been established in the academic literature both theoretically (Lipset, 1959; Kuran, 1989, 1991; Huntington, 1993; Acemoglu and Robinson, 2001) and empirically (Burke and Leigh, 2010; Brückner and Ciccone, 2011; Aidt and Leon, 2016).

increase citizens' protest payoffs. Citizens are politically heterogenous: Opponents hold political grievances against the autocrat that motivate their dissent, while supporters do not. Given an economic shock, the autocrat needs to invest in both repression capacity and targeted appeasement transfers. Taking these investments as given, supporters and opponents choose between protesting or abstaining. Protest choices between both groups operate as strategic complements, as repression losses imposed on demonstrators are spread out for larger protests. In order to avoid a broad revolution (a situation in which both opponents and supporters choose to protest), the autocrat will choose investments to either appease both groups and retain power with certainty, or appease only one group and risk the possibility of regime change. If appeasing only one group, the autocrat will choose to appease its supporters and save on the cost of compensating the opposition for its political grievances. The model's main result is that as shared economic grievances increase with the economic shock, the autocrat's expected payoff of appeasing both groups worsens relative to the payoff of favoring supporters and confronting limited opposition protests through political repression.

This result implies that in-group favors should grow as economic conditions worsen, and as a consequence, the resulting dissent and repression should be limited to the opposition. I provide evidence consistent with these predictions from two separate empirical settings. First, I present a case study on the Venezuelan week-long blackouts of early March of 2019, which occurred during a constitutional crisis that heightened the perceived chances of regime change. The regime responded one month after the blackouts with a power rationing schedule that fully exempted some areas of the country from official power cuts. I start by studying the determinants of the local assignment to power rationing. Local exposure to the blackouts in early March is associated with a higher chance of rationing in early April, but this association is absent for regime supporting areas. I then perform difference-in-differences analyses to assess the effect of the blackout on local protests and repression fatalities. I find that blackouts induced a spike in political protests and repression fatalities, but the effects were limited to opposition-leaning areas. From the perspective of the model, these results suggest that the regime prevented further power cuts on its support base in order to limit the effect of the blackouts on protests during a period of heightened vulnerability to political dissent.

I then show that the implications of the model generalize beyond the Venezuelan context, and help explain local development, dissent and repression outcomes in a cross-country setting. I focus on rainfall shocks in Sub-Saharan Africa, where dependence on rain-fed agriculture is relatively high, and where national droughts have been shown to induce both conflict (Miguel et al., 2004) and democratization (Brückner and Ciccone, 2011). I first evaluate the differences in local nighttime lights, protests and repression outcomes between the regions of leaders' birth and other regions. I find that nightlights, as a measure of local economic development, improve for leaders' birth regions during national droughts. Moreover, I find that protests, repression of dissent and state coercion are lower in these regions and, as predicted by the model, national droughts magnify these differences in favor of leaders' birth regions. Furthermore, I build on data from Dickens (2018) and Franck and Rainer (2012) to assess the effect of ethnolinguistic similarity and co-ethnicity to regime leaders on different development outcomes during national droughts.[3] Once again, I find that the benefits associated with units ethnically affiliated to country leaders magnify during rainfall shocks. From the perspective of the model, these findings are consistent with the view that leaders favor supporters during droughts to limit the scope of dissent and repression to unaffiliated areas.

This paper contributes to the theoretical and empirical literatures on economic shocks, favoritism, protests and regime change. On a theoretical front, the model introduces a simple mechanism to formalize how regimes invest in repression and targeted transfers to overcome economic crises. Consistent with Acemoglu and Robinson (2001), the model argues that economic shocks lead to threats of revolution that may induce regime change.[4] However, the model incorporates citizen political heterogeneities along with the possibility for autocrats to blend repression and redistribution in their strategic responses to economic downturns. As a result, the model highlights how autocrats may choose to selec-

[3]These analyses are presented in Appendix Section C.

[4]Contrary to this perspective, Boix (2003) argues that reduced threats of expropriation should lower the costs for elites to relinquish political control.

tively moderate sudden economic grievances and confront the dissent of excluded groups despite the possibility of being deposed.[5] Moreover, the model expands the formal literature on the political economy of favoritism. Padró i Miquel (2007) argues that autocrats favor affiliated groups to make them "fear" the prospect of being treated as outsiders if the regime falls. The model presented in this paper relies on simpler grievance-based motives for dissent to expand the strategic logic of in-group favoritism to periods of crisis.[6]

Furthermore, the model adds to the literature considering complementarities in citizens' protest choices (Passarelli and Tabellini, 2017; Cantoni et al., 2019; Bursztyn et al., 2021), and the role of focal points as opportunities to overcome protest coordination problems (Granovetter, 1978; Oliver et al., 1985; DeNardo, 1985; Kuran, 1989, 1991; Lohmann, 1994). Interestingly, several contributions in this literature highlight how regimes may decide to appease outsiders to prevent them from inducing other groups to join protests. By adding broad grievances from economic shocks, this model identifies the economic conditions after which the appeasement of outsiders becomes unaffordable, and autocrats move towards a strategy of in-group favoritism. An important aspect of the model is that autocrats facing smaller shocks may choose to favor the opposition to avert dissent.[7]

The evidence presented in this paper is consistent with the model's prediction of strategic in-group favoritism in response to negative economic shocks. Such findings contribute to the literature on the political economy of development, redistribution and dissent. To my knowledge, this is the first study to assess how economic shocks affect autocrats' strategic choices on redistribution.[8] Moreover, the paper expands the literature

[5] While such instances are anecdotally prevalent, they are not on the equilibrium path in Acemoglu and Robinson (2001).

[6] The model's consideration of economic shocks as drivers of citizen protests is grounded in the "relative deprivation theory" proposed by Gurr (1970). This "grievance-based" perspective argues that citizen discontent is driven by the intensity and scope of the mismatch between individuals' material expectations and actual conditions, and that attributing the responsibility for such gaps on the political establishment legitimizes violent rebellions. A recent formalization building on this perspective is Passarelli and Tabellini (2017), who combine "endogenous aggrievement" motives along with strategic considerations in modelling citizen protest choices.

[7] This scenario would be consistent with Wen (2020), who finds that the Chinese government responds to ethnic tensions the Xinjiang region by targeting public job opportunities to male minorities in other regions of the country.

[8] A related but limited literature addresses the political economy of prevention and relief spending during natural disasters. See Cohen and Werker (2008); Cooperman (2021); Garrett and Sobel (2003); Reeves (2011); Strömberg (2007); Kahn (2005).

on regional and ethnic favoritism (Franck and Rainer, 2012; Kramon and Posner, 2013; Hodler and Raschky, 2014b; De Luca et al., 2018; Dickens, 2018). First, I consider differences in protest and repression outcomes between leaders' regions of origin and other regions. To my knowledge, this is the first study to document lower dissent and coercion in leader-affiliated regions. Importantly, I find that national droughts magnify differences in development and conflict outcomes in favor of regime-affiliated regions.[9]

The paper continues as follows: Section 2 summarizes the theoretical model. Section 3 presents the 2019 Venezuelan Blackouts case-study. Section 4 presents evidence from Sub-Saharan Africa. Section 5 concludes.

# 2 Model summary

In this section, I briefly describe the structure and predictions from the theoretical model of autocratic redistribution, protest and repression during economic shocks, which I develop in full in Appendix Section A. The model has three agents, the autocrat, the supporters and the opposition. Economic shocks ($Z$) are the difference between actual and expected incomes, and are known to all agents at the beginning of the game. While supporters only experience economic grievances from the economic shock, the opposition also holds a political grievance against the regime.

Citizens will decide whether to protest or not based on how their political and economic grievances measure in comparison to the costs of experiencing repression during protests. Protest choices are strategic complements, as the costs of repression are lower if protests are larger. Before supporters and opponents decide whether to protest or not, the regime will decide how much to invest in repression and in targeted transfers to ameliorate grievances. The costs of investing in repression for the regime are convex.

The regime's objective is to maximize expected rents from remaining in office, net of repression costs and targeted transfers. Rents from office are affected by the economic

[9]While these results are fully consistent with the model's proposition, it remains possible that rainfall shocks magnify differences on development outcomes by exacerbating costly dissent and coercion in rival regions. The Venezuelan case-study overcomes this concern by focusing on a specific policy response to a broad economic shock during a period of heightened political instability.

shock. In the absence of protests, the regime remains in office with certainty. If both groups protest, the regime is deposed with certainty. If only one group protests, there is a known probability that the regime is deposed. Once a negative economic shock is realized, it is never optimal for the regime to allow both groups to protest, so it will engage in some repression investments and targeted transfers in order to appease society.

The regime needs to choose whether to appease both groups and remain in office with certainty at a higher cost, or to allow for partial protests by one of the groups at a lower cost but risking the probability of being deposed. A key point is that, if opting for partial protests, it will always be cost-effective for the regime to appease supporters, as they do not require compensation for past political grievances.

At very low negative economic shocks, investing strictly in repression is strategic for the regime, as marginal costs are low and it affects both groups' payoffs. However, given the convexity in repression costs, the regime will start using targeted transfers at some point during stronger economic shocks. At mild shocks, the rent of remaining in office with certainty is high and the costs of fully appeasing society are low. However, as economic shocks grow, rents of certain office dwindle and the costs of full appeasement grow. As shown in Figure 1, the difference between the regime's expected payoffs under no protests and under partial protests will shrink for stronger economic shocks, and will actually become negative after a threshold shock level ($Z^*$).

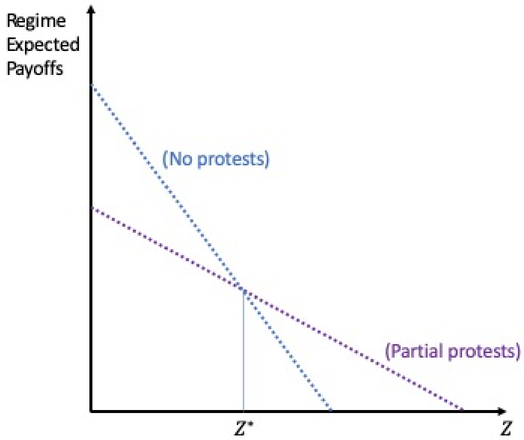



Figure 1: Regime returns for full and partial appeasement strategies

For economic shocks under $Z^*$, the regime will achieve full appeasement through repression and potentially through a transfer vector that benefits the opposition. But as shown in Figure 2, for shocks beyond $Z^*$, the regime will opt for partial appeasement by investing in repression and targeted transfers for its supporters. These “in-group” transfers will continue to grow for even greater economic shocks. In this scenario, the regime will engage in confront opposition protests, as it was not appeased.

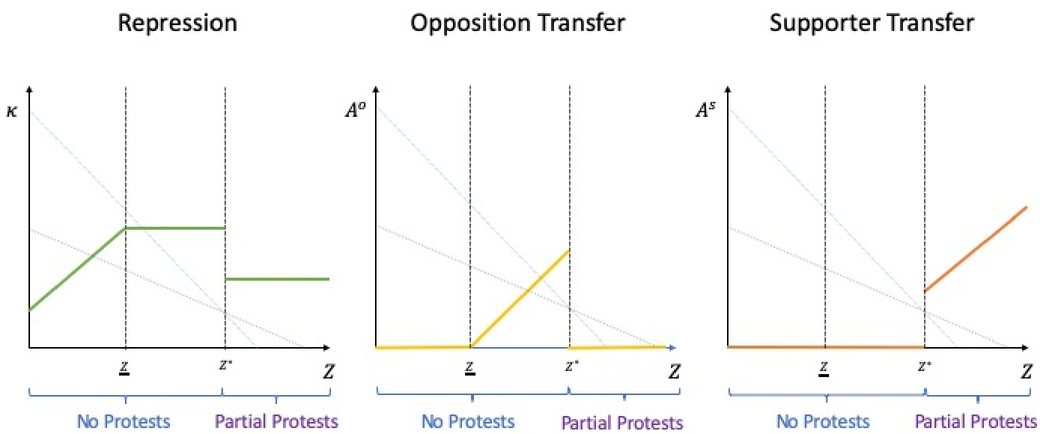



Figure 2: Regime choices as a function of the economic shock

The key implications of the model that I take to the data is that stronger economic shocks induce regimes to transfer favors to their supporters ("in-group favoritism") so that they do not join the opposition in the ensuing protests ("limited dissent"). Testing this hypothesis empirically requires observable variation in exposure to economic shocks, in economic policies and outcomes, in expressions of dissent, in measures of political repression, and in the degree of affiliation with the current regime.

# 3 The Venezuelan Blackouts of March 2019

The purpose of this section is to test the model's prediction that regimes confronting a threat of revolution should limit the effect of shocks on their supporters in order to limit the scope of dissent. The implication of this proposition is that we should expect stronger political heterogeneity in shock-related relief policies and in the levels of protests and repression in areas more strongly affected by an economic shock. I look at the case of the Venezuelan blackouts of early March of 2019, which occurred in the midst of a constitutional crisis that threatened to induce a democratic transition in the country. A thorough description of the empirical setting is provided in the Appendix Section B The case is useful because the distribution of power-rationing decisions aimed to ameliorate the economic effects of the blackouts are observable. Moreover, we observe cross-sectional variation in the local exposure to the blackouts, along with weekly panel variation in local protests, along with monthly panel variation in repression fatalities. I explore the main effect of the blackout and its heterogeneity along the regime's baseline electoral support on both the regime's power rationing choices, on citizens' political protests, and on the number of repression fatalities. I find that all results are consistent with the model's predictions.

### 3.1 Data

I measure local exposure to the blackouts in early March of 2019 in the cross-section as the drop rate in total daily nightlight radiance emanated from an administrative area[10] during the 5 days of the original blackout (between March 07 and March 12) in comparison to the 5 days prior. The reasons for focusing on this initial shock are two-fold. First, anecdotal evidence suggests that areas disproportionately affected by the original blackout in the north-west of the country were more likely to experience aftershocks and power supply irregularities later in 2019.[11] But perhaps most importantly, events during this initial shock were not endogenous to the regime policy responses that I study as outcomes.

Daily nightlights data comes from NASA's Black Marble Project[12], which provides information from the Visible Infrared Imaging Radiometer Suite (VIIRS) in the NASA-NOAA Suomi National Polar-orbiting Partnership (Suomi NPP) satellite. In particular, I use the VNP46A1 data product, which provides 500m $\times$ 500m grid data on science-quality sensor radiance measures. Each grid takes values from 0 to 65,534 nW/(cm2 sr). In order to aggregate measures at the administrative unit level, I first collect grids around the Venezuelan shapefile and remove grids affected by oil and gas flares, which are present in the eastern region of Furrial and in the Paraguaná Peninsula.[13]. I then calculate the total radiance of the administrative unit as the zonal sum for the grids within each administrative unit's polygon.[14]. I finally add the relevant days for the pre-blackout reference and the original blackout period, and calculate the drop rate of total radiance between the two periods. Figure 3 shows that blackouts lasted longer in the north-western region, where power supply became much more unreliable even after the

[10] Venezuela has three administrative area levels: States, Municipalities and Parishes. The data sources allow me to focus protest analyses at the municipality level and power rationing analyses at the parish level.

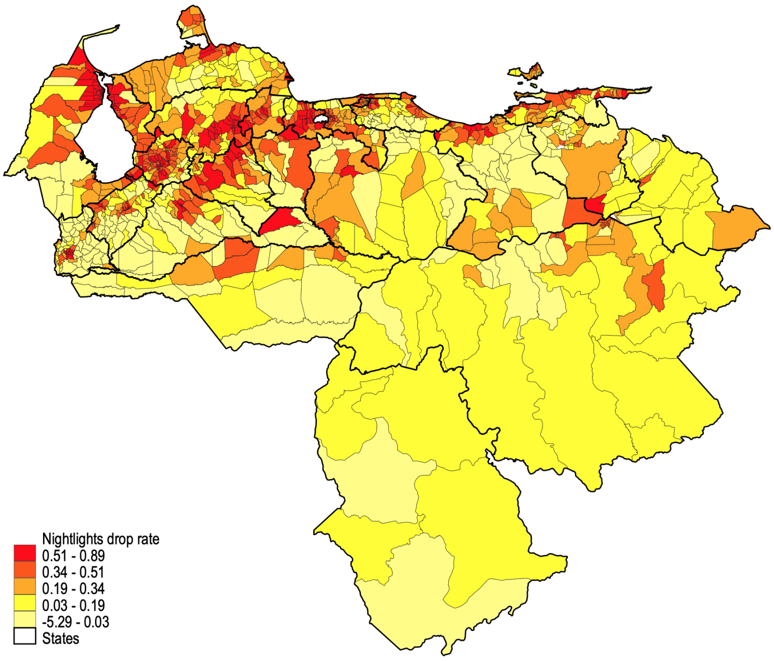
[11] Monash University's IP Observatory provides interesting insights on IP connections to the internet from a set of Venezuelan cities during the crisis. Consistent with the discussion above, the gap between latent and actual internet connectivity was greatest for Maracaibo -the largest city in North-Western Venezuela- both during the March blackouts and all through April and May. See https://ip-observatory.org/observatory/venezuela-crisis-2019

[12] https://blackmarble.gsfc.nasa.gov/

[13] Flare data from https://www.ngdc.noaa.gov/eog/interest/gas_flares_countries_shapefiles.html

[14] Shapefiles for Venezuela's administrative units can be found at UN's Humanitarian Data Exchange. See https://data.humdata.org/dataset/venezuela-administrative-level-0-1-and-2-boundaries

Figure 3: Local exposure to the blackouts of early March 2019



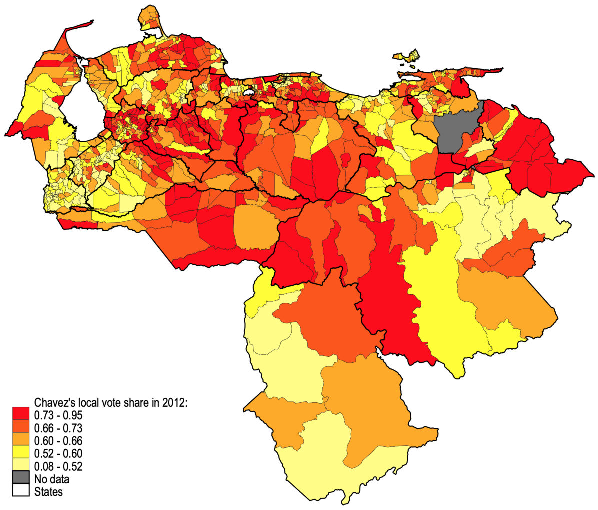

*Notes:* Daily nightlights data from VIIRS collected at the parish level. The drop rate is calculated as the inverse rate of change in the sum of local nightlight radiance between the week prior to the blackouts and the week of the blackout.

initial blackout was contained.[15]

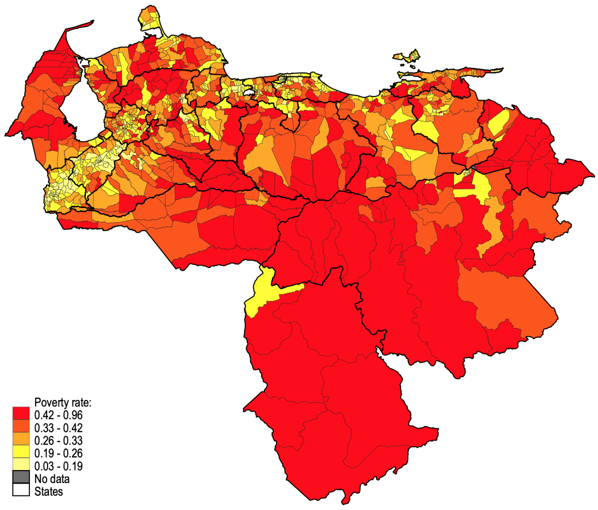
I measure an administrative area's level of support for the Chavista regime as the local vote share for Hugo Chávez in the 2012 National Presidential Election. While the opposition participated in two later national elections (presidential election of 2013 and legislative elections of 2015), this was the last national election in which President Chávez was on the ballot, best capturing the local ideological alignment with the Chavista movement. This data is collected from the Venezuelan National Electoral Council. I measure an administrative unit's poverty rate and population levels from the Venezuelan National Census of 2011. Population density is calculated as the fraction of the population of an administrative unit in 2011 by its total area. Figure 4 shows the spatial distribution in Chávez's 2012 vote share, poverty rate, population and population density across Venezuelan parishes.

