Extreme Weather Events and the Support for Democracy

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Abstract

Climate change and the erosion of democratic norms are two of the most important global challenges. This paper establishes a relationship between individuals' beliefs for what type of political system should govern their country and extreme weather events, such as droughts. I do so in the context of sub-Saharan Africa, a region highly susceptible to climate change and where democratic norms are not firmly entrenched. I analyze the issue by combining Afrobarometer data on the support for democracy from 2002 to 2015 for 129,002 individuals across 16 countries with granular weather data from 1960 to 2015 across 27km $\times$ 27km grid cells. I find that exposure to a drought reduces the support for democracy by 2.56%. This impact is the same for those residing in urban and rural areas, for those with differing levels of education, or those with different levels of income. The specific democratic features that exposure to droughts impact are personal freedoms and views of the government. I then explore the extent to which this weakening of democratic norms relates to exposure to non-democratic systems of governance, as proxied by households' proximity to development projects that are either funded by technocrats (World Bank) or autocrats (China). I find that the impact of droughts on the support for democracy is larger (5.36% to 5.82%) for individuals exposed to non-democratic systems of governance. The impact disappears for individuals not exposed to such alternatives. My findings shed light on the political costs of climate change in developing countries.

Keywords: climate change, support for democracy, non-democratic systems.
JEL Codes: Q54, Q56, P16, P48.

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1 Introduction

Climate change is one of the most urgent policy challenges worldwide. Anthropogenic climate change has increased temperatures by 1.3 degrees Celsius from 1900 to 2010, affecting the frequency and severity of extreme weather events, such as droughts or floods (IPCC, 2021). Concurrently, populist governments are gaining increasing traction globally, while support for democracy is falling and political polarization is rising (Guriev and Papaioannou, 2022).

This paper establishes a relationship between individuals' beliefs for what type of political system should govern their country and climate change. Sub-Saharan Africa (SSA) provides an interesting empirical setting for studying this relationship. The region is particularly vulnerable to climate change and is already experiencing large negative economic impacts as a consequence (e.g., Carleton and Hsiang, 2016). In addition, the slowing rate at which democracy has been adopted in SSA since 2000 coupled with the population's ambivalence towards democracy, raise the possibility that climate change influences the support for democracy.

To measure individuals' support for democracy, I use geolocalized data from five rounds of the Afrobarometer surveys in 16 SSA countries for the period 2002-2015. My main outcome is a dummy indicating whether individuals support democracies or are open to non-democratic systems. Across all countries and survey waves, 75.6% of respondents support democracy.

I proxy climate change by using a long-term measure of droughts: the Standardized Precipitation Evapotranspiration Index (SPEI) developed by Vicente-Serrano et al. (2010). The proxy is based on the increased scientific consensus that the frequency and intensity of natural disasters is amplified by anthropogenic climate change (IPCC, 2021). The SPEI index is a standardized and continuous drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. The index therefore captures both droughts and floods.[1]

[1] The key idea behind the SPEI index is that the impact of precipitation on agriculture depends not only on the level of precipitation, but also on the soil's ability to retain water. This ability is a function of a variety of other weather inputs, such as temperature, sunshine exposure, latitude, wind speed, and pressure. The SPEI index incorporates all of these inputs and outperforms other indices used to predict crop yields (Vicente-Serrano et al., 2012). The SPEI index is calculated using weather data at the grid cell level with monthly frequency from 1960 to 2015 and is expressed in units of standard deviations from the historical mean. In my sample, the mean (standard deviation) of the SPEI index is 0.475 (0.785), indicating that my sample period is drier than the historical period.

To identify the effect of droughts on the support for democracy, I regress the support for democracy on the drought index, controlling for grid cell and month-by-year of the survey interview fixed effects and various household-level characteristics.

In the first part of the paper, I establish a robust relationship between extreme weather events and the support for democracy. My baseline finding is that a drought reduces the support for democracy by 2.56%. This impact is the same for those residing in urban and rural areas, for those with differing levels of education, or those with different levels of income. Given that, for example, more educated individuals are more likely to support democracy, the lack of heterogeneous effects of droughts on the support for democracy across education levels suggests that mechanisms of other than education might explain my findings.

Throughout a lifetime, an individual is unlikely to be affected only by one drought. The median individual in my sample is affected by 7 droughts (min=0 and max=16). Estimating the cumulative effect of exposure to multiple droughts I find that exposure to 7 droughts translates to a reduction in the support for democracy of 7.95%.

Democracy is a multi-dimensional concept, meaning different things to different people both across and within countries. The overwhelming majority of my sample (above 40%) associate democracy with personal freedom, followed by only around 10% who associate democracy with the idea of government by and for the people and another 10% who associate it with voting.