[15] 16% of parishes receive a negative measure of the drop rate - that is, they capture a higher total nightlight radiance for the period of the blackout than during the reference period. This may be due to the occurrence of fires in sparsely populated areas during the blackouts or to other factors contributing to the inherently noisy nature of daily nightlights data. However, these parishes account for 7.4% of the population, suggesting that they will receive relatively little weight in later analyses that account for the relative population size of each administrative unit.

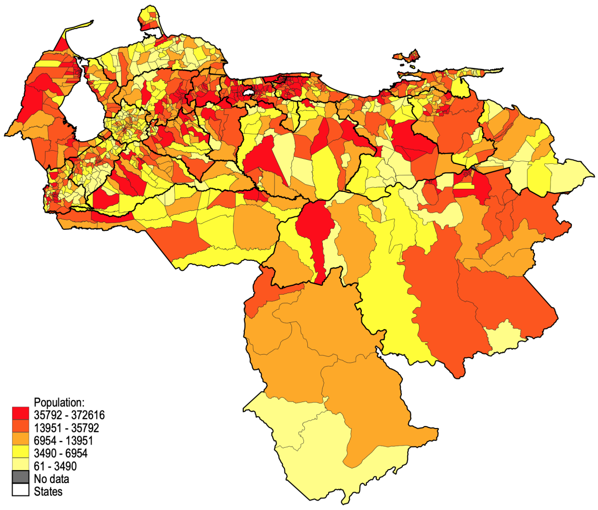
Figure 4: Regime Support, Poverty, Population and Population Density



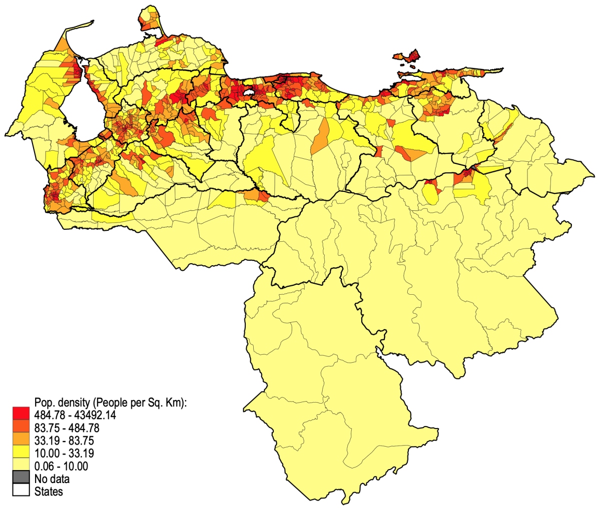

(a) Chávez's vote share in 2012




(b) Poverty rate




(c) Population




(d) Population density

*Notes:* The figure shows the spatial distribution of political, socioeconomic and demographic baseline co-variates across Venezuelan parishes. Electoral data on the Chavista vote share in the 2012 presidential election comes from the Venezuelan Electoral Council, while population and poverty data come from the 2011 Venezuelan Population Census. Population density is calculated by dividing parishes' population by their area as captured in shapefiles from the UN's Humanitarian Data Exchange.

Regarding protests, I collect data from the Venezuelan Observatory of Social Conflict (OVCS), a Venezuelan NGO tracking traditional and social media outlets in order to document events of protests throughout the country. I use data from 2018 and 2019, and produce weekly protest totals at the state and municipality levels. Importantly, I also segment protests according to the grievance expressed in each event, separating protests demanding improvements to utility service provision (chiefly, power and water services) from protests demanding political change. Furthermore, I take data from the Armed Conflict Location Event Data Project (ACLED) to identify events of political repression that led to fatalities.[16] Figure 5 shows the spatial distribution of total utility protests, political protests and fatalities in repression events across Venezuelan municipalities during the first semester of 2019. Figure 6 shows the evolution of weekly protests during the first semester of 2019, and Figure 7 shows the number of fatalities in repression events each month between July 2018 and July 2019.

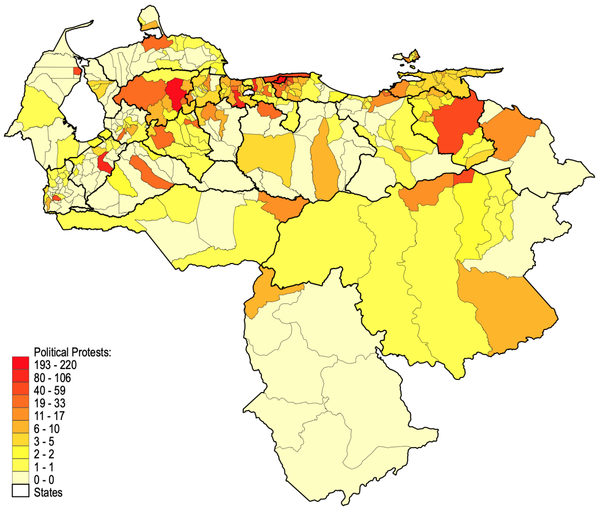
Regarding power rationing after the blackouts, I take data from Prodavinci, a Venezuelan investigative journalism outlet which scraped and coded the rationing schedule at the Parish level. I process this data further to produce a cross-section binary marker for whether a given parish was assigned any power rationing at all or was fully exempted from it.[17] Figure 8 identifies parishes that were rationed from those that were spared from rationing.

Finally, I produce a broad set of variables capturing how each administrative unit relates to the structure of the Venezuelan power supply grid. First, I identify and geolocate all power generation plants and transmission substations in the country from official sources, and then map the network structure of the power lines between substations. I then calculate the distance between the centroids of all administrative units and all elements of the Venezuelan power grid, and importantly, I identify the closest transmission station to each administrative unit, its distance to that transmission station, and its dis-

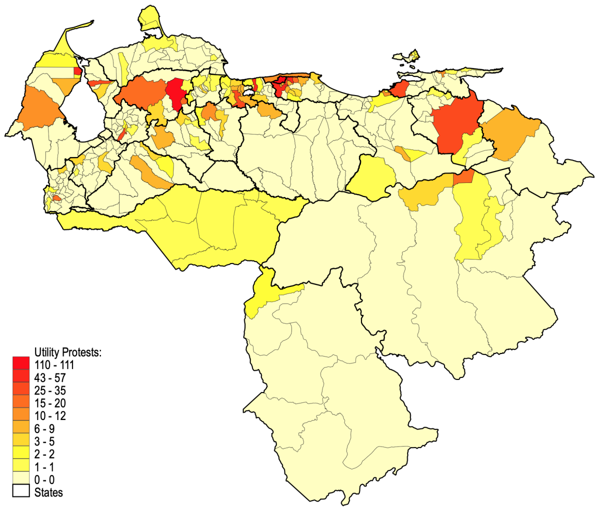
[16] ACLED classifies events of conflict according to the relationship between the actors engaged in that event. I consider events classified as "Violence against civilians", "Arrests" and "Excessive force against protesters" as events of political repression.

[17] I thank Helena Carpio for sharing this information with me. See http://factor.prodavinci.com/lashorasoscuras/index.html

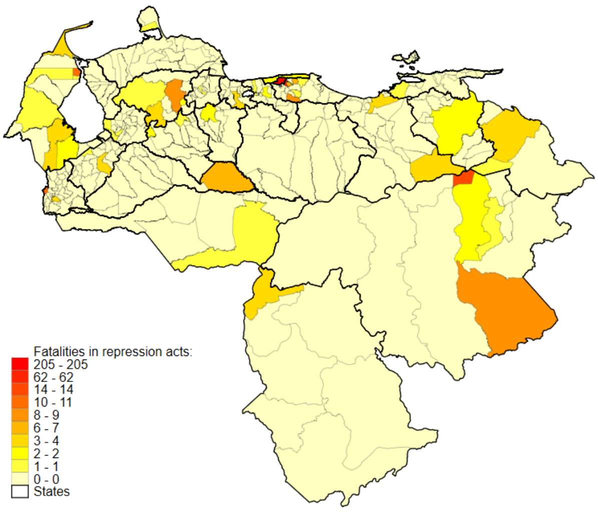
Figure 5: Protests and repression fatalities during the first semester of 2019




(a) Political Protests



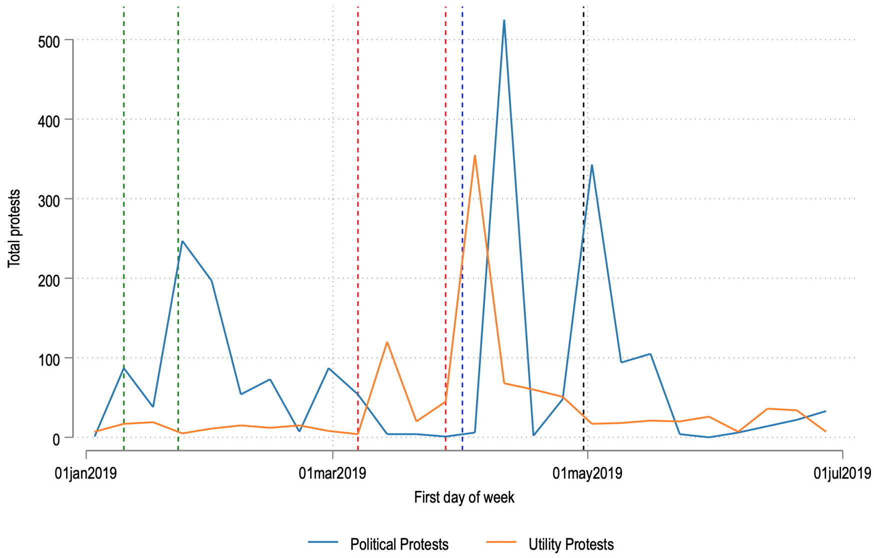

(b) Utility Protests




(c) Fatalities in repression events

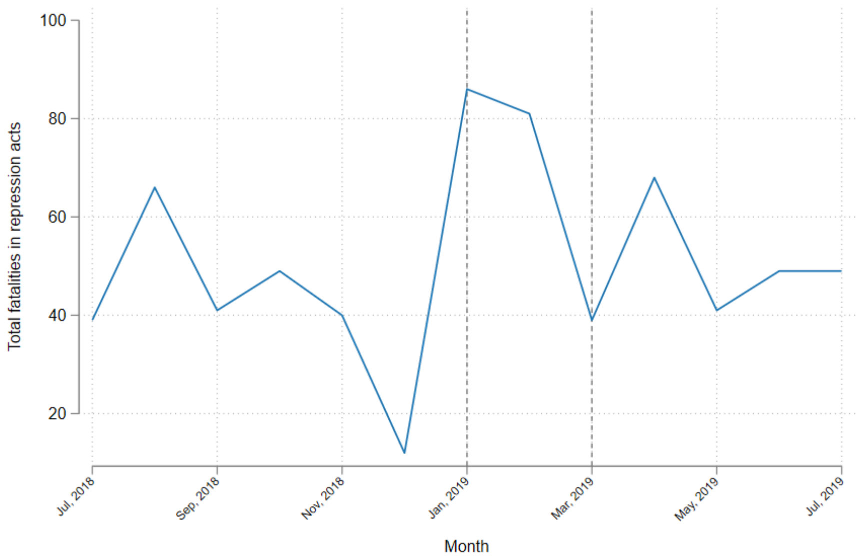
*Notes:* Panels A and B show the spatial distribution of political and utility protests across Venezuelan municipalities during the first semester of 2019. Data is from the Venezuelan Observatory of Social Conflict (OVCS). Protest events are classified as either expressing "political" or "utility" demands according to the grievance expressions associated to each event as coded by OVCS. Panel C shows the spatial distribution of fatalities in repression events during the first semester of 2019. Data comes from the Armed Conflict Location Event Data Project (ACLED). Events classified as "Violence against civilians", "Arrest" or "Excessive force against protesters" are considered acts of "repression". Map shows total fatalities in acts of repression in each municipality in the country.

Figure 6: Weekly Protests in Venezuela, first semester of 2019



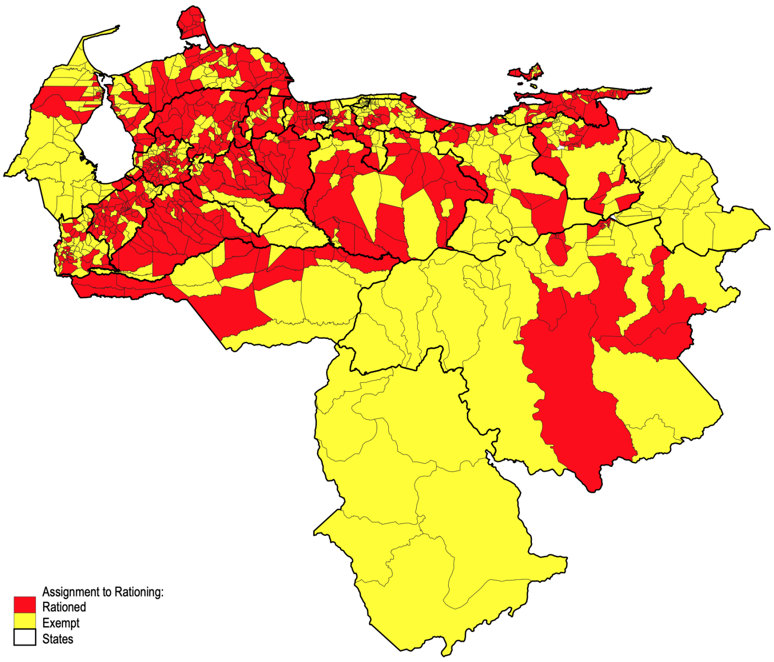

*Notes:* Data comes from the Venezuelan Observatory of Social Conflict (OVCS). Protests are classified as "political" when they focus on expressing rejection against the Maduro regime, and they are classified as "utility" when they focus on demands for improved access to water and power services. Weekly protests counts are shown. Vertical dashed lines highlight events in the constitutional and power supply crises of early 2019. The first two lines (green) mark the end of Maduro's constitutional (Jan. 10) and Guaidó's oath of office (Jan. 23). The next two lines (red) mark the original blackout (Mar. 07) and it's aftershock (Mar. 25). The next line (blue) marks the roll-out of the rationing schedule (Apr. 01). Finally, the last line (black) marks the failed military uprising against the Maduro regime (Apr. 30).

Figure 7: Monthly repression fatalities in Venezuela




*Notes:* Data comes from the Armed Conflict Location & Event Data Project (ACLED). Events classified as "Violence against civilians", "Arrest" or "Excessive force against protesters" are considered acts of "repression". Monthly fatalities during acts of repression are shown. Vertical dashed lines highlight the start of the constitutional crisis (January, 2019) and the start of the blackouts (March 2019).

Figure 8: Rationing schedule




*Notes:* The map shows parishes in the country that the regime assigned to official rationing at the start of April 2019, and those that were exempt from any rationing.

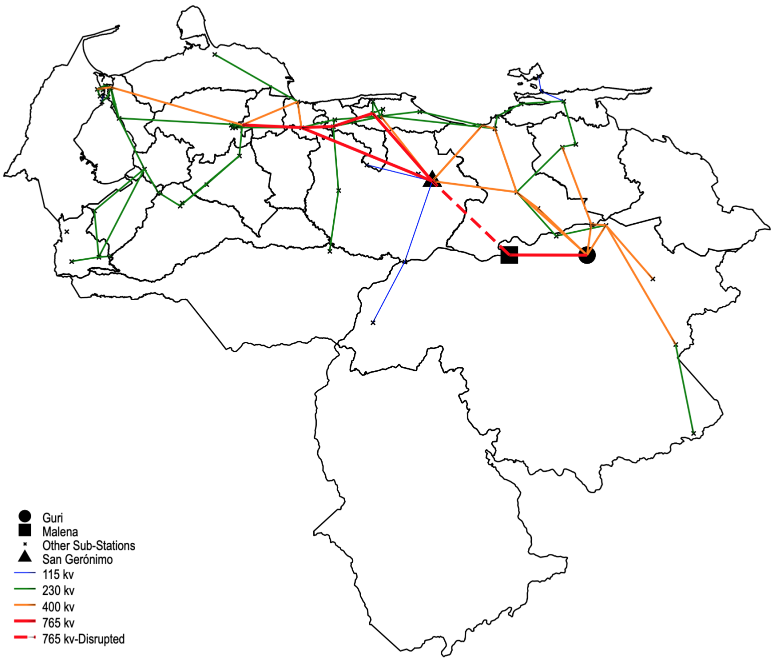
tance to the Guri hydro power plant in South-Eastern Venezuela. Figure 9 shows the structure of the Venezuelan power grid, highlighting the Guri hydropower station and the 765 kv line connecting the Malena and San Gerónimo transmission substations.

Table A.2 provides summary statistics for the main variables used in the analyses that follow.