I therefore document that my baseline result coincides with decreases in three types of freedoms. Specifically, I show that a drought reduces individuals' perceived freedom of speech, freedom to join a political organization, and freedom to vote by 4.94%, 3.18%, and 2.85%, respectively. One way to interpret these results is that individuals voluntarily give up some freedom in exchange for something else. In particular, I show that a drought increases the support for one party rule and one man rule by 5.94% and 2.88%, respectively. This suggests that the loss of freedoms may be part of a deliberate decision. For instance, individuals may believe that "less democracy" is better at dealing with climate change and therefore increase their support for a more consolidated power structure in their country.

My findings hold for a variety of robustness checks. My estimations rely on three primary assumptions: (a) the exogeneity of the drought index, (b) homogeneous treatment effects (e.g., De Chaisemartin and d'Haultfoeuille, 2022*b*; Roth et al., 2023), and (c) no selected sample.

The first assumption assumes that the weather is random conditional on geography and time fixed effects. The fact that the weather is random (within a place and time) has been a long-established result in the literature. The second assumption assumes that the treatment effect is constant across all 16 countries and five survey waves. I show that my results are robust to allowing for heterogeneous treatment effects. The assumption of no selected sample refers to the possibility that: (i) natural disasters can affect the roll out of the Afrobarometer surveys, (ii) conditional on the roll out of the surveys, the Afrobarometer interviews different "types" of individuals, and (iii) individuals exhibit adaptation behavior (e.g., they migrate) due to natural disasters and thus change the composition of the sample. I show that these considerations do not represent concerns in my analysis.

In the second part of the paper, I examine the hypothesis that the main mechanism driving the documented relationship is exposure to non-democratic systems. I proxy this exposure by exposure to development projects funded by the World Bank and China, the former being technocratic and the latter being autocratic.

The intuition behind the mechanism is as follows. Large shares of individuals in my dataset are exposed to development projects. Given that the World Bank and China are, respectively, technocratic and autocratic, this exposes people to such technocratic and autocratic systems of governance. This exposure can lead individuals to update their beliefs about democracy in extreme times (i.e., when a drought occurs). The exposure to technocracy and autocracy provides individuals with two alternatives where power is consolidated, thus leading to the hypothesis that this exposure to non-democratic systems is driving the effect.

I find that respondents exposed to non-democracy systems (within 100km) experience a decrease of 5.36%-5.82% in their support for democracy after a drought. In contrast, the relationship between droughts and the support for democracy disappears for individuals not exposed to non-democratic systems of governance.

Because development projects are unlikely to be randomly allocated throughout SSA, likely targeting areas with particular characteristics (like poorer areas), one might worry that my results conflate other mechanisms. Examples include exposure to conflict or the income/wealth, health or education levels of the local population.

I implement three main tests to mitigate this concern. First, I rely on a doughnut design.

The premise of this idea is that if the exposure to alternatives to democracy (i.e., the presence of official development assistance (ODA)) is orthogonal to some x, then this x cannot be a mechanism because the relationship between climate change and the support for democracy only exists for individuals exposed to alternatives to democracy. This simple insight rules out a whole range of possible mechanisms. To assess this empirically, I show that development projects correlate with various potential mechanisms (e.g., employment/income, gender, age, schooling) in a radius of at most 20km. Thereafter, the presence of the development projects no longer correlates with local conditions. Replicating the main result while excluding individuals who live within a 20km radius of a development project therefore serves as a test whether I am conflating these potential mechanisms and exposure to non-democratic systems as mechanisms. I find no support for this, thus providing first evidence that local conditions do not act as potential confounders.

Second, for Chinese projects, I observe the dates when a project is announced and starts to be implemented. I can therefore test whether droughts affect the support for democracy in places where a project is announced but not yet implemented. I find no support for this. Areas that receive a project only after experiencing a drought do not exhibit any relationship between climate change and the support for democracy. In addition, if projects target certain types of areas, and certain characteristics of these areas drive the overall results, the drought index in these areas with these announced Chinese project would display significant effects. Therefore, this test rules out local conditions as a potential mechanism.

Third, I show that the results are not driven by development projects in particular sectors. This is further evidence that development projects do indeed act as proxies for exposure to non-democratic systems of governance and are not capturing a particular need of some people which may be driving the result.

Taken together, the evidence presented suggests that these development projects do indeed proxy exposure to non-democratic systems of governance and are not conflating other potential mechanisms.