## 3.2 Local Power Rationing after the National Blackouts

I now study the political heterogeneity in the connection between the local exposure to the blackout and the assignment of different parishes to the power rationing schedule implemented in April of 2019. The rationing schedule provides an explicit measure of the regime's spatial priorities in responding to the blackouts. However, this cross-section outcome incorporates both the regime's political priorities and the technical realities determining the local exposure to the blackouts and the possibility of reconnecting different areas to the country's main power grid. For this reason, I study the association between parishes' exposure to the blackouts and political profile with the chance of rationing con-

Figure 9: Structure of Venezuela's power grid




*Notes:* The map shows the location of all network transmission substations in the country and the transmission lines connecting them. The Guri Hidropower plant and the Malena and San Gerónimo substations and connecting line are highlighted as the main power generation source and the point of disruption in the transmission grid that induced the blackouts of early March 2019.

sidering a set of "grid controls" approximating how different parishes relate spatially to the Venezuelan power grid. Specifically, I estimate the following regression specification:

$$S_p = \alpha Shock_p + \sum_{k\in\{Ch,P,D\}} \beta^k C_p^k + \sum_{k\in\{Ch,P,D\}} \gamma^k Shock_p * C_p^k + f(G_p) + \epsilon_p \qquad (1)$$

where $S_p$ is a dummy variable for whether parish $p$ was spared from power rationing or not, $Shock_p$ is the local nightlights drop rate, and $C_p^k$ is the value of each of the $k$ cross-section co-variates in parish $p$. These covariates are the Chavista vote share in the 2012 presidential election, and the poverty rate and population density as reflected in the 2011 population census. Importantly, $f(G_p)$ is a flexible vector of controls capturing the spatial connection between each parish and the network structure of the Venezuelan power grid. This function is shaped by a set of fixed-effects for the closest power transmission sub-station to a parish, the distance between the parish's centroid to that closest sub-station, the distance of the centroid to the Guri hydropower plant, and interaction terms between all these variables. All regressors are standardized so that coefficients can be interpreted as the effect of a 1 s.d. increase in the regressor. Regressions weight all parishes by their respective population in 2011, and standard errors are clustered considering spatial correlation within a 200 km. bandwidth (Conley, 2010). All regressions exclude parishes in the Caracas metropolitan area from the sample in order to guarantee that conclusions are not driven by the special political treatment given to the capital city. The coefficients of interests are $\alpha$, $\beta^{Ch}$ and $\gamma^{Ch}$, which capture the average association between a 1 s.d. increase in the local exposure to the shock, in the baseline level of regime support, and their interaction with the probability of being spared from the regime's power rationing schedule.

Table 1 provides estimates for Equation 1. Column 1 shows no statistically significant association between the blackouts or regime support with the rationing schedule before controlling for the structure of the power grid. However, after considering the interaction between both terms, Column 2 suggests that the effect of a 1 s.d. increase in regime support on the probability of being spared from rationing grows by 3.4pp in parishes with a 1 s.d. higher exposure to the blackouts. Comparing parishes that connect similarly to the power grid reveals technical and political motives behind the regimes' rationing choices. Column 3 adds the "grid controls" described above and shows that parishes suffering a 1 s.d. higher exposure to the blackout experience a 5 pp lower probability of being spared from power rationing, while a 1 s.d. increase in baseline regime support associates with a 8.2 pp higher probability of being spared. Column 4 assesses the political heterogeneity in the technical effect of blackouts on power rationing, and confirms the results described in Column 2. Column 4 provides the "baseline" reference for later regression tables. Figure 10 builds on the results from Column 4 to provide estimated marginal effects of the local exposure to the blackout on the regime's rationing choices at different levels of baseline support. The figure confirms that the technical connection between local blackout exposure and power rationing is only present in opposition-leaning areas.

Table 1: Blackouts, Regime Support and Power Rationing

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Parish spared from rationing | | | |
| Shock | -0.0356 | 0.0126 | -0.0499** | -0.0425** |
| | (0.0222) | (0.0210) | (0.0236) | (0.0195) |
| Regime Support | -0.0205 | -0.0263 | 0.0824*** | 0.0723*** |
| | (0.0264) | (0.0232) | (0.0292) | (0.0275) |
| Shock × Support | | 0.0344* | | 0.0341*** |
| | | (0.0191) | | (0.0123) |
| Observations | 1,076 | 1,076 | 1,076 | 1,076 |
| R-squared | 0.037 | 0.067 | 0.533 | 0.536 |
| Socioeconomic Controls | Yes | Yes | Yes | Yes |
| Grid Controls | No | No | Yes | Yes |

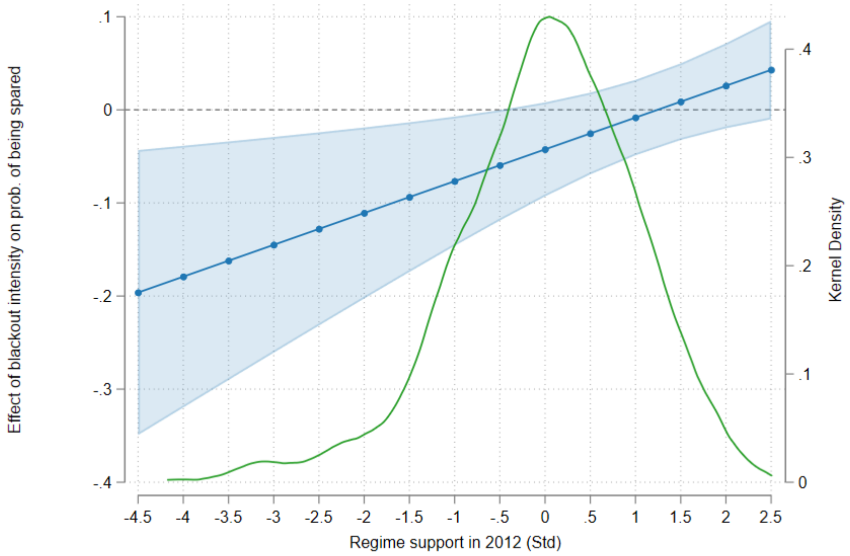
*** p<0.01, ** p<0.05, * p<0.1

*Notes:* This table summarizes key results of linear probability models assessing the determinants of the regime power rationing choices for April 2019 as expressed in the published schedule. All regressions control for local poverty rates and population density, and Columns (2) and (4) add additional interaction terms between these socioeconomic controls and the local exposure to the blackout. Grid controls considered in Columns (3) and (4) include fixed effects for the closest transmission sub-station to each parish's centroid, the distance to that sub-station, the distance to the Guri dam and interaction terms between the three. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

I provide further evidence that these results are not driven by politically "split" parishes. A seminal insight in political economy is that politicians should target "swing voters" who are not uncompromising in their political behavior (Downs et al., 1957; Lindbeck and Weibull, 1987; Feddersen and Pesendorfer, 1996; Robinson and Torvik, 2009) and who may reside in politically split regions. Moreover, there may be information advantages of protecting regime support in split areas of the country (Balcells, 2010). Table A.3 considers whether a split level of regime support affects informs the regime's rationing choices.[18] Column 1 provides the baseline specification as reference. Column 2 shows no statistically significant effect of split support on rationing choices. Column 3 confirms both the results of the baseline specification and the absence of independent

[18]The degree to which the support for the regime is considered "split" is measured by the negative of the absolute difference between a given parish and the average level of regime support across all parishes.

Figure 10: Marginal effect of the blackout at different levels of regime support.




*Notes:* Figure provides estimates of the effect of 1 s.d. increase in the local exposure to the blackout on the probability of being spared from power rationing at different levels of Chávez's vote share in 2012.

effects for the split support.[19]

Furthermore, I evaluate whether these results can be explained by the deployment of prior power infrastructure favors towards regime-supporting regions. While the lion share of the Venezuelan power grid was built before Chávez first took office, later investments could explain these results if any supplementary infrastructure allows blackout-affected, regime-supporting regions to regain access to power supply and avoid the need to be rationed. To address this possibility, I leverage information about the location of *"Generación Distribuida"* local power plants procured and installed by the Government between 2009 and 2011.[20] While small in comparison to the inherited installed power generation capacity in the country, these investments constituted the largest addition to the power generation system in Venezuela during the Chávez and Maduro administrations.[21] Most importantly, the small scale of each investment allowed for the pursuit of

[19]Controlling for split support does make the estimates for the effects of regime support more imprecise. This problem of collinearity is explained by the fact that the measure of split support is a linear transformation of the level of regime support at each side of its average level. Still, we observe that the estimated effects of regime support on power rationing are largely unaffected.

[20]Information about the location and power generation capacity of each of these power plants comes from Corpoelec, the national electricity company. See https://www.slideshare.net/guest5b2b41/misif3n-revolucif3n-energe9tica

[21]These 117 localized plants added 1,295 MW to the Venezuelan power generation system. As refer-

local political priorities in their deployment. Table A.4 tests whether controlling for State fixed-effects or/and for the local presence of one of these "local plants" affects the main results. The main conclusions of the analysis remain unaffected.

Finally, Table A.5 tests for the possibility that the main results are driven by alternative political or economic mechanisms. In particular, I study whether the results are robust to controlling for, or are specific to, areas with a high reach of the 4G cellular network, areas with Military barracks, and oil producing regions. The regime might have decided to ration electricity in blackout-affected, opposition-leaning areas of the country in order to limit the opposition's access to social networks and other protest coordination-enabling technologies. If this was the case, we would expect the results to concentrate in areas with high baseline access to these technologies. I measure this baseline access with data from the OpenCellID.[22] I measure the share of the area in each parish that is covered by the 4G Network. Column 1 shows that the main results are robust to controlling for the reach of the 4G network, and Column 2 shows that the main results are not largest for areas with high network coverage. Similarly, the regime may have opted to spare affected regime-supporting regions in order to prevent the military from noticing the collapse of the regime's popular support. If this was the case, the main effects of the study would be expected for areas with presence of military units. I analyze whether the presence of military barracks explain rationing choices.[23] Column 3 shows that the main results are robust to controlling for the presence of military barracks, while Column 4 shows that the results are not contingent to parishes with military barracks. Finally, rationing decisions may have been geared towards improving power access in regime-supporting oil producing regions only supporters work in the oil sector, and their protests would disrupt oil operations. If this was the case, results would concentrate in oil producing regions in the country. Column 5 shows that the main results are robust to controlling for an indicator of local presence of oil production. Column 6 shows that effects the main results do not seem exclusive to oil producing areas.

ence, the Guri hydropower plant has an installed generation capacity of 10,325 MW.

[22] See https://www.opencellid.org/

[23] I thank José Gustavo Arocha, Ronna Risquez and Luis Da Silva for their help in building this dataset.

### 3.3 Effects of the Blackout on Protests

Given the availability of panel variation in protest activity, I now study the effect of the blackout on protests building on a difference-in-difference specification considering total weekly protests at the municipality level between September 2018 and July 2019 as outcome variable. Protests are typified by citizen demands, and separated into protests demanding improvements to public utilities and protests anti-regime political protests. I estimate the following regression specification:

$$
\begin{aligned}
P_{mw} = \alpha * Shock_m * Post_w + \sum_{k \in \{Ch,P,D\}} \beta^k * C_m^k * Post_w + \\
\sum_{k \in \{Ch,P,D\}} \gamma^k * Shock_m * C_m^k * Post_w + \psi_m + \psi_w + \epsilon_{mw}
\end{aligned} \tag{2}
$$

where $P_{mw}$ is the total number of protests in municipality $m$ in week $w$. $Shock_m$ is the cross-section variation in municipality $m$'s exposure to the blackout. $Post_w$ is a binary variable identifying whether week $w$ is in the post-blackouts period. $C_m^k$ is the value of each of the $k$ cross-section co-variates (Chávez's vote share in 2012, Poverty rate and Population density in 2011) in municipality $m$. $\phi_m$ and $\phi_w$ stand for municipality and week fixed effects, and $\epsilon_{mw}$ is the error term. All explanatory variables are standardized to interpret estimates as the effect of 1 s.d. differences on the total number of protests. Our main coefficients of interest are both $\alpha$, $\beta^{Ch}$ and $\gamma^{Ch}$, which assess the effect of a 1 s.d. increase in the local exposure to the blackouts, in the baseline local vote share for the regime, and in their interaction on the total number of protests. All regressions exclude municipalities in Caracas from the sample, weight observations by population size and cluster standard errors considering possible spatial correlation within a 200 km. bandwidth.

Table 2 provides estimates for the regression specification decribed in Equation 2, evaluating effects on total protests and in "utility" and "political" protests separately. Column 1 shows that a 1 s.d. increase in the blackout associates with 0.3 additional protests, while a 1 s.d. increase in baseline regime support associates with a drop in 0.8

protests. Column 2 explores the interaction between the blackouts shock and baseline regime vote shares, and finding that the positive effect of the blackout on protests very rapidly attenuates for regime supporting municipalities: a 1 s.d. increase in Chávez's 2012 vote reduces the effect of the shock on total protests by 0.85 protest. Columns 3-4 and Columns 5-6 replicate this analysis looking at utility protests and political protests separately, and document similar patterns, confirming strong political heterogeneities in the effect of the blackout on demands for improvements to utility services and demands for political change.

Panel A in Figure 11 shows week-specific estimates for $\alpha$ on total protests, while Panel B provides week-specific estimates for $\gamma^{Ch}$ on total protests, both taking the week before the blackouts as reference. The figure confirms parallel pre-blackout trends along the local exposure to the shock. Importantly, the figure also confirms that the political heterogeneity in the effect of blackouts did not occur immediately after the blackouts. The key spike in these effects occurs between weeks 4 and 9 after the blackout, pointing to the period between the implementation of the rationing schedule in early April and the failed pro-Guaidó military putsch in early May. Panel C shows the estimated marginal effect of local exposure to the blackout on protest activity at different points of the Chávez's 2012 vote share distribution, confirming that the conclusions are driven by a spike protests in opposition areas of the country relatively affected by the blackouts.

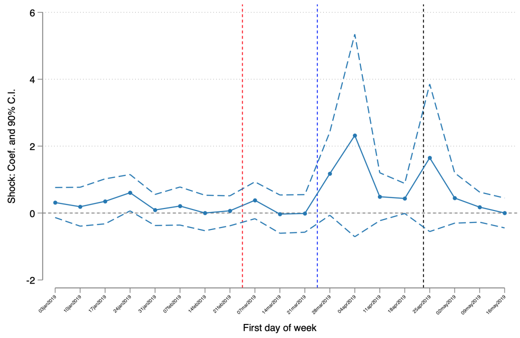
Table 2: Blackouts, regime support and protests

| VARIABLES | (1) All Protests | (2) | (3) Utility Protests | (4) | (5) Political Protests | (6) |
|---|---|---|---|---|---|---|
| Shock × Post | 0.304* | 0.154 | 0.220** | 0.164*** | 0.301* | 0.177* |
| | (0.171) | (0.104) | (0.100) | (0.0584) | (0.157) | (0.0911) |
| Regime Support × Post | -0.824* | -0.612* | -0.442* | -0.313* | -0.785** | -0.585** |
| | (0.425) | (0.322) | (0.243) | (0.183) | (0.390) | (0.293) |
| Shock × Support × Post | | -0.850* | | -0.451* | | -0.761* |
| | | (0.449) | | (0.260) | | (0.421) |
| Observations | 12,144 | 12,144 | 12,144 | 12,144 | 12,144 | 12,144 |
| R-squared | 0.009 | 0.015 | 0.012 | 0.018 | 0.013 | 0.021 |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Week FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Socioeconomic Controls | Yes | Yes | Yes | Yes | Yes | Yes |

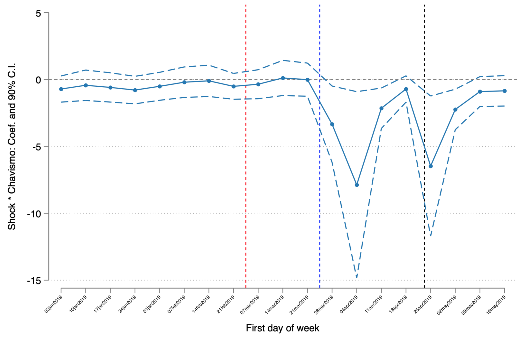
*** p<0.01, ** p<0.05, * p<0.1

*Notes:* The table summarizes key results of a difference-in-differences specification assessing the effect of the local exposure to the blackout on protest activity at different levels of regime support. Columns 1-2 show did and triple-did estimates on total weekly protests in a municipality. Columns 3-4 and Columns 5-6 provide similar estimates for Utility protests and Political protests, separately. All regressions control for the interactions between the local poverty rate and the local population density with the identifier of the post-treatment period, while Columns 2, 4 and 6 also control for the triple interaction between these and the local exposure to the blackout. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

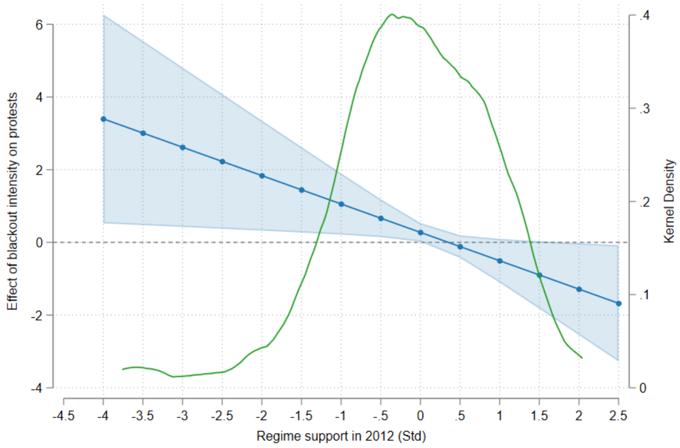
Figure 11: Blackouts, regime support and protests




(a) Week-specific: Shock




(b) Week-specific: Shock × Support




(c) Marginal effect of Shock

*Notes:* Figures show effect on total weekly protests. Panel A provides week-specific coefficient estimates for the local exposure to the blackout. Panel B provides week-specific coefficients for the interaction between the local exposure to the blackouts and the baseline regime support. While the regression analysis was performed considering all weeks between September 2018 and July 2019, only coefficients for the first semester of 2019 are shown. Panel C shows the marginal estimated effect of a 1 s.d. increase in the local exposure to the blackouts at different levels of baseline regime support.

## 3.4 Effects of the Blackout on Repression

Similar to the case of protests, I leverage panel data to study the effect of the blackout on repression fatalities during the political crisis. I again perform a difference-in-difference specification considering total monthly repression fatalities at the municipality level between July 2018 and July 2019 as outcome variable. I estimate the following regression specification:

$$K_{mp} = \alpha * Shock_m * Post_p + \sum_{k \in \{Ch,P,D\}} \beta^k * C_m^k * Post_p + \\ \sum_{k \in \{Ch,P,D\}} \gamma^k * Shock_m * C_m^k * Post_p + \psi_m + \psi_p + \epsilon_{mp} \tag{3}$$

where $K_{mp}$ is the total number of repression fatalities in municipality $m$ in the month period $p$. $Shock_m$ is the cross-section variation in municipality $m$'s exposure to the blackout. $Post_p$ is a binary variable identifying whether month $p$ is in the post-blackouts period. $C_m^k$ is the value of each of the $k$ cross-section co-variates in municipality $m$. $\phi_m$ and $\phi_p$ stand for municipality and month fixed effects, and $\epsilon_{mp}$ is the error term. All explanatory variables are standardized to interpret estimates as the effect of 1 s.d. differences on the total number of protests. Our main coefficients of interest are both $\alpha$, $\beta^{Ch}$ and $\gamma^{Ch}$, which assess the effect of a 1 s.d. increase in the local exposure to the blackouts, in the baseline local vote share for the regime, and in their interaction on the total number of protests. All regressions exclude municipalities in Caracas from the sample, weight observations by population size and cluster standard errors considering possible spatial correlation within a 200 km. bandwidth.

Table 3 provides estimates for the regression specification decribed in Equation 3, evaluating effects on total repression fatalities. Column 1 shows that a 1 s.d. increase in the blackout associates with 0.03 additional fatalities, while a 1 s.d. increase in baseline regime support associates with a drop in 0.1 fatalities. These coefficients, however, are imprecisely estimated and are not statistically significant. Column 2 explores the interaction between the blackouts shock and baseline regime support shares, and finds political heterogeneities in how the blackout affected repression: a 1 s.d. increase in Chávez's 2012 vote reduces the effect of the shock on repression by 0.19 fatalities. Panel A in Figure 12 shows month-specific estimates for $\alpha$, while Panel B provides month-specific estimates for $\gamma^{Ch}$, both taking the month before the blackouts as reference. The figure confirms the patterns detected for protest activity: While pre-blackout trends along the local exposure to the shock are parallel, the effect of blackouts on repression did not occur immediately after the blackouts but in April, after the roll-out of the rationing schedule. Panel C shows the estimated marginal effect of local exposure to the blackout on repression fatalities at different points of the Chávez's 2012 vote share distribution, confirming that the blackout induced a spike in repression fatalities in opposition areas of the country.

As some repression fatalities are recorded during events of "excessive violence against protesters", there is a question of whether the effects on repression constitute an independent test of the model. The model suggests that economic downturns should induce autocratic regimes to repress the opposition as it takes to protest. For this reason, the fact that the two processes are connected is a feature of tests described above. Still, Table A.6 shows that these results are robust to controlling for the concurrent and lagged levels of protests, and that results are robust to excluding fatalities during protest repression.

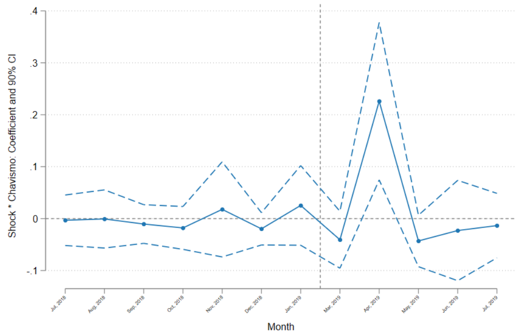
Table 3: Blackouts, regime support and repression fatalities

| | (1) | (2) |
|---|---|---|
| VARIABLES | Fatalities in repression events | |
| Shock × Post | 0.0309 | 0.0223 |
| | (0.0305) | (0.0303) |
| Support × Post | -0.0972 | -0.0355 |
| | (0.0704) | (0.0587) |
| Shock × Support × Post | | -0.188*** |
| | | (0.0665) |
| Observations | 4,316 | 4,316 |
| R-squared | 0.063 | 0.086 |
| Municipality FE | Yes | Yes |
| Month FE | Yes | Yes |
| Socioeconomic Controls | Yes | Yes |

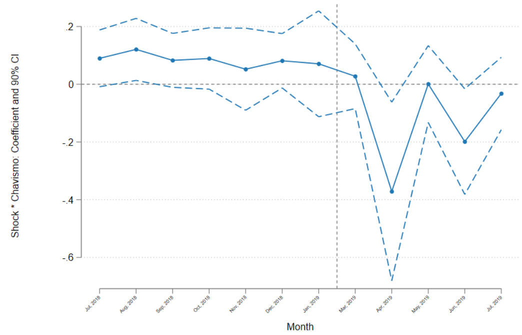
*** p<0.01, ** p<0.05, * p<0.1

*Notes:* The table summarizes key results of a difference-in-differences specification assessing the effect of the local exposure to the blackout on repression fatalities at different levels of regime support. Columns 1-2 show did and triple-did estimates on total monthly repression fatalities in a municipality. All regressions control for the interactions between the local poverty rate and the local population density with the identifier of the post-treatment period, while Column 2 also controls for the triple interaction between these and the local exposure to the blackout. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

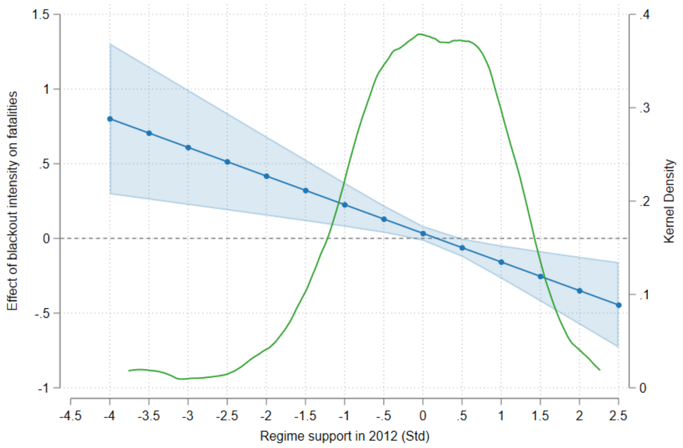
Figure 12: Blackouts, regime support and repression fatalities




(a) Month-specific: Shock




(b) Month-specific: Shock × Support




(c) Marginal effect of Shock

*Notes:* Figures show effect on total monthly repression fatalities. Panel A provides month-specific coefficient estimates for the local exposure to the blackout. Panel B provides month-specific coefficients for the interaction between the local exposure to the blackouts and the baseline level of regime support. Panel C shows the marginal estimated effect of a 1 s.d. increase in the local exposure to the blackouts at different levels of baseline regime support.

## 3.5 Robustness checks

As discussed, the specifications above exclude municipalities or parishes in the Caracas metropolitan area, measure regime support as Chávez's vote share in the 2012 presidential election (the last election before his passing), and cluster standard errors considering the possibility of spatial correlation with a 200 km. bandwidth. Figure A.2 provides estimates and confidence intervals for $\gamma^{Ch}$ in equations 1, 2 and 3 considering a number of robustness checks. First, I include locations within the Caracas Metropolitan Area. Second, I measure regime support as the average Chavista vote share in the 2012, 2013 and 2015 national elections. Third, I cluster standard errors at different bandwidths around the original 200 km. level. Panel A provides results for the probability of being spared from rationing, Panel B provides estimates for political protests, and Panel C provides estimates for repression fatalities. The three panels confirm the robustness of the original results.

# 4 Favoritism during droughts in Sub-Saharan Africa

This empirical section evaluates the theoretical predictions of model proposed above in an international setting. The claim that regimes hoping to overcome an economic shock will target benefits in favor of their supporters suggests that patterns of favoritism should magnify during bad times. Assessing this distributive implication requires within-country variation in economic and conflict-related outcomes. Moreover, it also requires within-country variation in the level of support for -or affiliation to- the national government. I focus on rainfall shocks in Sub-Saharan Africa. National droughts in this region have been shown to induce conflict (Miguel et al., 2004) and democratization (Brückner and Ciccone, 2011). Moreover, patterns of regional and ethnic favoritism have been documented in this region of the World (Franck and Rainer, 2012; Hodler and Raschky, 2014a; De Luca et al., 2018; Dickens, 2018). According to the model, such patterns of favoritism towards co-ethnics or leader-affiliated regions should compound during national droughts in order to moderate supporters' exposure to its economic consequences, and as a result, limit the scope of the resulting wave of dissent and repression to opponents. In what that follows, I study patterns of regional favoritism and conflict towards leaders' regions of birth. In Appendix Section C I study patterns of ethnic favoritism.

## 4.1 Regional favoritism and conflict during rainfall shocks

I now evaluate the sub-national variation of local nightlights, protests and events of repression of dissent and coercion in Sub-Saharan Africa.

### Data

I perform the analysis for subnational regions using administrative units at the first level (ADM1) as defined in shapefiles provided by the Database of Global Administrative Areas (GADM).[24] I follow Hodler and Raschky (2014a) in using satellite nightlights data as key measure of local economic growth to test for the existence of favoritism. This data comes from the US's National Oceanic and Atmospheric Administration (NOAA),[25] which provides year-grid (1 km $\times$ 1km) raster observations of the average daily light radiance at night after removing observations affected by clouds and other measure-distorting phenomena. The resulting data, which measures spatial variation in nighttime lights driven by human activities and proxies for local economic activity between 1992 and 2013, takes indexed values from 0 to 63. I then aggregate these values for spatial polygons representing the first administrative unit level in every country. This allows me to produce a panel of subnational economic outcomes of comparable quality across countries in Sub-Saharan Africa. Because the resulting variable is highly right-skewed but also has a high proportion of regions taking values of 0, I use the inverse hyperbolic sine (IHS) transformation of total nighttime light values.

I produce region-year totals for events of citizen protests, repression of dissent and state coercion using the Global Database of Events, Language and Tone (GDELT), which tracks media sources to collect a localized dataset of political events starting in 1979. The span of the GDELT data fully covers the 1980-2004 period, which has been the focus of the literature on the effect of economic shocks on democratization (Brückner and Ciccone, 2011; Brückner et al., 2012) and conflict (Miguel et al., 2004; Brückner and Ciccone, 2010). GDELT classifies events according to the Conflict and Mediation Event Observations (CAMEO) classification,[26] and I collect events under the "Protests" classification, which include engagement in political dissent, demonstrations or rallies, hunger strikes, strikes or boycotts, obstruction of passages or blockades, and violent protests or riots. Moreover, GDELT identifies events of State repression of citizen protests from other events of state

[24] https://gadm.org/
[25] https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html
[26] http://data.gdeltproject.org/documentation/CAMEO.Manual.1.1b3.pdf

coercion for this period. To my knowledge, GDELT is the only source to document these events starting in 1980. I assign the country and region of the event according to the assigned geolocation, filtering events for which the geolocation does not capture any subnational precision.[27]

Country-year rainfall levels are collected from NOAA's Global Precipitation Climatology Centre (GPCC).[28] GPCC's "Full Data Product" provides monthly rainfall estimates based on quality-controlled data from from 67,200 stations world-wide starting on 1891. GPCC provides files with monthly rainfall estimates in $0.5° \times 0.5°$ latitude-longitud raster grids with the average daily mm rainfall levels.[29] The data is then aggregated at the country-year with average mm/year levels according to country-wide shape-files. I finally calculate the logarithm of the country-year rainfall level, and then standardize it. I finally take the negative of this value to calculate the "Country Dryness" measure that I use in the analysis below.

Regarding regional affiliations to a country's regime, I follow the literature on regional favoritism by focusing on leaders' location of birth. Specifically, I expanded the dataset used in Larreguy and Marx (2014) in order to identify the location of origin of leaders in Sub-Saharan African countries between 1980 and 2012.[30]. I exclude a few country-year combinations for which the country's leader was born outside of the country. I also identify capital regions in every country.[31]

Finally, while my key measure of economic shocks will continue to be the country-wide dryness levels in each year, I complement these measures with local rainfall data, also from GPCC, aggregating yearly rainfall levels at the region level. I collect key economic and industrial markers at the region level from the African Regional Development Indicators from Monash University's Data-in-Space Initiative.[32]. I use data on the local presence of mines and oil fields; ports and roads; and cropland. Importantly, I classify locations

[27] About 80% of these events in the GDELT dataset provide geolocations with subnational precision within the country of the event.
[28] https://psl.noaa.gov/data/gridded/data.gpcc.html#detail
[29] See Schneider et al. (2016) for more details.
[30] I thank Prof. Horacio Larreguy for sharing their data with me
[31] Dar es Salaam region is marked as Tanzania's capital for the full period of analysis.
[32] https://datainspace.org/index.php/regional-development-indicators-beta/

as "highly agricultural" if the cropland share is above the country's median. I classify regions as with high infrastructure if its road length is above the median or has a port present. Regions are classified as either oil producing or mineral producing by whether there are oil fields or mines present. I collect international oil, food and metal yearly price indices from the IMF, from Jacks (2019) and from the Commodity Exchange Inc. (COMEX). Table A.7 provides summary statistics for the data variables used in the analysis of patterns of regional favoritism and conflict during national rainfall shocks in Sub-Saharan Africa.

### Regression specification and results

I now study the connection between local economic and conflict outcomes, local affiliation with regimes' leaders and national rainfall shocks. I estimate the following regression specification:

$$Y_{r,y} = \beta_1 L_{r,y-1} + \beta_2 D_{c,y-1} * L_{r,y-1} + \phi_r + \phi_{c,y} + \epsilon_{r,y} \tag{4}$$

where $Y_{r,y}$ is the outcome variable in region $r$ and year $y$, $D_{c,y}$ is the Country Dryness measure for country $c$ in year $y$, and $L_{r,y}$ is a binary variable for whether region $r$ is the region of origin for the country's leader in year $y$. $\phi_r$ and $\phi_{c,y}$ are region and country-year fixed effects respectively, and $\epsilon_{r,y}$ is the error term. Standard errors are clustered at the country-year to match the exogenous variation of the rainfall shock. Focusing on the lagged values of the leader's origin and rainfall shocks accounts for the fact that responses to droughts -and their effect on economic and conflict outcomes- are expected to operate with a lag.[33] Hence, I focus my attention on regression estimates for $\beta_2$.

Columns 1-3 of Panel A in Table 4 provide estimates of the effect of regional affiliation to the regime and national dryness on local nightlight radiance between 1992 and 2013. Column 1 shows that local nightlights are somewhat higher in leaders' regions of origin, but the estimate is very imprecise. Column 2 adds the interaction of national dryness

[33]Focusing on lagged economic shocks and region origins is standard practice in the conflict, democratization and favoritism literatures.

with the regime's region of origin. We find that the effect of the leaders' origin at the average national rainfall year is similar to that observed in Column 1, but regime affiliated regions experience a 14% relative improvement in nighttime lights during years that are 1 s.d. dryer. Column 3 adds a number of region-year controls[34] and shows that estimates are again largely unaffected. Overall, Columns 1-3 of Panel A suggest that patterns of regional favoritism are contingent to periods of national droughts.

Columns 4-6 in Panel A of Table 4 provide similar specifications on the total number of protests observed in a location. Column 4 shows that leader regions associate with 2.5 fewer protests. Columns 5-6 show that a 1 s.d. drop in rainfall leads to a further relative drop of 4.5 protests in leader-affiliated regions. Columns 1-3 of Panel B study events of repression of dissent, showing around 0.25 fewer acts of repression on average in leader regions (not statistically significant), and that a 1 s.d. drop in national rainfall induces 0.7 fewer events of this kind in leader regions. Finally, Columns 4-6 of Panel B aggregate all events of State coercion.[35] Leader regions associate with 15-20 fewer acts of coercion on average, but a 1 s.d. drop in rainfall magnifies this difference by 16-17 additional acts. Overall, these results suggests that there is lower dissent and repression of dissent in regime-affiliated areas, and that this difference compounds during droughts. Figure 13 provides estimates for the marginal effect of leaders' origin region at different national dryness levels, confirming that the results discussed above are driven by negative rainfall shocks.

## 4.2 Interpreting effects on development and conflict outcomes

The international evidence on regional and ethnic favoritism has documented robust differences in local or individual development outcomes in favor of units affiliated with the country's leader at a given period. The first result in this subsection and those in the next subsection below confirm this finding, and highlight how differences in favor of leader-

[34]Column 3 controls for interactions between the national rainfall and local identifiers for the capital region and for agricultural areas within the country, for interactions between agricultural areas and an index of food prices, for interactions between oil, gas and mining regions and indices for international oil and copper prices, and for local rainfall levels and their interaction with agricultural areas.

[35]Including those that occur outside of the context of protests. In unreported results, I find that conclusions are robust to excluding events of protest repression.

Table 4: Regional favoritism and conflict during rainfall shocks

Panel A

| VARIABLES | (1) | (2) Nightlights (Inverse Hyperbolic Sine) | (3) | (4) | (5) Protests (Total events) | (6) |
|---|---|---|---|---|---|---|
| Leader's (t-1) Region of Birth | 0.0395 | 0.0477 | 0.0426 | -2.463* | -2.420* | -2.498* |
| | (0.0495) | (0.0487) | (0.0491) | (1.478) | (1.458) | (1.476) |
| Region of Birth × Country Dryness (Log, Std, t-1) | | 0.146*** | 0.152*** | | -4.608*** | -4.487*** |
| | | (0.0431) | (0.0437) | | (1.542) | (1.495) |
| Observations | 13,311 | 13,311 | 13,025 | 19,791 | 19,791 | 19,362 |
| R-squared | 0.902 | 0.903 | 0.902 | 0.515 | 0.516 | 0.517 |
| Controls | None | None | All | None | None | All |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

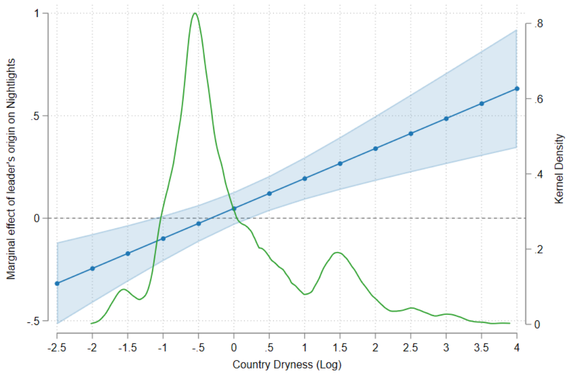
Panel B

| VARIABLES | (1) | (2) Repression of Dissent (Total events) | (3) | (4) | (5) State Coercion (Total events) | (6) |
|---|---|---|---|---|---|---|
| Leader's (t-1) Region of Birth | -0.245 | -0.238 | -0.252 | -14.94** | -14.79** | -14.99** |
| | (0.260) | (0.256) | (0.258) | (6.137) | (6.074) | (6.159) |
| Region of Birth × Dryness | | -0.730** | -0.701** | | -16.82*** | -15.93*** |
| | | (0.304) | (0.294) | | (5.640) | (5.482) |
| Observations | 19,791 | 19,791 | 19,362 | 19,791 | 19,791 | 19,362 |
| R-squared | 0.349 | 0.349 | 0.351 | 0.598 | 0.598 | 0.600 |
| Controls | None | None | All | None | None | All |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

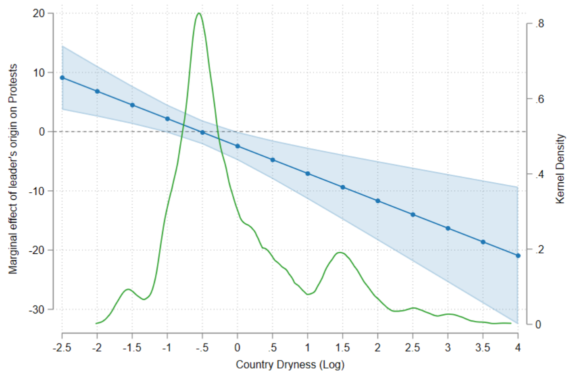
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

*Notes:* Regressions evaluate the effect of leaders' region of birth during national dry years on local nightlights (Panel A, Columns 1-3), protests (Panel A, Columns 4-6), repression of dissent (Panel B, Columns 1-3) and all events of State coercion (Panel B, Columns 4-6). Columns 1 and 4 evaluate the effect of leaders' origins unconditional on rainfall shocks. Columns 2 and 5 add country dryness and its interaction with leaders' origins. Columns 3 and 6 control for interactions between the national dryness and local identifiers for the capital region and for agricultural areas within the country, for interactions between agricultural areas and an index of food prices, for interactions between oil, gas and mining regions and indices for international oil and copper prices, and for local rainfall levels and their interaction with agricultural areas. All regressions control for region and country-year fixed effects. Standard errors are clustered at the country-year level to match the exogenous variation of the national rainfall shocks.