The paper contributes to various strands of the literature. To the best of my knowledge, this paper is the first to link individuals' beliefs for what type of political system should govern their country to climate change. Theoretically, this necessitates a model of individuals' beliefs about what type of system should govern their country as a function of some conditions. Climate change, my empirical "application", is one such condition. This is different than standard political agency models, which often consider moral hazard and adverse selection problems—incentive and selection issues, respectively—when modeling the interaction between voters and politicians (e.g., Banks and Sundaram, 1993).[2]

An interesting way to think of the modeling of this problem is to think of a coordination problem. There is likely less coordination in democracies than in non-democratically governed countries, leading to less efficient outcomes. Some policy issues, such as climate change, may be very technical and/or require fast action/coordination, even if the action is the wrong one.Two papers that go in this direction and could possibly be extended to model the problem at hand are Maskin and Tirole (2004) and Bolton et al. (2013).

For example, Maskin and Tirole (2004) analyze citizens' expected welfare under three modes of decision-making: direct democracy (where citizens hold all the power), representative democracy (where accountable officials hold the power), and judicial power (where non-accountable officials ("judges") hold the power).[3] They show that when information acquisition is costly, i.e., when it is cumbersome, complicated, and/or costly to inquire about the payoffs of different actions, judicial power tends to outperform both direct democracy and representative democracy. This is because the information is not valuable for a politician in a representative democracy if she gets voted out of office in the next election (which is not possible for judges).[4] They conclude that "representative democracy will not accommodate technical decisions well" and thus "technical decisions are best taken by judges." Climate change is the definition of a complex policy issue, difficult to understand for citizens and politicians alike. While scientists are in relative accordance about the past, future climate change is highly uncertain, making the whole issue even more difficult to grasp. According to Maskin and Tirole (2004), climate change is therefore a policy issue best solved by "judges", i.e., technocrats in the case of climate change.

The paper further relates to a literature analyzing the drivers of people's political beliefs.[5]

[2] This is distinct from models of populism that explain why populists are elected (e.g., Acemoglu et al., 2013). It is also different from models of non-democratic politics (e.g., Gehlbach et al., 2016; Egorov and Sonin, 2020).

[3] In their framework, accountability is equivalent to having to run for reelection.

[4] The underlying assumption in their model is that officials are better informed than citizens, hence making direct democracy the least preferred option in a scenario where information is difficult to obtain and understand.

[5] For an overview looking at the burgeoning literature analyzing people's understanding of economic policies, see Stantcheva (2023). For an example related to climate change policies, see Dechezleprêtre et al. (2022).

In particular, my paper builds on the strand in this literature looking at how exposure to foreign influences drives political outcomes. For example, Meyersson et al. (2008) study how political characteristics of trading partners like China and the US matter for political outcomes in SSA and document negative effects of increased trade on human rights. The emergence of China as an important global player has furthermore led to a growing literature studying the effects of Chinese foreign aid.[6] While Chinese aid may, for example, positively impact (short-run) growth and incomes (Dreher et al., 2021; Mueller, 2022), the presence of Chinese aid also generates negative externalities, such as local corruption (Isaksson and Kotsadam, 2018*a*) and political capture (Dreher et al., 2019). I contribute to this literature in two ways. First, I show that political characteristics of aid donors, interacted with climate change, are important determinants of the beliefs about democracy in SSA, highlighting effects of foreign aid not studied yet. Second, by showing that climate change interacted with foreign aid reduces the support for democracy, I add a new negative externality to the list of potential concerns associated with the effects of foreign aid.

Another strand of this literature analyzes determinants of the support for democracy (e.g., Fuchs-Schündeln and Schündeln, 2015; Claassen, 2020*b*; Acemoglu et al., 2021; Tabellini and Magistretti, 2022; Kotschy and Sunde, 2022). In light of the decrease of actual levels of democracy, much of this literature has focused on Lipset (1959)'s claim that public support for democracies helps democracies survive, which is empirically supported by Claassen (2020*a*).[7] I contribute to this literature by considering a new determinant for the support for democracy: climate change.

The economic, social, and political effects of climate change have been widely studied (e.g., Dell et al., 2014; Carleton and Hsiang, 2016). Researchers studying the political effects have largely focused on the effects of natural disasters and weather on voting outcomes (e.g., Malhotra and Kuo, 2008; Healy and Malhotra, 2009; Healy et al., 2010; Cole et al., 2012; Amirapu et al., 2022). My results build upon this literature in two ways. First, instead of studying electoral

[6]See, for example, Bluhm et al. (2018), Martorano et al. (2020), Dreher et al. (2021), and Mueller (2022) for economic impacts; Isaksson and Kotsadam (2018*a*) for effects on corruption; Eichenauer et al. (2021) and Wellner et al. (2022) for effects on attitudes towards China; Isaksson and Kotsadam (2018*b*) for effects on trade union involvement; and Dreher et al. (2019) for effects on political capture.

[7]Theoretically, this is related to the notion of "democratic capital", introduced by Persson and Tabellini (2009), who argue that a nation's historical experience with democracy reduces the probability that it exits from democracy.

outcomes, I focus on a particular political belief: support for democracy is important because democratic norms around the world have been eroding. This outcome is also important because electoral data in developing countries can be inaccurate and beliefs can signal future votes, providing useful information for policy makers.[8] Second, most of this literature, especially in developing countries, argues that the main mechanism is one through income or agricultural productivity (Cole et al., 2012; Amirapu et al., 2022). In contrast, my results suggest a limited role for income when studying the support for democracy.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 establishes a robust relationship between extreme weather events and the support for democracy and presents all the robustness checks. Section 4 discusses the exposure to non-democratic systems of governance as the main mechanism. Section 5 concludes and offers new avenues for future work.

2 Data

Afrobarometer data. To measure the support for democracy across SSA, I rely on the Afrobarometer surveys. These nationally representative surveys, conducted approximately every three years in a variety of African countries, contain a plethora of information regarding Africans' political preferences, social capital, economic conditions, as well as other topics. In each country-survey wave, interviews are conducted in the local language with a (random) sample of either 1,200 or 2,400 individuals.

This paper uses geocoded data from 16 SSA countries that were surveyed in all rounds from round 2 to round 6 (2002—2015), providing me with a sample of 129,002 individuals, representing 51.7% of the SSA population.[9,10] Geocoded Afrobarometer surveys provide researchers with the location of an "Enumeration Area" (EA), i.e., the primary sampling unit (PSU). The precision

[8] An important exception studying the connection between beliefs and climate change is Balcazar and Kennard (2022), who find that temperatures above 3 degrees Celsius decrease trust in politicians by 2-3 percentage points.

[9] The countries are Botswana, Cape Verde, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. The reason for restricting the sample to 16 countries is that they are the only ones surveyed in all five survey rounds.

[10] At the time of writing (November 9, 2023), only survey rounds 1 through 6 have been geocoded. Since the wording of questions in survey round 1 is quite different from other rounds, I exclude that round. Furthermore, in round 2, I lose 797 observations in Senegal as the date of those interviews is not known.

of this PSU depends on the size of the EA, which varies between different population densities, but usually represents a village (or a several geographically close villages) or a neighborhood in an urban area. I match these locations to weather grid cells, which are described in more detail below.[11,12]

The precise question respondents were presented with is "Which of these three statements is closest to your own opinion? A: Democracy is preferable to any other kind of government. B: In some circumstances, a non-democratic government can be preferable. C: For someone like me, it doesn't matter what kind of government we have." I use this question to code three different versions of the outcome used in this paper. First—coding 1—I create a dummy variable that equals 1 if participants answer "A" (i.e., they support democracy) and 0 if they answer "B" (i.e., they are open to non-democratic regimes). Second—coding 2—I create a dummy variable that equals 1 if participants answer "A" (i.e., they support democracy) and 0 if they answer "B" or "C" (i.e., they are open to non-democratic regimes or indifferent). Third—coding 3—I create a categorical variable that equals to 1 if respondents answer "A", that equals to 0 if respondents answer "C", and that equals to -1 if respondents answer "B".[13]

The first row in Panel A of Table 1 displays the share of individuals who support democracy, showing that 85.9% of individuals support democracy across my full sample (Column 1) and that this share does not vary much across different regions in Africa (Columns 2—4). To delve into the geographical distribution of this support for democracy in more detail, Panels A and B

[11]Each geocoded location is associated with a precision code ranging from 1 (most precise) to 8 (least precise). 98.46% of observations have precision codes between 1 and 4. As this is pretty much the complete sample (except for 1,986 observations), I keep the full sample in my main analysis. All results presented in this paper are robust to restricting the sample to precision codes 1 through 4. These results are available upon request.

[12]For more information on the process of geocoding the Afrobarometer data, see BenYishay et al. (2017). Other papers that have used and matched geocoded Afrobarometer data to other datasets are, for example, Nunn and Wantchekon (2011), Deconinck and Verpoorten (2013), Knutsen et al. (2017), or Isaksson and Kotsadam (2018*a*). None of these papers, however, merge Afrobarometer data to weather data.