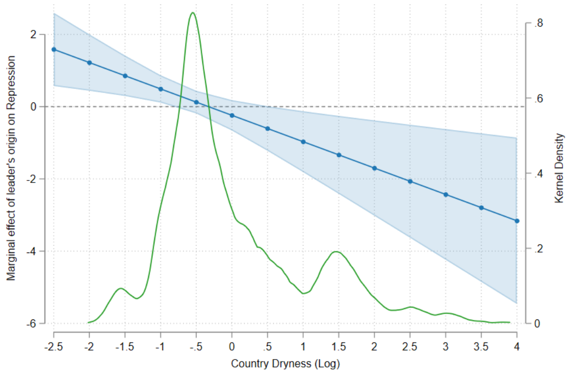
Figure 13: Regional favoritism and conflict during rainfall shocks - margin plots



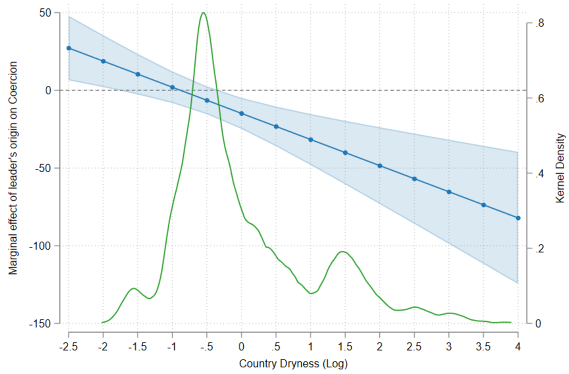

(a) Nightlights




(b) Protests




(c) Repressions of Dissent




(d) State Coercion

*Notes:* Figures show estimated marginal effects of regime leaders' regions of origin at different levels of the national rainfall distribution on local nightlights (Panel A), protests (Panel B), acts of repression of dissent (Panel C) and acts of State coercion (Panel D). These are calculated based on regression outputs shown in Columns 3 and 6 in Table 4 - that is, controlling for interactions between the national rainfall and local identifiers for the capital region and for agricultural areas within the country, for interactions between agricultural areas and an index of food prices, for interactions between oil, gas and mining regions and indices for international oil and copper prices, and for local rainfall levels and their interaction with agricultural areas.

affiliated units magnify whenever countries experience negative rainfall shocks. Since the literature focuses on "favoritism", these patterns are often interpreted as driven by regime choices on the distribution of economic benefits. For instance, Franck and Rainer (2012) highlight three possible distributive channels to explain health and education differences in favor of individuals ethnically affiliated to regime leaders.[36]

However, my analysis also documents a pattern of higher dissent and repression outside of the regions of birth of country leaders, which also magnifies during national droughts. These new findings highlight the possibility of endogeneity in the standing evidence of favoritism. There is ample evidence for the economic costs of conflict. To the degree that dissent and repression may yield local economic costs, it remains possible that differences in nightlights or other development outcomes are driven not by favors from the central government towards affiliated regions or individuals, but by their differential exposure to higher levels of confrontation. It may also be true that, if national rainfall shocks induce dissent in excluded areas, then the magnifying of differences in economic outcomes may also be driven by conflict and not by favors. While my cross-country analysis thus far will remain agnostic on this point, it is important to highlight that both these results are consistent with the main theoretical proposition of this paper, and that the Venezuelan case-study discussed above overcomes this problem by focusing on a policy choice by the central government (the rationing schedule) and not on an economic outcome.

Finally, while the theoretical arguments discussed in this paper take features characteristic of autocratic regimes -namely full budget agency and the possibility of being deposed in the short run- democratic incumbents may face similar pressures for in-group favors during bad times. I leverage data from the Polity II Democracy scores at the country-year level to evaluate whether patterns of favoritism during droughts are greatest

[36] They argue that regimes can directly increase access and quality of health and education services for co-ethnics. At the same time, leaders could support the incomes of co-ethnics, enabling them to take advantage of available health and education services. Finally, policies favoring co-ethnics may improve their future outlooks so that they decide to invest in the education of their children or care more for newborn children. While all these channels are plausible and identifying between them would be of interest, the authors recognize that such assessment is not possible while focusing on development outcomes and not on international comparable development policies.

for Sub-Saharan African countries under dictatorial regimes. Countries are characterized as dictatorships if their Polity II score takes the value of 0 or less. Table A.11 shows that patterns of in-group favors and their growth during national droughts are strongest under dictatorial regimes.

# 5 Conclusions

This paper argues that autocrats confronting a threatening economic shock will choose to minimize their supporters' economic grievances to prevent them from joining opposition protests and avert a broad revolution. The strategic logic behind this hypothesis is that in the face of sudden and shared impoverishment, it should be cheapest to defuse coordinated dissent by moderating the grievance of citizens that do not hold past grudges against the regime. I formalize a proposition of strategic in-group favoritism and limited dissent during stronger economic shocks with a simple model of redistribution, dissent and autocrat stability during economic shocks, considering politically heterogenous citizens with economic and political grievances against an autocratic regime who face complementarities in their protest choices.

I test this proposition in the context of the Venezuelan blackouts of early March 2019, which occurred during a constitutional crisis that heightened the possibility of regime change. Locations more exposed to the blackout were more likely to be assigned to power rationing, but -consistent with the model- this was not the case for regime supporting areas of the country. Unlike opposition-leaning areas affected by the blackout, regime-leaning areas did not observe a spike in protests or repression fatalities at the peak of the constitutional crisis.

The prediction of strategic in-group favoritism during economic shocks travels outside of the Venezuelan context, explaining differences in development and conflict outcomes in favor of regime affiliated regions in Sub-Saharan Africa. Local nighttime light differences in favor of leader-affiliated regions magnify during national droughts. Similarly, differences in infant mortality and in indicators of access to private assets and public services in favor regime-affiliated regions and individuals also grow during droughts. Moreover, I document differences in protests, repression and state coercion in favor of leaders' regions of birth, and these differences also seem to magnify during dry years at the country level.

This paper highlights a number of open avenues for future research. First, the model could be expanded to account for dynamic considerations during transitory economic shocks, and to include a "democratization" outside option for regime leaders. Second, the Venezuelan case-study highlights how high-periodicity satellite data can be leveraged to assess the spatial distribution of natural or economic shocks and governments' responses along political dimensions in other settings. Such methodologies seem most pertinent to the study of natural disaster relief efforts - an agenda that is likely to become prescient as the effects of climate change ensue. Finally, the question of potential endogeneity between development and dissent outcomes in the Sub-Saharan Africa evidence on regional favoritism needs to be addressed empirically by shifting attention from local development outcomes to internationally comparable but subnationally precise measures of governments' distributive policy choices. This could be advanced by considering foreign aid projects in places where autocrats have influence over their location, and by leveraging satellite imagery that can help reconstruct panels of the evolution of public goods such as road and electricity networks.

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# Appendix

# A Model

I now outline a simple model of redistribution, dissent and autocratic stability during economic shocks. The model is an extensive form stage game solved by backward induction. In the model, the autocrat observes an economic shock and has limited agency to deter or appease dissent from regime supporters and opponents by targeting benefits and investing in repression. A strategy of defusing citizen coordination with targeted transfers in favor of regime supporters will allow autocrats to limit the scope of dissent to the opposition, moderating appeasement costs but allowing for the possibility of regime change. The model predicts that as economic shocks grow, autocrats' relative payoffs under this "partial appeasement" strategy improve, so they become more likely to favor their supporters to prevent them from joining opposition protests.

## A.1 Model Setup

### Players, payoffs and sequence of play

There are three groups in society: The autocratic regime ($R$), the opposition citizens ($O$) and the supporter citizens ($S$). There are no within-group coordination or free-riding problems, so that each group can be considered an individual agent.

$R$'s utility boils down to the level of income it can retain. In the autocratic status quo, $A$ captures a fraction of $\theta$ of actual income $y$. In a revolution, which will be determined by citizen protest choices, $R$'s payoff would be 0. In order to avoid the revolution, $R$ can invest in group-specific transfers $A^O$ and $A^S$ and in repression level $\kappa$ to disincentivize protests. $R$ faces convex costs of repression $\frac{\kappa^2}{c}$, where $c$ measures $R$'s baseline repressive capacity.

All agents expect incomes to take a value of $y^e$. The economic shock $Z$ is measured as the gap between expectations and reality ($Z = y^e - y$). The shock generates economic grievances that motivate citizens to protest. $S$ and $O$ citizens differ from each other in their political grievances against $R$: While $S$ citizens have no political grievance against $R$, $O$ citizens do. $T^j$ measures the political grievance for citizen group $j$, and I assume that $T^O = T > T^S = 0$. Finally, citizens protest choices are complementary, since the repression costs experienced by a dissenting group are slashed in half if the other group is also joining the protests.

Consider $\rho^j \in \{0, 1\}$ to be citizen group $j$'s decision to abstain from protesting or to protest. Incorporating economic and political grievances, repression costs, appeasement transfers and strategic motives, the payoff for group $j$ to protest ($\rho^j = 1$) if group $-j$ also protests ($\rho^{-j} = 1$) is:

$$V^j_{1,1} = Z - A^j + T^j - \frac{\kappa}{2}$$

This expression captures that the economic grievance is driven by the combination of the economic shock (which is shared by both groups) and the appeasement transfer received by group $j$ (which the regime can target across groups). The political grievance $T^j$ equals 0 for $S$ and is positive for $O$. Because both groups are protesting, the repression losses of each group are divided by two. In the case that group $-j$ abstains from protesting ($\rho^{-j} = 0$), the payoff for group $j$ to protest is:

$$V^j_{1,0} = Z - A^j + T^j - \kappa$$

Regardless of group $-j$'s decision, the payoff of abstention for group $j$ is always 0:

$$V^j_{0,1} = V^j_{0,0} = 0$$

### Timing of play and possible outcomes for $R$

In the first stage of the game, the actual level of income $y$ is revealed. Upon observing the value of $y$, $R$ determines group-specific appeasement transfers and repression levels. Taking appeasement transfers and repression levels as given, both citizen groups will decide in parallel whether to protest ($\rho^j = 1$) or abstain ($\rho^j = 0$). $\rho = \{\rho^O, \rho^S\}$ is the joint vector of citizen protest choices. If both groups protest ($\rho = \{1, 1\}$), then there is a successful revolution ($X$) and $R$ is deposed, receiving a payoff of 0. If both groups abstain ($\rho = \{0, 0\}$), then there is a revolt failure ($F$). $R$ receives its status quo payoff $\theta * y$ with certainty minus appeasement and repression costs. Finally, if only one group protests ($\rho = \{1, 0\}$ or $\rho = \{0, 1\}$), then the game ends in a confrontation ($C$). Protests will succeed in deposing the regime with probability $p$ and fail with probability $(1 - p)$. The group that protests suffers all repression costs, and $R$ will keep its privileges only if protests are unsuccessful.

## A.2 Citizen protest game

Citizens will decide whether to protest or not taking transfers and repression levels as given. Under the payoff functions shown above, citizen decisions will be contingent on other group choices. Here I provide a mathematical characterization of this citizen protest game.

**Lemma 1** *For all $\kappa$, $A^O$, $A^S$, $T$ and $x$ such that $\kappa \geq 0$; $A^S = A^O \geq 0$; $T > 0$ and $x \in \{0, 1\}$, we know that:*

$$V^O_{1,x} > V^S_{1,x} \tag{5}$$

This is because if $A^S = A^O$, then $V^O_{1,x} - V^S_{1,x} = T > 0$.

**Lemma 2** *For all $\kappa$, $A^O$, $A^S$, $T$ and $j$ such that $\kappa \geq 0$; $A^S \geq 0$, $A^O \geq 0$; $T > 0$ and $j \in \{O, S\}$, we know that:*

$$V^j_{1,1} > V^j_{1,0} \tag{6}$$

This is because, for the possible range of parameter values, $V^j_{1,1} - V^j_{1,0} = \frac{\kappa}{2}$.

Lemma 1 highlights that under no discriminatory transfers, the value that the opposition gets from protesting will be higher than that of regime supporters. Lemma 2 shows that the payoffs of protesting improve when the other group also protests (that is, protests are complementary).

## A.3 $R$'s cost minimization problems

The worst possible outcome for $R$ is a certain revolution ($X$), which would come about whenever both citizen groups protest at the same time. $R$ has two possible strategies to try and prevent a revolution during economic shocks. The first one is to invest in appeasement transfers and repression to the point that both $O$ and $S$ decide to abstain from protesting, which would result in a failed revolt ($F$). The second one is to set transfers and repression levels that appease only one of the groups, which would induce a confrontation ($C$) where the probability for $R$ to retain power becomes $1 - p$. $R$ will consider the cost-minimizing transfers and repression levels to induce each of these outcomes in order to compare their relative payoffs and make a decision. Importantly, let's define $K = \frac{\kappa^2}{c} + A^O + A^S$ to be $R$'s investments in appeasement transfers and repression efforts.

### A.3.1 Strategy profile 1: "Full appeasement"

**Lemma 3** *The cost-minimizing strategy to induce a $F$ outcome ($\rho = \{0, 0\}$) is for $R$ to set the following investment vector as a function of the level of shock $Z$:*

- *If $Z \leq \frac{c}{2} - T$:*

$$\kappa_{F1} = Z + T \ ; \ A^O_{F1} = 0 \ ; \ A^S_{F1} = 0 \ ; \ V(R)_{F1} = \theta(y^e - Z) - \frac{(Z+T)^2}{c}$$

- *If $\frac{c}{2} - T < Z \leq \frac{c}{2}$:*

$$\kappa_{F2} = \frac{c}{2} \ ; \ A^O_{F2} = Z + T - \frac{c}{2} \ ; \ A^S_{F2} = 0 \ ; \ V(R)_{F2} = \theta(y^e - Z) + \frac{c}{4}Z - T$$

- *If $\frac{c}{2} < Z \leq c$:*

$$\kappa_{F3} = Z \ ; \ A^O_{F3} = T \ ; \ A^S_{F3} = 0 \ ; \ V(R)_{F3} = \theta(y^e - Z) - \frac{Z^2}{c} - T$$

- *If $c < Z$:*

$$\kappa_{F4} = c \ ; \ A^O_{F4} = Z + T - c \ ; \ A^S_{F4} = Z - c \ ; \ V(R)_{F4} = \theta(y^e - Z) + c - 2 * Z - T$$

Intuitively, the costs of inducing a full appeasement equilibrium grow with the level of the economic shock. In the absence of a shock, only the opposition holds (political) grievances against the regime, so that inducing full appeasement depends on setting the level of repression at a level such that deters the opposition from protesting conditional on the supporters abstaining. As the shock grows beyond $\frac{c}{2} - T$, the convexity in repression costs now make it an expensive mean to appease the opposition, so the regime starts transferring appeasement transfers to them.[37] The shock, importantly, is also shared by regime supporters, who will start

[37] One possibility is that the value of $T > \frac{c}{2}$. This would mean that the political grievances of the opposition are so large that they would need to receive positive appeasement transfers even in the absence of a economic shock for them to acquiesce to the regime.

to consider whether to protest or not when the shock reaches $\frac{c}{2}$. At this point, the regime increases the level of repression back up, as the alternative is now to provide appeasement to both $O$ and $S$ for their exposure to stronger shocks. Finally, once the shock reaches $c$, the convex costs of repression become such that it's preferable for the regime to send additional appeasement transfers to both the opposition and the regime supporters for their exposure to additional economic grievances.

**Lemma 4** *A situation of "full appeasement" induced by the regime will not be a unique equilibrium if the level of the shock* $Z \geq min\{T; \frac{c}{4}\}$.

Intuitively, the regime induces full appeasement by making the opposition indifferent between protesting and not protesting. Once the shock reaches $\frac{c}{2}$, the regime also needs to make the supporters just indifferent between protesting or not protesting. From lemma 2 we know that both payoffs would improve if the other group protested, so that with the same regime investment vector, both $\rho = \{0, 0\}$ and $\rho = \{1, 1\}$ would be Nash equilibria of the protest game. For shock levels below $\frac{c}{2}$, supporters value of protesting is negative conditional on the appeasement of the opposition, but may be positive if the opposition protests. The value of the shock after which $V^S_{1,1}$ turns positive given the investment vector strategy described above is the minimum value between $T$ and $\frac{c}{4}$. This point highlights the importance of protest complementarities in the model and the potential value of outsider favoritism: The regime often needs to appease the opposition not to avoid a confrontation with them, but to avoid a broad revolution.

### A.3.2 Strategy profile 2: "Partial appeasement"

Alternatively, $R$ could consider the option of appeasing just one group and confronting the other. The reason to do this would be to save on appeasement costs at the expense of some probability of regime change. From lemma 1, it is easy to see that, whatever the level of Z, the costs of appeasing supporters conditional on opposition protests should be cheaper than the costs of appeasing the opposition conditional on supporters' protests.

**Corollary 1** *Define* $K^j_{\{0,1\}}$ *as the regime's cost of appeasing group* $j$ *conditional on group* $-j$ *protesting. Because* $V^S_{1,1} < V^O_{1,1}$ *for any value of* $\kappa$ *and* $A^O = A^S \geq 0$ *(lemma 1), then* $K^S_{\{0,1\}} <$

$K^O_{\{0,1\}}$. *Similarly, define* $V(R)^j_C$ *as the regime's expected payoff of a confrontation strategy focusing on the appeasement of group* $j$. *Given lemma 1,* $V(R)^S_C > V(R)^O_C$.

This means that given a strategy of partial appeasement, it will always be preferable to appease supporters and confront the opposition than the opposite. Hence, I focus on deriving the optimal investment vector to appease $S$ in measuring the value for the regime to pursue a partial appeasement strategy.

**Lemma 5** *The cost-minimizing strategy to induce a* $C$ *outcome (either* $\rho = \{1, 0\}$ *or* $\rho = \{0, 1\}$ *is for* $R$ *to set the following investment vector as a function of the shock* $Z$*:*

- *If* $Z \leq \frac{c}{8}$*:*

$$\kappa_{C1} = 2 * Z \;\; ; \;\; A^O_{C1} = 0 \;\; ; \;\; A^S_{C1} = 0 \;\; ; \;\; V(R)_{C1} = \theta(1-p)(y^e - Z) - \frac{(2*Z)^2}{c}$$

- *If* $Z > \frac{c}{8}$*:*

$$\kappa_{C2} = \frac{c}{4} \;\; ; \;\; A^O_{C2} = 0 \;\; ; \;\; A^S_{C2} = Z - \frac{c}{8} \;\; ; \;\; V(R)_{C2} = \theta(1-p)(y^e - Z) + \frac{c}{16} - Z$$

Intuitively, $S$ citizens hold no grievances in the absence of an economic shock, but because the opposition is protesting, repression investments need to grow with the shock twice as fast so as to induce the supporters to abstain than would be needed if the opposition was also abstaining. For this reason, the level of the economic shock after which the marginal cost of repression equals that of appeasement transfers to supporters is $\frac{c}{8}$. Larger shocks under the partial appeasement strategy will be addressed with supporter favors.

**Lemma 6** *If* $T \leq \frac{c}{8}$*, a "partial appeasement" strategy will yield a multiple equilibrium between a failed revolt and a broad revolution for shock levels* $Z \in [T, \frac{c}{4} - T]$.