[13]This question is unique in that it asks respondents directly about their belief whether democratic or non-democratic regimes are better. It does, to my knowledge, not exist in this form in any other survey. It is most closely related to the "democracy better" variable used in Tabellini and Magistretti (2022), which asks respondents to agree or disagree with the statement "Democracy may have problems but it's better than any other form of government." While similar in spirit, there is a subtle difference between the two questions. The Afrobarometer neutrally presents respondents with two alternatives, namely democratic or non-democratic regimes. It does not imply that one is better than the other. The "democracy better" variable suggests that democracy is flawed and then asks individuals to agree or disagree with this statement. This suggestion that democracy is flawed, I would argue, can influence respondents answer. The Afrobarometer thus presents a unique opportunity to analyze respondents' answers to a simple straightforward question about their support for democracy.

of Figure 1 plots that same share at the state level for survey rounds 2 and 6 separately. While the overall support for democracy is quite high throughout, there is some variation that suggests, for example, that landlocked regions in southern and eastern Africa exhibit higher support for democracy than non-landlocked regions. All these shares are conditional on not picking option "C" (i.e., coding 1 of the outcome). As Panel A in Table 1 shows, 12% of respondents choose option "C". It follows that 75.6% of the sample support democracy unconditionally (as shown in the second row of Panel A in Table 1).

I conduct my main analysis relying on coding 1 of the outcome. I view this as the most conservative approach, as it relies on individuals who display strict preferences over which alternative is better. Indifferent individuals, or individuals who may not have views on political systems at all, are therefore excluded from the analysis. I show that all the results displayed in the paper also hold for codings 2 and 3 of the outcome in robustness tests.

Democracy can, and likely does, mean different things to different people both across and within countries. Understanding what respondents perceive democracy to be is therefore important. To this end, Panel B of Table 1 displays the three main answers to a question in the Afrobarometer asking individuals "what does democracy mean to you?". They are (i) personal freedoms (over 40%), (ii) government for and by the people (over 10%), and (iii) voting (over 10%). This suggests that individuals hold an overwhelmingly positive view of democracy.

Panels C and D in Table 1 and Table 2 provide summary statistics for these dimensions of democracy. First, Panel C of Table 1 displays variables relating to personal freedom, showing that 76.9%, 81.8%, and 84.3% of respondents perceive that they are free to, respectively, speak their mind, join any political organization, and vote. Second, Panel D of Table 1 provides the shares of respondents who do not support one party rule, army rule, and one man rule (i.e., abolishing parliament and elections). Table 2 displays three groups of variables relating to trust in government, the capabilities of the government, and trust in institutions. All these measures show that around half of the respondents trust the government, its institutions, and/or view it to be capable in providing various services. For each group of the variables displayed in Panels C and D in Table 1 and Table 2, I also construct index is by (a) averaging the dummy variables in each category and (b) standardizing this measure.[14]

[14]The Afrobarometer also contains a battery of individual and village level characteristics that can be used

To validate the responses in the survey, Table A3 present OLS regressions of coding 1 of my main outcome variable on the above mentioned household and village characteristics. The table shows that older respondents, respondents who completed at least high school, male respondents, black respondents, religious respondents, and respondents who are politically aligned with the party in power are more likely to support democracy. The respondent's employment status does not correlate significantly with the support for democracy and having an occupation that is affected by climate change correlates negatively with the support for democracy.

Weather data. As measuring climate change is inherently difficult, my focus here is on droughts. The rationale behind this is based on the scientific consensus that the frequency and intensity of natural disasters is amplified by anthropogenic climate change (IPCC, 2021).[15] A drought is a "temporal anomaly characterized by a deficit of water compared with long-term conditions" (Peng et al., 2020) that can be grouped into one of five types: meteorological (precipitation deficiency), agricultural (soil moisture deficiency), hydrological (runoff and/or groundwater deficiency), socioeconomic (social response to water supply and demand) and environmental or ecological (Mishra and Singh, 2010; Peng et al., 2020).

To identify droughts, or drought-like conditions, my main right-hand side variable is the SPEI index, developed by Vicente-Serrano et al. (2010).[16] The SPEI index is a standardized and continuous drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. More specifically, the impact of precipitation on agriculture not only depends on the level of precipitation, but also on potential evapotranspiration (PTE),[17] i.e., the soil's ability to retain water. PTE is a function of a variety of other weather inputs such as temperature, sunshine exposure, latitude, wind speed, and pressure. The SPEI index incorporates all of these components and has been found to outperform other indices in predicting crop yields (Vicente-Serrano et al., 2012).[18]

as controls and which I've summarized in Tables A1 and A2, respectively.

[15]Examples of work looking at political outcomes include papers analyzing the effects of tornadoes (e.g., Healy et al., 2010), hurricanes (e.g., Malhotra and Kuo, 2008; Fitch-Fleischmann and Kresch, 2021), droughts (e.g., Tarquinio, 2022), earthquakes (e.g., Klomp, 2020; Pathak and Schündeln, 2022), or floods (e.g., Besley and Burgess, 2002; Cole et al., 2012; Kosec and Mo, 2017; Neugart and Rode, 2021).

[16]To ease the interpretation of my results, I multiply the final index by -1.

[17]PTE is the amount of evaporation that would occur if a sufficient water source were available.

[18]Two of these other indices are the Palmer Drought Severity Index (PDSI) (Palmer, 1965) and the Standardized Precipitation Index (SPI) (McKee et al., 1993). For more information on drought indices, see Mishra

I rely on the daily ERA5 reanalysis dataset from the European Center for Medium-Range Weather Forecasts for the weather inputs to calculate the SPEI index, downloading the data from 1960 until 2015 for a 2.5×2.5 degree (≈ 27×27km) grid spanning the world.[19]

The SPEI index is calculated for each grid cell-month and is expressed in units of standard deviations from the grid cell's historical mean. By construction it therefore has mean (standard deviation) 0 (1) in the historical sample, which in my case is 1960-2015. In my sample, the mean (standard deviation) of the SPEI index is 0.475 (0.785), indicating the my sample period (2002-2015) was both drier and exhibited less variability than the historical period.

Present drought conditions are not only a function of current weather conditions but also of past periods. The SPEI index can therefore be constructed over different timescales. This paper relies on the 12 months SPEI index which reflects long-run climatic conditions. The reasons for this choice are twofold. First, given my interest in the effects of climate change (i.e., a long-run event), it is imperative to focus on a SPEI index capturing long-run deviations from the historical mean. Second, individuals' recollection period is not infinite. As such, while I could compute the SPEI index for any other months, limiting the "recall period" is important. I choose 12 months in my main specification.

Notwithstanding its continuous nature, researchers have categorized the index. Values above 2.00 are classified as being "extremely wet", values between 1.50 and 1.99 are "very wet", values between 1.00 and 1.49 are "moderately wet", values between -0.99 and 0.99 are "near normal", values between -1.00 and -1.49 are "moderately dry", values between -1.50 and -1.99 are "severely dry", and values below -2.00 are "extremely dry". Throughout the paper, I sometimes define extreme weather event dummies. Extreme droughts or floods are classified as "extremely dry" or "extremely wet" in the SPEI categories. Droughts and floods add the categories "severely dry" and "very wet" to the "extreme" categories. (Extreme) disasters are defined to be (extreme) droughts and floods combined. Finally, for expositional simplicity, I call the 12 months SPEI index "drought index" in this paper.

Panels C and D of Figure 1 plots the distribution of the drought index for the grid cells

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and Singh (2010). The details for the calculation of the SPEI index can be found in Vicente-Serrano et al. (2010) and can simply be executed in R using the package "SPEI".

[19]See Auffhammer et al. (2013) for arguments why using reanalysis data is more suitable than simple gridded datasets such as UDEL or CRU.

in my data for survey rounds 2 and 6 separately, showing variation both across geography and time. As can be seen, large parts of western Africa, Kenya, Uganda, and Lesotho are the most dry areas in the sample. Other places like Namibia, Zimbabwe, and South Africa, for example, are wet areas, suffering from floods instead of droughts. Furthermore, over time, the graphs get "lighter" (in color), implying that the climate becomes drier.

The drought index yields a level effect of drought conditions on the support for democracy. With climate change one might, however, also be interested in looking at the effects of higher moments or at nonlinearities.

The premise of this paper relies on the fact that individuals notice changes in the weather and update their beliefs accordingly. As such, these changes must be noticeable. This leaves the level effect and the effect of the variance (or standard deviation) of droughts, i.e., the facts that climate change doesn't just change the intensity of droughts but also affects the frequency and/or likelihood of their occurrence. As already mentioned, the mean (standard deviation) of the SPEI index is 0.475 (0.785) in my sample. This standard deviation is smaller than the one in the historical sample (which is 1). The individuals in my sample are therefore not exposed to more drought variability over time. This renders the context of my study more suited to study level effects.

Figure A1 provides further intuition for this by plotting the 1, 12, 24, and 48 months SPEI index from January 1970 to December 2015 for Dakar, Senegal.[20] Shorter timescales of the index pick up a lot of short-run variation while longer time horizons vary much less. This is why I don't consider nonlinear effects—captured for example by the inclusion of drought or flood dummies—as my main point of interest. I want to capture the effect of long-run changes in drought conditions and these are not only represented by extreme drought dummies, but also by prolonged moderately dry periods, for example. The 12 months SPEI index allows me to capture all of these effects.

[20] The location is arbitrary. The point is to show inherent features of the different timescales of the SPEI index. These are similar for any location.

3 Main Results

Empirical strategy. To capture the reduced form effect of the drought index on the support for democracy, my main specification looks as follows

$$\text{Support for democracy}_{igt} = \delta_g + \tau_t + \beta \text{Drought Index}_{gt} + \mathbf{x}_{igt}\gamma + \epsilon_{igt} \tag{1}$$

where Support for democracy$_{igct}$ denotes the outcome variable indicating whether individual i in grid cell g in year-month t supports democracy or is open to non-democratic regimes. The right-hand side of the equation includes grid cell and year-month fixed effects, the drought index at the grid cell and year-month level, and allows for the inclusion of household level controls. Standard errors are clustered at the grid cell level.