What lemma 6 highlights is that it may be possible to appease the opposition by also supporters under the condition that the opposition protests. This could happen if the level of repression needed to induce $S$ to abstain conditional on $O$ protesting is also enough to induce $O$ to abstain conditional on $S$ abstaining. While $O$'s political grievances would lead to protests under the partial appeasement strategy when $Z = 0$, both a positive shock and the fast growing levels of repression to induce $S$ to abstain would also influence $O$'s protest choice. As shown in lemma 5, the level of repression under the partial appeasement strategy will be capped at $\frac{c}{4}$ when $Z \geq \frac{c}{8}$. This means that if $T > \frac{c}{8}$, the opposition will always protest under the partial appeasement strategy. If $T < \frac{c}{8}$, the level of repression under this strategy will be enough to make $O$ abstain in a range of the economic shock between $Z = T$ and $Z = \frac{c}{4} - T$. In this range, the strategy of partial appeasement will lead to multiple equilibria between protest failure ($\rho = \{0, 0\}$) and a broad revolution ($\rho = \{1, 1\}$). This is because while making supporters indifferent is enough to also appease the opposition in this shock range, lemma 2 shows that the opposition would protest if indifferent supporters took to the streets.

**Lemma 7** *Suppose that $T < \frac{c}{8}$ and $Z \in [T, \frac{c}{4} - T]$. Then, $K^S_{\{0,1\}} \geq K^O_{\{0,0\}}$.*

The results from lemmas 3 and 6 show that if $T < \frac{c}{8}$, both strategies could lead to full appeasement when $Z \in [T, \frac{c}{4} - T]$. Lemma 7 shows that the cost of doing so will be lower under the full appeasement strategy profile, which confirms that $R$ would never pursue a partial strategy profile in the hopes of achieving a full appeasement outcome.

## A.4 Comparing $R$'s payoffs under both strategy profiles

Lemmas 3 and 5 provide optimal strategies and expected payoffs for $R$ conditional on different shock levels. Will $R$ choose full or partial appeasement? Let's define $\Delta = V(R)_F - V(R)_C$ to be the difference in expected payoffs for $R$ between the full appeasement and partial appeasement strategies.

An important question is how the shock threshold after which positive transfers are needed for the opposition to abstain under the a full appeasement strategy ($Z = \frac{c}{2} - T$) relates to the shock threshold after which positive transfers are needed for supporters to abstain under the a partial appeasement strategy ($Z = \frac{c}{8}$). I will assume that the latter is greater, so that $T \geq \frac{3}{8}$.[38]

**Assumption 1** *The value of $T$ relative to $c$ is such that $T \geq \frac{3}{8}c$.*

I now characterize the values of $\Delta$ at different levels of $Z$, and most importantly, how the value of $\Delta$ changes with increases to the economic shock.

[38]This assumption also rules out the possibility of multiple equilibria in the partial appeasement strategy discussed in lemma 6.

**Theorem 1** *$\Delta$ as a function of $Z$ is such that* $\frac{\partial \Delta}{\partial Z} \leq 0$

**Proof.** $\Delta$ as a function of $Z$ is described below:

- If $Z \leq \frac{c}{2} - T$:

$$\Delta = \theta p[y^e - Z] + \frac{(2Z)^2 - (Z+T)^2}{c}$$

- If $\frac{c}{2} - T < Z \leq \frac{c}{8}$:

$$\Delta = \theta p[y^e - Z] + \frac{c}{4} - Z - T + \frac{(2Z)^2}{c}$$

- If $\frac{c}{8} < Z \leq \frac{c}{2}$:

$$\Delta = \theta p[y^e - Z] + \frac{3}{16}c - T$$

- If $\frac{c}{2} < Z \leq c$:

$$\Delta = \theta p[y^e - Z] + Z - \frac{Z^2}{c} - T - \frac{c}{16}$$

- If $c < Z$:

$$\Delta = \theta p[y^e - Z] + \frac{15}{16}c - Z - T$$

The theorem is proven by differentiating each of these expressions by $Z$ and showing that the derivatives are negative under their respective range of $Z$ values. ■

Theorem 1 is the key result of the model: As the economy deteriorates, the costs of staying in office with certainty through a full appeasement strategy become unaffordable for a regime whose resources are also dwindling as a consequence of the shock.

**Corollary 2** *Define $Z^*$ as the value of $Z$ such that $\Delta = 0$. $Z^*$ is such that:*

$$\frac{\partial Z^*}{\partial T} < 0 \ ; \ \frac{\partial Z^*}{\partial y^e} > 0 \ ; \ \frac{\partial Z^*}{\partial \theta} \geq 0 \ ; \ \frac{\partial Z^*}{\partial p} \geq 0 \ ; \ \frac{\partial Z^*}{\partial c} \geq 0$$

This corollary can be proven directly by differentiating the expressions of $\Delta$ by each parameter and observing the offsetting change to $Z$ needed to keep $\Delta = 0$. $Z^*$ marks the level of the shock after which $R$ switches from a full appeasement strategy to a partial appeasement strategy. Importantly, because the value of $T$ raises the cost of full appeasement but does not affect the expected regime payoff under partial appeasement, $Z^*$ can take a value of 0 for very high values of $T$.[39]

[39]The maximum possible value of $Z^*$ would occur in parameter values when $D > 0$ at $Z = c$, and

## A.5 Strategy changes at $Z^*$ and the characterization of equilibria

As discussed, $Z^*$ characterizes the level of the shock after which the regime changes it's strategy from full appeasement to partial appeasement. This means that the equilibrium levels of repression and appeasement transfers as a function of the observed economic shock will be determined by the strategy profile presented in lemma 3 if shock $Z \leq Z^*$, and will be determined by the strategy profile presented in lemma 5 when $Z^* < Z$. The proposition below shows equilibrium appeasement transfers and repression levels according to the level of the shock and the value of $Z^*$.

**Proposition 1** *Under assumption 1, the equilibrium of the game is characterized as follows:*

**If $Z^* = 0$:**

*In this instance, the partial appeasement strategy is optimal for R even in the absence of a negative economic shock.*

- *If $Z \leq \frac{c}{8}$: The repression level will be $K_{C1}$ and there are no appeasement transfers. There is limited confrontation against the opposition.*
- *If $\frac{c}{8} < Z$: The repression and supporter appeasement transfers will be $K_{C2}$ and $A^S_{C2}$. There is limited confrontation against the opposition.*

**If $0 < Z^* \leq \frac{c}{2} - T$:**

*In this case, the strategy switch occurs from a point where there is no opposition transfers under the full appeasement strategy to a point where there is no appeasement transfer to supporters under the partial appeasement strategy.*

- *If $Z \leq Z^*$: The repression level will be $K_{F1}$ and there are no appeasement transfers. There are no protests.*
- *If $Z^* < Z \leq \frac{c}{8}$: The repression and supporter appeasement transfers will be $K_{C1}$.*

$T = \frac{3}{8}c$. This means that $Z^* \in [0, \frac{\theta p y^e + \frac{9}{16}c}{1+\theta p}]$. The important point is that even for a low value of $T$, there is still a threshold level of the shock after which partial appeasement becomes the preferred strategy profile.

- *If* $\frac{c}{8} < Z$*: The repression and supporter appeasement transfers will be* $K_{C2}$ *and* $A^S_{C2}$*. There is limited confrontation against the opposition.*

**If** $\frac{c}{2} - T < Z^* \leq \frac{c}{8}$**:**

*In this case, the strategy switch goes from full appeasement with positive transfers to the opposition to partial appeasement with no transfers for supporters.*

- *If* $Z \leq \frac{c}{2} - T$*: The repression level will be* $K_{F1}$ *and there are no appeasement transfers. There are no protests.*

- *If* $\frac{c}{2} - T < Z \leq Z^*$*: The repression and opposition appeasement transfers will be* $K_{F2}$ *and* $A^O_{F2}$*. There are no protests.*

- *If* $Z^* < Z \leq \frac{c}{8}$*: The repression will be* $K_{C1}$ *and there are no appeasement transfers. There is limited confrontation against the opposition.*

- *If* $\frac{c}{8} < Z$*: The repression and supporter appeasement transfers will be* $K_{C2}$ *and* $A^S_{C2}$*. There is limited confrontation against the opposition.*

**If** $\frac{c}{8} < Z^* \leq \frac{c}{2}$**:**

*The strategy switch now goes from full appeasement with positive transfers to the opposition to partial appeasement with positive transfers for supporters.*

- *If* $Z \leq \frac{c}{2} - T$*: The repression level will be* $K_{F1}$ *and there are no appeasement transfers. There are no protests.*

- *If* $\frac{c}{2} - T < Z \leq Z^*$*: The repression and opposition appeasement transfers will be* $K_{F2}$ *and* $A^O_{F2}$*. There are no protests.*

- *If* $Z^* < Z$*: The repression and supporter appeasement transfers will be* $K_{C2}$ *and* $A^S_{C2}$*. There is limited confrontation against the opposition.*

**If** $\frac{c}{2} < Z^* \leq c$**:**

*The strategy switch now goes from full appeasement with positive transfers to the opposition and increased repression to partial appeasement with positive transfers for supporters.*

- *If $Z \leq \frac{c}{2} - T$: The repression level will be $K_{F1}$ and there are no appeasement transfers. There are no protests.*

- *If $\frac{c}{2} - T < Z \leq \frac{c}{2}$: The repression and opposition appeasement transfers will be $K_{F2}$ and $A^O_{F2}$. There are no protests.*

- *If $\frac{c}{2} < Z \leq Z^*$: The repression and opposition appeasement transfers will be $K_{F3}$ and $A^O_{F3}$. There are no protests.*

- *If $Z^* < Z$: The repression and supporter appeasement transfers will be $K_{C2}$ and $A^S_{C2}$. There is limited confrontation against the opposition.*

**If $c < Z^*$:**

*The strategy switch now goes from full appeasement with positive transfers to the opposition and to supporters to partial appeasement with positive transfers only for supporters.*

- *If $Z \leq \frac{c}{2} - T$: The repression level will be $K_{F1}$ and there are no appeasement transfers. There are no protests.*

- *If $\frac{c}{2} - T < Z \leq \frac{c}{2}$: The repression and opposition appeasement transfers will be $K_{F2}$ and $A^O_{F2}$. There are no protests.*

- *If $\frac{c}{2} < Z \leq c$: The repression and opposition appeasement transfers will be $K_{F3}$ and $A^O_{F3}$. There are no protests.*

- *If $c < Z \leq Z^*$: The repression, opposition appeasement transfers and supporter appeasement transfers will be $K_{F4}$ and $A^O_{F4}$ and $A^S_{F4}$. There are no protests.*

- *If $Z^* < Z$: The repression and supporter appeasement transfers will be $K_{C2}$ and $A^S_{C2}$. There is limited confrontation against the opposition.*

As proposition 1 shows, whenever an economic shock $Z \geq max\{Z^*, \frac{c}{8}\}$, $R$ will engage in growing in-group favoritism to avoid regime supporters from joining opposition protests. Whether smaller shocks can lead to opposition-oriented favors in order to induce a full appeasement outcome will depend on the value of $Z^*$. More specifically, out-group favors are only possible for milder shocks if $Z^* > \frac{c}{2} - T$. Hence, the model allows the strategic logic for out-group favors under complementarities in citizen protest choices (DeNardo, 1985). But even when parameter values allow for it, this logic is outweighed by the increasing costs of appeasing the opposition after a sufficiently strong shock.

# B Venezuelan Blackouts: Empirical Setting

### Chavismo's tenure at the start of the economic crisis

Hugo Chávez, a former Lt. Colonel in the Venezuelan Army, was sworn in as President of Venezuela in January of 1999. He rose to national political recognition after leading a failed coup attempt in 1992. As his case got dismissed by President Rafael Caldera in 1994, Chávez became the leading anti-establishment figure in a country that had grown disappointed with its 40-year old bipartisan electoral democracy.

Upon his inauguration, Chávez progressively centralized political and economic power in the presidency, leading to increasing polarization against a "democratic opposition" shaped by traditional and new parties and civic organizations. Chávez benefited from greatly increasing oil prices, which allowed him to fund popular social programs and subsidize an import-based consumption boom while eroding legal and informal limits on his power - including term limits - and imposing restrictive measures against private enterprise in all sectors of the economy.

By the time the 2012 presidential elections were due, Chávez had been diagnosed with cancer. He decided to run nonetheless, building his campaign on massive new public spending programs running in parallel to the electoral cycle. Chávez defeated the opposition in October that year, but passed away in March 2013. His appointed successor, Nicolás Maduro, was much less charismatic, had much less money to campaign with, and could not play Chávez's role as arbiter of last resort for conflict resolution within Chavismo. Maduro was narrowly elected in April 2013, only a few months before the start of the economic crisis.

### Venezuela's economic collapse and democratic backsliding.

While strong signs of economic deterioration -such as the growing scarcity of key staple goods- were already visible by mid-2013,[40] Venezuela officially entered in a recession in the first quarter of 2014, as the government became unable to sustain the spending and import levels

[40] https://www.usatoday.com/story/money/business/2013/05/16/venezuela-toilet-paper-chavez/2165405/

experienced in 2011 and 2012. International oil prices collapsed in late 2014, making matters much worse for a country that relied on oil and oil derivatives for about 95% of its exports. Given his frail control over Chavismo, Maduro failed to pass the economic reforms necessary to deal with the ensuing crisis effectively: devaluing the official exchange rate, restructuring sovereign debt and that of PDVSA,[41] and consolidating the country's fiscal accounts to prevent the monetization of the deficit.

Such inaction sent the country into a tailspin. By almost any conceivable measure, Venezuela started experiencing the largest collapse in human welfare in recent history. The country's GDP dropped by over 70% between 2013 and 2019.[42] The country went into hyperinflation in 2017, and experienced an inflation level of over 1,600,000% in 2018.[43] Income poverty grew from 40% to 90%, and university-led substitutes for official household surveys found that 70% of the population lost weight involuntarily in 2017.[44] By 2017, infant mortality had grown by 70%, and the purchasing power of the minimum wage had dropped by 92%.[45] By 2019, the crisis had forced over 16% of the Venezuelan population to leave the country, yielding a regional refugee crisis without precedent in Latin America.[46] Such an economic collapse is virtually unprecedented outside the context of civil war or natural disasters.

Maduro's popular support eroded as the economic crisis unravelled. In the National Parliamentary Elections of December 2015, the opposition obtained a 2/3 super-majority that allowed it to enact organic laws, pass constitutional amendments, and generally impose important oversight and institutional restrictions on Maduro's executive power.[47] Maduro leveraged the Chavista control over the Judicial branch to defang the legislature, ruling all new legislative actions as unconstitutional, and preventing a Recall Referendum on Maduro in 2016.[48] These judicial actions triggered a set of mass protests in 2017 which were met with violent repression by official security forces.[49] Moreover, Maduro circumvented the legal procedure to call for a

[41] *Petróleos de Venezuela*, the country's National Oil Company.

[42] https://publications.iadb.org/publications/english/document/A-Look-to-the-Future-for-Venezuela.pdf

[43] https://www.piie.com/sites/default/files/documents/pb19-13.pdf

[44] https://www.proyectoencovi.com/

[45] https://www.brookings.edu/wp-content/uploads/2019/05/impact-of-the-2017-sanctions-on-venezuela_final.pdf

[46] https://www.thecipherbrief.com/column_article/the-staggering-scale-of-the-venezuelan-refugee-crisis

[47] https://www.efe.com/efe/english/world/venezuelan-opposition-obtains-supermajority-in-legislature/50000262-2784920

[48] https://www.bbc.com/news/world-latin-america-37724322

[49] https://www.theatlantic.com/photo/2017/06/months-of-anti-government-protests-continue-in-

National Constitutional Assembly, effectively assuming legislative powers for Chavismo.[50]

By this point, most observers agreed that Venezuela had effectively transitioned into autocratic rule. On August 2017, following the creation of the National Constitutional Assembly and with accelerating migration rates, neighboring countries created the *Grupo de Lima*, a regional coordination space to advocate for a return to constitutional rule in Venezuela.[51] At the same time, the U.S. administration enacted the first set of financial sanctions on PDVSA.[52]

### Constitutional Crisis of January 2019.

As presidential elections were scheduled for 2018, Chavismo and the Opposition met in the Dominican Republic to negotiate credible electoral conditions. Negotiations failed to deliver an agreement, and Julio Borges -the chief negotiator for the opposition- was not able to return to the country and remains in exile.[53] The opposition opted to boycott the 2018 election, as the *Grupo de Lima*, the US, the EU, the OAS and most international electoral observers stated that there were no conditions for a free and fair election that year.[54] Maduro went ahead with the election regardless, despite unprecedentedly low turnout numbers.[55] Later that year, Fernando Albán -a Caracas councilman and one of Borges' closest aides- was detained in the airport and died while under police custody, setting the tone for the constitutional clash to come in 2019.[56]

Maduro's term officially ended on January 10th, 2019. The opposition-led legislature argued that whenever there is no legally elected president at the start of a new presidential period, the constitution mandates for the Speaker of the National Assembly to take on the Interim Presidency until new free elections are held.[57] Under this reading of the constitution, Juán Guaidó, took oath of office as interim president on January 23rd, and was recognized as such by countries in the *Grupo de Lima*, the U.S., most countries of the E.U. and a number of democracies around the world.[58]

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venezuela/530031/

[50] https://www.bbc.com/news/world-latin-america-41094889

[51] https://www.international.gc.ca/world-monde/international_relations-relations_internationales/latin_america-amerique_latine/2017-08-08-lima_group-groupe_lima.aspx?lang=eng

[52] https://www.nytimes.com/2017/08/25/world/americas/venezuela-sanctions-maduro-trump.html

[53] https://www.voanews.com/americas/venezuela-talks-break-down-presidential-vote-looms

[54] https://www.reuters.com/article/us-venezuela-election-limagroup-idUSKCN1IM19G

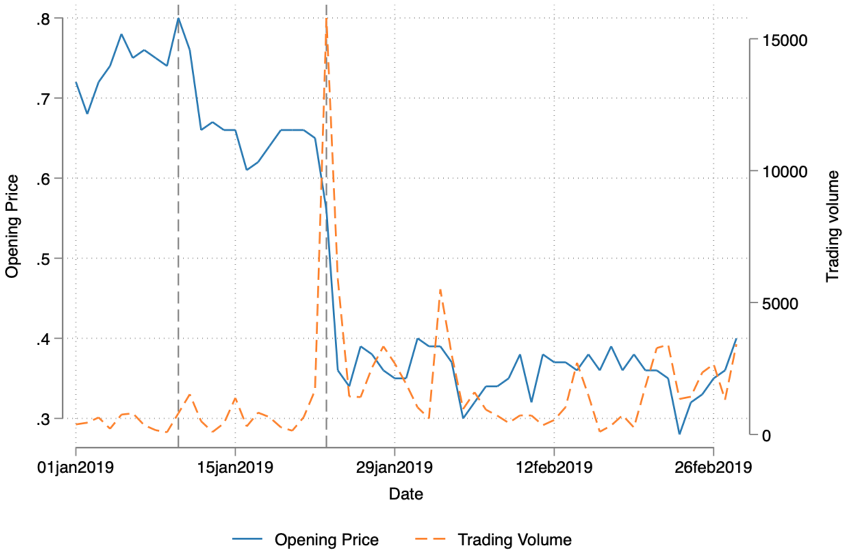
[55] https://www.nytimes.com/2018/05/20/world/americas/venezuela-election.html

[56] https://www.nytimes.com/2018/10/09/world/americas/venezuela-opposition-death-alban.html

[57] https://law.stanford.edu/2019/02/01/guaido-not-maduro-is-the-de-jure-president-of-venezuela/

[58] https://www.bloomberg.com/news/articles/2019-01-23/brazil-canada-join-trump-backing-guaido-as-venezuela-president

Figure A.1: PredictIt's betting market data on the Maduro Regime, IQ 2019




*Notes:* PredictIt data on market opening price and trading volume for the question "Will Nicolás Maduro be president of Venezuela on Dec. 31, 2019?". Vertical dashed lines mark the end of Maduro's constitutional term (January 10th) and Guaidó's oath of office (January 23rd).

The start of this crisis led to a new wave of domestic protests and international diplomatic and economic efforts to push for a democratic transition.[59] The regime decided to repress protests[60] and forcefully prevent the entry of international aid to support the ailing population.[61] These events drastically affected beliefs over the possibility of regime change during 2019. Figure A.1 shows betting market data from PredictIt[62] on the market opening price and trading volume for the question "Will Nicolás Maduro be president of Venezuela on Dec. 31, 2019?". The market's predicted probability that Maduro would make it as Venezuela's president through 2019 went from 80% at the end of Maduro's term on January 10th to 35% at the end of the month, hovering between 30% and 40% during all of February as the conflict unfolded.

[59] https://www.theguardian.com/world/2019/jan/23/venezuela-protests-thousands-march-against-maduro-as-opposition-sees-chance-for-change

[60] https://www.hrw.org/news/2019/01/25/venezuela-arrests-killings-anti-government-protests

[61] https://theconversation.com/why-maduro-is-blocking-venezuela-bound-humanitarian-aid-when-so-many-people-in-his-country-need-it-111585

[62] PredictIt is a New Zealand-based online prediction market that offers exchanges on political and financial events. I'm thankful to Parker Howell, Senior Data Analyst at PredictIt, for sharing this data.

### Blackouts of March 2019

On March 07, a 5-day long nation-wide blackout hit the country. The regime and the opposition presented conflicting narratives about the causes of the blackout. The regime argued that the blackout was caused by foreign sabotage, while the opposition blamed it on poor maintenance of the power infrastructure network. Local experts reported that the blackout was triggered by a fire that reached the 765 kV transmission lines near the San Gerónimo Power Transmission Substation in the state of Guárico. These lines have the highest transmission capacity, and connect the Guri Hydropower Plant in south-eastern Venezuela -the main generation station in the Venezuelan power grid- to the north-western urban corridor.[63]

Moreover, a large portion of the country lost access to power again between March 25 and 29.[64] On March 30th, the regime published a rationing schedule laying out the structure of official power cuts for the month of April.[65] Importantly, some areas of the country were spared from any type of formal rationing. As has been the case in past instances of energy rationing, the Caracas' metropolitan area was fully exempted from any power rationing. Given the pivotal importance of Caracas as the country's seat of power, the special treatment of the capital uncovers political motives in the regime's power rationing choices.[66] However, North-Western parishes were also more likely to be assigned to rationing, which suggests that technical factors may have also informed the rationing schedule.

### Failed coup attempt and stabilization after May 2019.

While political protests spiked at the start of the constitutional crisis in January and February, dissent shifted towards demands for improvements in public utilities in March, as the country dealt with the blackouts and their immediate aftermath. Political protests throughout the country resumed in April, as the power rationing schedule was rolled out. Moreover, the regime started to rely on the newly created *Fuerzas de Acción Especial* (FAES)[67] -an elite

[63] https://www.univision.com/noticias/america-latina/por-que-ocurrio-el-apagon-nacional-que-provoco-el-caos-en-venezuela-los-expertos-explican

[64] https://www.theguardian.com/world/2019/mar/25/venezuela-new-blackout-half-country-no-power-maduro

[65] https://news.yahoo.com/maduro-announces-30-days-electricity-rationing-venezuela-015233386.html

[66] This result is consistent with theories connecting patterns of urban concentration with the political nature of different regimes (Ades and Glaeser, 1995).

[67] FAES was created by President Nicolás Maduro to "combat crime and terrorism" in 2017. FAES has been accused by human rights organizations of multiple political killings around the constitutional

branch within the National Police Force that was previously focused on fighting organized crime-to punish opposition organizers.[68] Similar to the patterns observed for political protests, the number of fatalities in events of political repression spiked at the start of the constitutional crisis, temporarily subsiding in the immediate aftermath of the blackouts, and picking back up after the roll-out of the power rationing schedule.

On April 30th, in the midst of this new wave of political dissent and repression, police and military officers aligned with the opposition attempted to overthrow the Maduro regime. The uprising was unsuccessful in eliciting broad military support, but it further stimulated pro-democracy protests - now often oriented towards military detachments as means to pressure for an uprising against the regime.[69] This failed coup attempt marked the apex of the conflict: Once it became apparent that the military was not going to break with the Maduro regime, protests started to subside.

As these events unfolded, the Maduro regime decided to stop enforcing exchange and price controls in the country. This led to a *de-facto* dollarization of the Venezuelan economy, which motivated the private sector to import previously unavailable goods and sell them at international market prices.[70] All in all, moderate economic improvements, increases in political repression, and the growing belief that the military would not break from the regime demobilized the opposition. While grievances against the Maduro regime remained strong, Guaidó and the opposition became increasingly unable to mobilize such grievances towards collective demands for democratization.[71]

# C Ethnic favoritism and rainfall shocks

In Section 4, I studied patterns of regional favoritism based on leaders' regions of birth. Another approach to assess local or individual affiliations with the regime is to consider leaders' ethnicities, and how these connect with those of the groups that dominate a region of the

crisis of 2019. The UN High Commissioner for Human Rights reported the murdering of at least 6,800 Venezuelans from January 2018 to May 2019 by various security forces, including the FAES. These murders are usually registered as events of "resistance to authorities".

[68] https://www.caracaschronicles.com/2019/01/27/meet-faes-the-bolivarian-police-death-squads-leading-repression-against-protesters/

[69] https://apnews.com/article/nicolas-maduro-caribbean-ap-top-news-venezuela-latin-america-7143cc60448a4647805ff784ce6df95f

[70] https://www.ft.com/content/1d899e2e-0d20-11ea-bb52-34c8d9dc6d84

[71] https://www.nytimes.com/2020/03/10/world/americas/venezula-protests-maduro-guaido.html

country, or the ethnicity of an individual. To expand my analysis in this direction, I build on regional and individual data from Dickens (2018) and from individual data from Franck and Rainer (2012). I assess the effect of similarity to the leader's ethnic language and co-ethnicity with the leader on local nightlights and on individual measures of wealth an infant mortality, and how these patterns vary during national rainfall shocks.

### Local nightlights by ethnic regions

To study the effect of national droughts on established patterns of favoritism across ethnic regions, I take the ethnic region panel used in Dickens (2018), who partitions Sub-Saharan Africa at the intersection of national borders and ethnolinguistic homelands described in the Ethnologue (Lewis, 2009). This strategy relies on the quasi-random assignment of national borders in the continent (Michalopoulos and Papaioannou, 2016), which split about 200 ethnic groups into different countries. Dickens (2018) identifies the ethnic group of each country's leader in every year between 1992 and 2013, and identifies the region of the leader's ethnic group. Importantly, he calculates a measure of lexicostatistical similarity between the language of each ethnic group and that of the leader's ethnic group, allowing for a continuous measure of affiliation to the leader in each year.[72] Nightlights from each partitioned ethnic group are calculated using the NOAA yearly rasters and obtaining the log of total nighttime light values plus 0.01.[73] Additional variables in this panel include average of population density (log) for each ethnic group, the geodesic distance between the homeland of an ethnic group and the homeland of the leader's group, indicators for the presence of oil and diamond reserves in a given region and that of the leader, and the absolute difference in elevation, ruggedness, rainfall, temperature, and in agricultural quality (Galor and Özak, 2015) between each ethnic region and that of the country's leader. Finally, I add the National Rainfall levels from GPCC to the panel. Table A.8 shows relevant summary statistics.

[72] He describes his preferred measure of lexicostatistical similarity between languages as follows: "As percentage estimate of a language pair's cognate words (i.e., words that share a common linguistic origin), lexicostatistical similarity approximates the phonological similarity between two languages. Because the extent of this similarity is a function of time since two languages split from a common ancestral group, the lexicostatistical similarity of a group to their leader captures that group's ancestral relatedness to their leader (i.e., ethnic similarity)."

[73] While the main results discussed above focus on the IHS transformation of total nighttime lights, other papers in this literature focus on the logarithm of the total nightlights measure after adding 0.01 (Hodler and Raschky, 2014a; Dickens, 2018). In this section, I use this log transformation to extend the results of Dickens (2018) for comparability reasons.

### Individuals' wealth and linguistic similarity with the leader

To assess the effect of national rainfall shocks on the wealth of individuals with different ethnic affiliations to regime leaders, I take individual level data from Dickens (2018). He collects data from the Demographic and Health Surveys (DHS) for 13 countries. Individuals are linked to two measures of linguistic similarity to the leader's language, one for the location they are surveyed in, and for the language spoken at home. The resulting data is made of 33 DHS country waves capturing 13 countries and 20 partitioned language groups. Of the 56,455 respondents, only 56% reside in their ethnolinguistic homeland. Importantly, each individual is provided with a wealth index, aggregating different measures about household living conditions, including ownership of assets (e.g., television, refrigerator, telephone, etc.) and access to public resources (e.g., water, electricity, sanitation facility, etc.). Hence, the measure can be considered a joint metric of a household's access to private assets and public infrastructure. Individuals' age, gender, city characteristics, education and religion are considered as controls. Finally, I add the GPCC national rainfall measure. Table A.10 provides summary statistics.

### Infant mortality and mother's co-ethnicity with the leader

I leverage data from Franck and Rainer (2012) on women between 15 and 49 years of age surveyed in different DHS waves in order to assess how patterns of ethnic favoritism on infant mortality are influenced by national rainfall levels. Surveyees were asked to report about all the children they gave birth to in the past, highlighting their children's dates of birth and dates of death whenever a child died before the interview was conducted. Following Kudamatsu (2012), the authors build a dataset with each newborn baby reported, and define an Infant Death marker that captures whether the newborn child died within the first year of life. They then link every child to the ethnic group of the mother, and chiefly, they highlight whether the mother was a co-ethnic of the country's leader at around the time of the child's birth. Their final sample collects DHS data on 1,173,710 children from 18 countries in sub-Saharan Africa. They also consider the children's gender and whether the mother was surveyed in a rural location or not. I then add information of the national rainfall level. Table A.9 shows summary statistics.

### Empirical specifications and results

In order to assess effects on ethnic regions' nightlights, I perform the following regression specification:

$$Y_{gcy} = \beta_1 S_{gcy-1} + \beta_2 S_{gcy-1} * D_{cy-1} + X_{gcy}\omega + \phi_{cy} + \phi_{gy} + \phi_{cg} + \epsilon_{gcy} \tag{7}$$

where $Y_{gcy}$ is the log nightlights emanated from the ethnic region of group $g$ in country $c$ at time $c$, $S_{gcy}$ is the similarity (lexicostatistical linguistic similarity or co-ethnicity) between group $g$ and the leader of country $c$ in year $y$, and $D_{cy}$ is the national dryness of country $c$ in year $y$. $X_{gcy}$ capture the set of co-variates discussed above, while $\phi_{cy}$, $\phi_{gy}$ and $\phi_{cg}$ capture country-year, ethnic group-year and country-group fixed effects.[74] As in the previous subsection, I will focus attention on $\beta_2$, which captures how lagged country dryness affects patterns of ethnic favoritism. Standard errors are again clustered at the country-year level.

Panel A in Table A.1 provides estimates for Equation 7. Column 1 confirms a positive association between linguistic similarity and local nightlights. Column 2 shows that this association becomes strongest during dry years. Column 3 confirms that co-ethnic regions experience an improvement in nightlights, but Columns 4 shows that this association is contingent to dry years.

To study effects on individuals' wealth index, I perform the following regression:

$$Y_{igcy} = \beta_1 S_{igy} + \beta_2 S_{igy} * D_{cy-1} + X_{igcy}\omega + \phi_{cy} + \phi_{gy} + \phi_{cg} + \epsilon_{igcy} \tag{8}$$

where $Y_{igcy}$ is the individual's household wealth index, $S_{igy}$ is the (local or individual) linguistic similarity to the leader's ethnic group[75], and $D_{cy}$ is the national dryness in country $c$ in year $y$. $X_{igcy}$ capture the set of individual co-variates discussed above, while $\phi_{cy}$, $\phi_{gy}$ and $\phi_{cg}$ capture country-year, ethnic group-year and country-group fixed effects. Standard errors are clustered at the country-year level.

Panel B of Table A.1 shows estimates for Equation 8. Columns 1-2 focus on the linguistic

[74] The main difference with the structure of this specification and that of equation 4 is that, since ethnic regions cut across countries, we are able to observe the same group in different countries, so we can control for within-group and within-country events separately.

[75] The individual-level data in Dickens (2018) only provides similarity measures for the year of the survey and not for the previous year. Hence, this is the only specification where I look at the current level of affiliation to regime leaders.

similarity between the ethnic region of the surveyee and the country's leader. Column 1 confirms a positive association between the local linguistic similarity and the household wealth index, and Columns 2 highlights an even stronger association during dry years at the country level. Columns 3-4 show no effects of individuals' linguistic similarity to the leader and their wealth index, and a smaller and imprecise heterogeneity during droughts. This is consistent with the idea that central governments target benefits to ethnically affiliated regions, but they cannot reach ethnically affiliated individuals outside of these regions.

Finally, I now study effects of mothers' co-ethnicity with regime leaders during rainfall shocks on infant mortality. For this purpose, I estimate the following equation:

$$Y_{iesy} = \beta_1 C_{iesy-1} + \beta_2 C_{iesy-1} * D_{sy-1} + X_{iesy}\omega + \phi_{sy} + \phi_{es} + \epsilon_{iesy} \tag{9}$$

where $Y_{iesy}$ is a binary variable for whether newborn $i$ of a mother from the ethnic cluster $e$ in survey $s$ born in year $y$ died as an infant. $C_{iesy}$ is a marker for whether the mother's ethnic cluster $e$ is the same of the leader of the country of survey $s$ in year $y$. $D_{cy}$ is the national dryness for survey $s$ in year $y$.[76] $X_i$ capture demographic covariates of the individual, and $\phi_{sy}$ and $\phi_{es}$ capture survey-year and survey-ethnic cluster fixed effects. Standard errors are clustered at the survey-year level.

Panel C of Table A.1 shows estimates for Equation 9. As in previous results, Column 1 shows lower infant mortality for children born to mothers sharing ethnicity with the leader, and Column 2 shows that this association is even stronger during dry years at the national level.

[76] DHS surveys are performed at the country level, so that leaders and rainfall for a given individual are set according to the relevant survey.

Table A.1: Ethnic favoritism during rainfall shocks

Panel A: Nightlights

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Nightlights: Log(Total Radiance + 0.01) | | | |
| Linguistic Similarity to Leader's (t-1) Group | 0.305*** | 0.195** | | |
| | (0.0752) | (0.0866) | | |
| Linguistic Similarity × Country Dryness (Log, Std, t-1) | | 0.110* | | |
| | | (0.0658) | | |
| Leader's (t-1) Ethnic Region | | | 0.168** | 0.0798 |
| | | | (0.0670) | (0.0809) |
| Ethnic Region × Dryness | | | | 0.109* |
| | | | | (0.0621) |
| Observations | 6,610 | 4,896 | 6,610 | 4,896 |
| R-squared | 0.971 | 0.978 | 0.971 | 0.978 |
| Controls | All | All | All | All |
| Country-Year FE | Yes | Yes | Yes | Yes |
| Language-Year FE | Yes | Yes | Yes | Yes |
| Language-Country FE | Yes | Yes | Yes | Yes |

Panel B: Individual's "Wealth"

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Wealth Index | | | |
| Local Linguistic Similarity to Leader's (t) Group | 0.540*** | 1.337*** | | |
| | (0.117) | (0.462) | | |
| Local Similarity × Dryness | | 1.261* | | |
| | | (0.680) | | |
| Individual's Linguistic Similarity to Leader's (t) Group | | | 0.239 | 0.282 |
| | | | (0.180) | (0.222) |
| Individual Similarity × Dryness | | | | 1.032 |
| | | | | (1.131) |
| Observations | 56,455 | 56,455 | 56,455 | 56,455 |
| R-squared | 0.606 | 0.607 | 0.606 | 0.606 |
| Controls | All | All | All | All |
| Country-Year FE | Yes | Yes | Yes | Yes |
| Loc. Language-Year FE | Yes | Yes | Yes | Yes |
| Ind. Language-Year FE | Yes | Yes | Yes | Yes |

Panel C: Infant Mortality

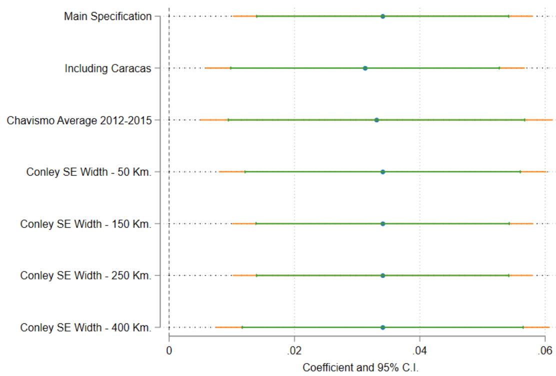
| VARIABLES | (1) | (2) |
|---|---|---|
| | Indicator of Survival as Infant | |
| Mother's Co-Ethnicity to Leader (t-1) | 0.00228* | 0.00253** |
| | (0.00122) | (0.00118) |
| Mother's Co-Ethnicity × Dryness | | 0.00228** |
| | | (0.00111) |
| Observations | 1,172,842 | 1,172,842 |
| R-squared | 0.013 | 0.013 |
| Controls | All | All |
| Survey-Birth Year FE | Yes | Yes |
| Survey-Ethnic Group FE | Yes | Yes |

*** p<0.01, ** p<0.05, * p<0.1

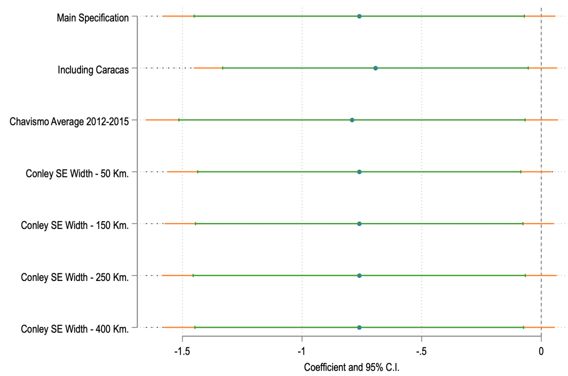
*Notes:* Regressions evaluate the effect of ethnic affiliation to the country's leader on ethnic region nightlights (Panel A), individual wealth (Panel B), and events of infant mortality (Panel C). Columns 1 and 3 evaluate the effect of different ethnic affiliation measures on the relevant outcome. Columns 2 and 4 add the interaction between national dryness and ethnic affiliation measures. All regressions add the set of controls considered in the relevant specifications in Dickens (2018) and Franck and Rainer (2012), which are discussed in subsection **??**. Standard errors are clustered at the country-year or survey-year level to match the exogenous variation of the national rainfall shocks.