The coefficient of interest in this TWFE regression, β, indicates the percentage point change in the outcome in response to a one standard deviation increase in the drought index. Recall from section 2 that values above 1.5 are considered severely dry and extremely dry and that the mean (standard deviation) of my drought index is 0.475 (0.785). Defining a drought as corresponding to severely and extremely dry conditions, the effect of a drought is therefore equivalent to a two standard deviation increase in the drought index.

Whether this regression succeeds in capturing the causal effect of the drought index on the support for democracy, hinges on at least three important assumptions: (a) the exogeneity of the index, (b) homogeneous treatment effects (e.g., De Chaisemartin and d'Haultfoeuille, 2022*b*; Roth et al., 2023), and (c) no selected sample. The first assumption assumes that the weather is random conditional on geography and time fixed effects. The fact that the weather is random (within a place and time) has long been documented and is widely accepted. The second assumption assumes that the treatment effect is constant across all 16 countries and five survey waves. I show that my results are robust to allowing for heterogeneous treatment effects in robustness tests. The assumption of no selected sample refers to the possibility that: (i) natural disasters can affect the roll out of the Afrobarometer surveys, (ii) conditional on the roll out of the surveys, the Afrobarometer interviews different "types" of individuals, and (iii) individuals exhibit adaptation behavior (e.g., they migrate) due to natural disasters and thus change the composition of the sample. I show that these considerations do not represent concerns in my analysis in robustness tests.

Main results. Table 3 presents the main results. Column 1 estimates equation (1) and shows that a one standard deviation increase in the drought index decreases the support for democracy by 1.1 percentage points. This effect is significant at the 1% level. The third part of the table translates this estimate into percentage effects for one drought. As mentioned above, one drought corresponds to an increase of 2 standard deviations in the SPEI index. Put differently, this means that one drought alone reduces the support for democracy by 2.56%.

Columns 2—6 explore heterogeneous effects with respect to five individual-level characteristics by expanding equation (1) and adding an interaction term of the drought index and a dummy variable and said dummy variable itself. The dimensions of heterogeneity analyzed are captured by variables indicating whether the respondent (a) has completed high school or more (Column 2), (b) is in their impressionable years (Column 3), (c) is male (Column 4), (d) is employed (Column 5), and (e) lives in an urban area (Column 6). There are no significant differential effects across any of these five dimensions. Tables A4 and A5 repeat this heterogeneity analysis with 4 further individual-level characteristics (Table A4) and six measures of conflict exposure (Table A5). Similarly to the main results, there are no significant different effects across any of these dimensions either.[21,22]

Recall from Table A3 that individual level characteristics significantly correlate with the support for democracy. The lack of heterogenous effects of droughts on the support for democracy across these dimensions hints at the possibility that mechanisms other than these dimensions of

[21]The Afrobarometer lacks reliable income data. I rely on two proxies. First, I download the widely used grid cell level nightlights data from 1992 to 2013. The main variable I use is lagged nightlights. Second, I use the Afrobarometer's information on whether the village or neighborhood the respondent lives in has access to electricity. Note that Michalopoulos and Papaioannou (2014) show that nightlights are good predictors of this electricity variable.

[22]To measure possible exposure to conflict events by Afrobarometer respondents, I download the Armed Conflict Location & Event Data Project (ACLED) database for all years of my sample. I follow Harari and La Ferrara (2018) in defining dummy variables capturing this exposure. Specifically, the dummy "any conflict" indicates exposure to any type of conflict within the year of the interview, the variable "battles" indicates having experienced a conflict classified as a battle of any kind (regardless whether control of geographies changes), the variable "violence against civilians" indicates if any unarmed civilians were attacked during a conflict episode, the variable "riots", capturing riots and protests, indicates if (public) demonstrations against government institutions take place, and the variable "non-violent activities" indicates if rebels establish a base or headquarters in the area. Finally, the variable "fatalities" indicates whether any individuals died as a result of the conflict episode. All variables used are lagged.

heterogeneity are at play here. This will be analyzed in more detail in the next section.

Dimensions of democracy. As discussed in section 2, democracy is a multi-dimensional concept, meaning different things to different people both across and within countries. To this end, Table 4 displays the effects of droughts on five indices capturing five dimensions of democracy: personal freedom, democratic governance, trust in government, capabilities of the government, and trust in institutions.