# D Additional Figures and Tables

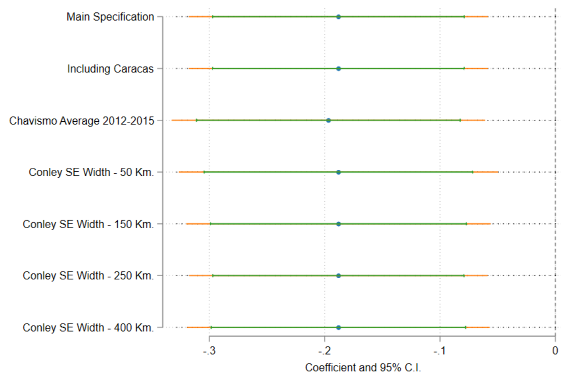
Figure A.2: Robustness checks




(a) Rationing




(b) Political Protests




(c) Repression fatalities

*Notes:* Figures provide a number of robustness checks for different specification decisions in estimating $\gamma^{Ch}$. Panel A provides robustness estimates for Column 4 on Table 1, while Panel B provides robustness estimates for Column 6 on Table 2. Panel C provides robustness estimates for Column 2 on Table 3. Figures compare estimates and statistical significance of the main specification with specifications that include municipalities and parishes in the Caracas Metropolitan Area as part of the sample, specifications that consider an average of the Chavismo vote share in all national elections between 2012 and 2015, and specifications considering different bandwidths in estimating the Conley spatial correlation robust standard errors.

Table A.2: Venezuelan blackouts analysis - summary statistics

Panel A: Parish Cross-Section Variables

| VARIABLES | (1)<br>N | (2)<br>mean | (3)<br>sd | (4)<br>min | (5)<br>max |
|---|---|---|---|---|---|
| Nightlights drop rate | 1,108 | 0.223 | 0.465 | -5.288 | 0.888 |
| Spared from rationing | 1,108 | 0.479 | 0.500 | 0 | 1 |
| Chavista vote share, 2012 | 1,107 | 0.622 | 0.131 | 0.0760 | 0.950 |
| Poverty rate, 2011 | 1,108 | 0.317 | 0.160 | 0.0251 | 0.965 |
| Population, 2011 | 1,108 | 24,377 | 38,673 | 61 | 372,616 |
| Population density, 2011 | 1,108 | 877.1 | 3,199 | 0.0586 | 43,492 |
| Distance to Guri | 1,108 | 659.2 | 272.0 | 16.94 | 1,102 |
| Distance to Transmission Grid | 1,108 | 42.38 | 41.78 | 0.363 | 544.2 |
| Military unit presence | 1,108 | .1895307 | .3921066 | 0 | 1 |
| Distributed Generation | 1,108 | 0.085 | 0.279 | 0 | 1 |
| Reach of 4G Network | 1,108 | 0.170 | 0.329 | 0 | 1 |
| Oil Production | 1,108 | 0.051 | 0.219 | 0 | 1 |

Panel B: Municipality Cross-Section Variables

| VARIABLES | (1)<br>N | (2)<br>mean | (3)<br>sd | (4)<br>min | (5)<br>max |
|---|---|---|---|---|---|
| Nightlights drop rate | 335 | 0.206 | 0.365 | -2.971 | 0.784 |
| Power rationing | 335 | 0.755 | 0.431 | 0 | 1 |
| Chavista vote share, 2012 | 335 | 0.602 | 0.113 | 0.177 | 0.858 |
| Poverty rate | 335 | 0.299 | 0.128 | 0.0331 | 0.852 |
| Population | 335 | 81,271 | 168,542 | 2,029 | 1.95 MM |
| Population density | 335 | 278.0 | 673.5 | 0.0586 | 5,405 |
| Distance to Guri | 335 | 641.3 | 266.7 | 59.71 | 1,080 |
| Distance to transmission grid | 335 | 47.49 | 56.34 | 1.906 | 544.2 |

Panel C: Municipality Panel Variables

| VARIABLES | (1)<br>N | (2)<br>mean | (3)<br>sd | (4)<br>min | (5)<br>max |
|---|---|---|---|---|---|
| Total protests | 12,384 | 0.514 | 2.426 | 0 | 118 |
| Political protests | 12,384 | 0.177 | 1.638 | 0 | 113 |
| Utility protests | 12,384 | 0.122 | 0.985 | 0 | 53 |
| Repression Fatalities | 4,381 | 0.151 | 1.85 | 0 | 62 |

*Notes:* Summary statistics for all variables considered in the analyses of the effects of the Venezuelan blackouts of early March 2019 on later power rationing and protests.

Table A.3: Regime support and "split" parishes

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | Parish spared from rationing | | |
| Shock | -0.0425** | -0.0568 | -0.0511 |
| | (0.0195) | (0.0513) | (0.0485) |
| Regime Support | 0.0723*** | | 0.0966** |
| | (0.0275) | | (0.0431) |
| Shock × Support | 0.0341*** | | 0.0381 |
| | (0.0123) | | (0.0293) |
| Split Vote | | 0.0254 | -0.0439 |
| | | (0.0330) | (0.0489) |
| Shock × Split | | -0.0229 | -0.00892 |
| | | (0.0404) | (0.0510) |
| Observations | 1,076 | 1,076 | 1,076 |
| R-squared | 0.536 | 0.528 | 0.538 |
| Socioeconomic controls | Yes | Yes | Yes |
| Grid controls | Yes | Yes | Yes |

*** p<0.01, ** p<0.05, * p<0.1

*Notes:* This table summarizes key results of linear probability models assessing the determinants of the regime power rationing choices for April 2019 as expressed in the published schedule. All regressions control for local poverty rates and population density, their interaction terms with the local exposure to the blackout, and a set of Grid controls that include fixed effects for the closest transmission sub-station to each parish's centroid, the distance to that sub-station, the distance to the Guri dam and interaction terms between these three variables. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

Table A.4: Regime support and preparedness for blackouts

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Parish spared from rationing | | | |
| Shock | -0.0425** | -0.0365** | -0.0380 | -0.0354* |
| | (0.0195) | (0.0184) | (0.0242) | (0.0207) |
| Regime Support | 0.0723*** | 0.100*** | 0.0726*** | 0.0992*** |
| | (0.0275) | (0.0324) | (0.0253) | (0.0284) |
| Shock × Support | 0.0341*** | 0.0317** | 0.0320* | 0.0322* |
| | (0.0123) | (0.0136) | (0.0186) | (0.0187) |
| Observations | 1,076 | 1,076 | 1,076 | 1,076 |
| R-squared | 0.536 | 0.567 | 0.537 | 0.568 |
| Socioeconomic controls | Yes | Yes | Yes | Yes |
| Grid controls | Yes | Yes | Yes | Yes |
| Additional controls | None | State FEs | Local Plants | Both |

*** p<0.01, ** p<0.05, * p<0.1

*Notes:* This table summarizes key results of linear probability models assessing the determinants of the regime power rationing choices for April 2019 as expressed in the published schedule. All regressions control for local poverty rates and population density, their interaction terms with the local exposure to the blackout, and a set of Grid controls that include fixed effects for the closest transmission sub-station to each parish's centroid, the distance to that sub-station, the distance to the Guri dam and interaction terms between these three variables. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

Table A.5: Alternative mechanisms

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Parish was spared from rationing | | | | | |
| Shock | -0.0852*** | -0.0884*** | -0.0909*** | -0.0873** | -0.0486 | -0.0434 |
| | (0.0280) | (0.0298) | (0.0352) | (0.0348) | (0.0323) | (0.0314) |
| Regime Support | 0.0586** | 0.0707 | 0.0487* | 0.0578* | 0.0703** | 0.0762*** |
| | (0.0272) | (0.0462) | (0.0288) | (0.0301) | (0.0284) | (0.0272) |
| Shock × Support | 0.0353*** | 0.0386*** | 0.0660*** | 0.0691*** | 0.0382* | 0.0335 |
| | (0.0118) | (0.0145) | (0.0216) | (0.0197) | (0.0208) | (0.0207) |
| Mechanism | -0.267** | -0.283** | -0.141*** | -0.153*** | -0.108 | -0.125 |
| | (0.127) | (0.142) | (0.0346) | (0.0356) | (0.102) | (0.0966) |
| Shock × Mechanism | 0.309* | 0.314* | 0.0850* | 0.0515 | 0.00402 | 0.0113 |
| | (0.161) | (0.169) | (0.0514) | (0.0741) | (0.0513) | (0.0606) |
| Support × Mechanism | | -0.0202 | | -0.0226 | | -0.142** |
| | | (0.0643) | | (0.0416) | | (0.0649) |
| Shock × Support × Mech. | | -0.0105 | | -0.0578 | | 0.0327 |
| | | (0.0743) | | (0.0753) | | (0.0602) |
| Observations | 1,076 | 1,076 | 1,076 | 1,076 | 1,076 | 1,076 |
| R-squared | 0.545 | 0.551 | 0.545 | 0.547 | 0.538 | 0.539 |
| Socioeconomic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Grid controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Mechanism | Reach of 4G Network | | Military Barracks | | Oil production | |

*** p<0.01, ** p<0.05, * p<0.1

*Notes:* This table summarizes key results of linear probability models assessing the determinants of the regime power rationing choices for April 2019 as expressed in the published schedule. All regressions control for local poverty rates and population density, their interaction terms with the local exposure to the blackout, and a set of Grid controls that include fixed effects for the closest transmission sub-station to each parish's centroid, the distance to that sub-station, the distance to the Guri dam and interaction terms between these three variables. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

Table A.6: Repression beyond protests

| VARIABLES | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Repression Fatalities (All events) | | | Repression Fatalities (Excluding protests) | | |
| Post × Shock | 0.0235 | 0.0224 | 0.0193 | 0.00472 | 0.00549 | 0.00182 |
| | (0.0308) | (0.0299) | (0.0301) | (0.0266) | (0.0263) | (0.0271) |
| Post × Regime Support | -0.0425 | -0.0399 | -0.0273 | -0.00378 | -0.00564 | 0.00330 |
| | (0.0617) | (0.0604) | (0.0591) | (0.0446) | (0.0447) | (0.0464) |
| Post × Shock × Support | -0.191*** | -0.188*** | -0.181*** | -0.107** | -0.109** | -0.105** |
| | (0.0672) | (0.0640) | (0.0630) | (0.0506) | (0.0489) | (0.0515) |
| Protests | | 0.0720 | 0.0816 | | -0.0516 | -0.0341 |
| | | (0.132) | (0.132) | | (0.110) | (0.112) |
| Protests (t-1) | | | 0.161 | | | 0.0747 |
| | | | (0.135) | | | (0.119) |
| Observations | 4,290 | 4,290 | 3,960 | 4,290 | 4,290 | 3,960 |
| R-squared | 0.088 | 0.090 | 0.097 | 0.093 | 0.094 | 0.094 |

*** p<0.01, ** p<0.05, * p<0.1

*Notes:* The table summarizes key results of a difference-in-differences specification assessing the effect of the local exposure to the blackout on repression fatalities at different levels of regime support. Columns 1-3 show triple-did estimates on total monthly repression fatalities in a municipality. Column 1 provides a baseline specification, and Columns 2 and 3 control for concurrent and lagged protests respectively. Columns 4-6 provide similar specifications using the total repression fatalities outside of protest events. All regressions control for the interactions between the local poverty rate and the local population density with the identifier of the post-treatment period, and with the local exposure to the blackout in the post-treatment period. All observations are weighted by the local population and standard errors are calculated considering potential spatial correlation within a bandwidth of 200km following Conley (2010).

Table A.7: Regional favoritism - summary statistics

Panel variables

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| Leader's region of birth | 21,250 | 0.0615 | 0.240 | 0 | 1 |
| Nightlights (Inverse hyperbolic sine) | 13,750 | 7.154 | 3.088 | 0 | 14.075 |
| Protests (Total) | 21,250 | 7.501 | 50.55 | 0 | 3,154 |
| Acts of repression of dissent (Total) | 21,250 | 0.715 | 6.621 | 0 | 393 |
| Acts of State coercion (Total) | 21,250 | 37.55 | 220.2 | 0 | 8,982 |
| Country rainfall (log) | 21,250 | 4.209 | 0.717 | 1.408 | 5.660 |
| Local rainfall (log) | 21,216 | 7.097 | 1.952 | -4.239 | 11.97 |
| Dictatorship | 21,250 | 0.67 | 0.47 | 0 | 1 |

Cross-section variables

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| Capital region | 625 | 0.0672 | 0.251 | 0 | 1 |
| Presence of mines | 612 | 0.395 | 0.489 | 0 | 1 |
| Presence of oil/gas fields | 612 | 0.0833 | 0.277 | 0 | 1 |
| Agricultural regions | 612 | 0.520 | 0.500 | 0 | 1 |
| High infrastructure regions | 612 | 0.601 | 0.490 | 0 | 1 |

Time-series variables

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| WTI oil price (Index) | 34 | 348.6 | 167.6 | 131.5 | 672.7 |
| Food price (Index) | 34 | 34.81 | 12.32 | 18.64 | 69.97 |
| Copper price (Index) | 34 | 150.8 | 107.5 | 62.64 | 408.0 |

*Notes:* Summary statistics for variables used in the analysis of regional favoritism and conflict during rainfall shocks in Sub-Saharan Africa.

Table A.8: Ethnic favoritism and regional nightlights - summary statistics

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| Nightlights (log(Total+0.01)) | 7,800 | -3.478 | 1.415 | -4.605 | 1.515 |
| Population Density (log) | 7,800 | 2.911 | 1.517 | -2.169 | 6.116 |
| Linguistic Similarity Index | 7,107 | 0.192 | 0.228 | 0.000569 | 1 |
| Distance to leader's region (log) | 7,800 | 5.859 | 1.440 | 0 | 7.419 |
| Elevation (abs. difference to leader's region) | 7,800 | 250.0 | 297.8 | 0 | 2,022 |
| Ruggedness (abs. difference to leader's region) | 7,800 | 99.01 | 103.2 | 0 | 542.4 |
| Local rainfall (abs. difference to leader's region) | 7,800 | 31.41 | 32.00 | 0 | 230.7 |
| Local temperature (abs. difference to leader's region) | 7,800 | 16.48 | 16.88 | 0 | 120.2 |
| Agricultural quality (abs. difference to leader's region) | 7,800 | 286.4 | 304.3 | 0 | 1,711 |
| Oil present in own and leader's region | 7,800 | 0.0154 | 0.123 | 0 | 1 |
| Diamonds present in own and leader's region | 7,800 | 0.0785 | 0.269 | 0 | 1 |
| Co-ethnicity with Leader | 7,800 | 0.00603 | 0.0774 | 0 | 1 |
| Country rainfall (log) | 6,780 | 6.853 | 0.539 | 5.307 | 7.881 |

*Notes:* Summary statistics for variables used in the analysis on the effect ethnic favoritism on regional nightlights during national rainfall shocks.

Table A.9: Ethnic favoritism and individuals wealth - summary statistics

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| Region's Linguistic Similarity | 56,455 | 0.350 | 0.380 | 0.0251 | 1 |
| Individual's Linguistic Similarity | 56,455 | 0.363 | 0.387 | 0.0206 | 1 |
| Age | 56,455 | 29.36 | 10.51 | 15 | 78 |
| $Age^2$ | 56,455 | 972.4 | 687.2 | 225 | 6,084 |
| Female marker | 56,455 | 0.663 | 0.473 | 0 | 1 |
| Rural locality marker | 56,455 | 0.635 | 0.482 | 0 | 1 |
| Capital city marker | 56,455 | 0.0513 | 0.221 | 0 | 1 |
| Distance to coast | 56,455 | 587.3 | 395.4 | 5.226 | 1,391 |
| Distance to border | 56,455 | 192.8 | 141.2 | 2.510 | 899.2 |
| Education category | 56,455 | 4.721 | 1.520 | 1 | 6 |
| Country rainfall (log) | 56,455 | 7.823 | 0.757 | 5.938 | 9.760 |

*Notes:* Summary statistics for variables used in the analysis on the effect ethnic favoritism on individuals' wealth index during national rainfall shocks.

Table A.10: Ethnic favoritism and infant mortality - summary statistics

| VARIABLES | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---|---|---|---|---|---|
| Child died as infant marker | 1.180e+06 | 0.100 | 0.300 | 0 | 1 |
| Mother's co-ethnicity with Leader at birth | 1.245e+06 | 0.224 | 0.417 | 0 | 1 |
| Urban marker | 1.252e+06 | 0.268 | 0.443 | 0 | 1 |
| Female marker | 1.252e+06 | 0.490 | 0.500 | 0 | 1 |
| Country rainfall (log) | 1.252e+06 | 4.078 | 0.690 | 1.785 | 5.177 |

*Notes:* Summary statistics for variables used in the analysis on the effect ethnic favoritism on individual's infant mortality during national rainfall shocks.

Table A.11: Dictatorship heterogeneities

| VARIABLES | (1) | (2) Nightlights (IHS) | (3) | (4) |
|---|---|---|---|---|
| Leader's (t-1) Region of Birth | 0.0426 | 0.214** | 0.0469 | -0.0195 |
| | (0.0491) | (0.109) | (0.0479) | (0.0461) |
| Region of Birth × Country Dryness (Log, Std, t-1) | 0.152*** | 0.318*** | 0.00788 | 0.0625* |
| | (0.0437) | (0.0855) | (0.0374) | (0.0369) |
| Region of Birth × Dictatorship | | | | -0.173** |
| | | | | (0.0872) |
| Region of Birth × Dryness × Dictatorship | | | | 0.202** |
| | | | | (0.0817) |
| Observations | 13,025 | 7,846 | 5,157 | 13,025 |
| R-squared | 0.902 | 0.890 | 0.939 | 0.902 |
| Controls | All | All | All | All |
| Region FE | Yes | Yes | Yes | Yes |
| Country-Year FE | Yes | Yes | Yes | Yes |
| Specification | Main | Dictatorships | Democracies | Interactions |

*** p<0.01, ** p<0.05, * p<0.1

*Notes:* Regressions evaluate the effect of leaders' region of birth during national dry years on local nightlights. Column 1 provides a baseline specification of the average effect of the leader's region of birth and how the effect changes during drier years. Columns 2 and 3 restrict the analysis to samples of dictatorships and democracies respectively. Column 4 assesses the heterogeneity of the effects captured on Column 1 along the democracy-dictatorship dimension. All regressions control for interactions between the national dryness and local identifiers for the capital region and for agricultural areas within the country, for interactions between agricultural areas and an index of food prices, for interactions between oil, gas and mining regions and indices for international oil and copper prices, and for local rainfall levels and their interaction with agricultural areas. Standard errors are clustered at the country-year level to match the exogenous variation of the national rainfall shocks.