Column 1 shows that one drought reduces individuals' perceived sense of freedom by 0.062 standard deviations. Table A6 presents the results for the individual components of the freedom index, showing that a drought reduces the freedom of speech, the freedom to joint any organization, and the freedom to vote by, respectively, 4.94%, 3.18%, and 2.85%. There are two ways of interpreting these results. The first is that individuals involuntarily lose various freedoms. The second is that individuals voluntarily give up this freedom but in exchange for something else.

The second interpretation suggests that individuals would be happy to give more power to someone else in exchange for their own freedom. To test this, Column 2 of Table 4 looks at whether this loss in freedom is offset by a reduction in the approval of democratic governance. I observe that a drought reduces this approval by 0.066 standard deviations. Table A7 looks at the components of the index: support for one party rule, support for army rule, and support for one man rule (i.e., abolishing parliament and elections). The results show that a drought increases the support for one party rule and one man rule by, respectively, 5.94% and 2.88%. There is no significant treatment effect on the support for army rule. The results in this table provide suggestive evidence that the loss of freedoms documented in Table A6 may be part of a deliberate decision. For instance, respondents may believe that "less democracy" is better at dealing with climate change and therefore increase their support for a more consolidated power structure in their country. The fact that the support for army rule does not increase is indicative that they believe that democracy is "the issue" when dealing with climate change (both democratic and not democratic countries have armies).

Columns 3—5 in Table 4 show that a drought reduces trust in government, the capabilities of the government, and trust in institutions by, respectively, 0.120 standard deviations, 0.070 standard deviations, and 0.136 standard deviations. Tables A8, A9, and A10 present results for each component of each index. I observe that one drought significantly reduces trust in the president by 11.3%, trust in parliament by 9.71%, and trust in local government by 4.68%. In terms of citizens' views of the capabilities of the government, a drought reduces the share of individuals who believe the government can manage the economy and education services by 8.25% and 5.52%, respectively. Finally, one drought reduces individuals's trust in the police, the courts, and the army by 12.6%, 7.72%, and 5.36% respectively.[23]

Two extensions.

Country-level heterogeneities. My sample consists of 16 SSA countries. These countries of course vary in their levels of democracy, state capacity, or economic development. They also vary culturally. While the fixed effects in my analysis take these differences into account (to some degree at least), I here nonetheless estimate equation (1) at the country level. Table A11 shows the results, presenting only the percentage effects of droughts or floods for each country where the effect is significant.

The table clearly shows that the overall effect from Table 3 masks large country level variations. The table shows that the negative effects of droughts on the support for democracy are driven by Lesotho, Cape Verde, Tanzania, Senegal, Zambia, and Kenya, with effects of one drought implying reductions in the support for democracy of up to 27.8%. In other countries, i.e., Zimbabwe, South Africa, and Namibia, the drought index picks up the effects of a flood. Looking at Figure 1 confirms that these countries are confronted mainly with extremely wet conditions (i.e., floods). Finally, the remaining countries—Botswana, Ghana, Malawi, Mali, Mozambique, Nigeria, and Uganda—display no effect of droughts on the support for democracy. There are many possible reasons for this.

The reasons for this country-level heterogeneity are not the subject of this paper. Notwithstanding this, Table A12 looks at heterogeneous effects with respect to four country-level variables. The table shows that countries with higher state capacity—measured by a public services index indicating whether basic state functions (health, education, infrastructure, shelter) are

[23]The results on trust in government mirror the findings from the literature. For example, Balcazar and Kennard (2022) find that temperatures above 3 degrees Celsius decrease trust in political leaders by 2-3 percentage points.

available— and not landlocked countries experience lower reductions in the support for democracy in response to a drought.[24]

Cumulative effects. Throughout a lifetime, an individual is unlikely to be affected only by one drought. Indeed, the median individual in my sample is affected by 7 droughts (min=0 and max=16).[25] Panel A of Figure A2 estimates equation (1) but replaces SPEI^{12}_{gct} with 16 dummy variables indicating whether the respondent has been exposed to 1, 2, 3, ..., 16 droughts, respectively.[26] As can be seen, all dummies have a negative effect on the support for democracy, with the effect clearly increasing with more drought exposure. For the first few droughts the effect is still non-significant but then becomes significant and remains so. For example, the cumulative effect of exposure to 7 droughts for the median individual in the sample is $-0.068(0.040)$, which translates into a 7.95% reduction in the outcome. For individuals exposed to 15 droughts, the effect is $-0.271(0.085)$, which translates into a 31.5% reduction in the outcome. Panel B of Figure A2 repeats this procedure but relys only on extreme droughts, showing an even more extreme pattern.

3.1 Robustness of Main Results

Appendix B presents details to ten robustness tests of the main result from Table 3. First, I show that my results are robust to allowing for heterogeneous treatment effects. Second, I explore the possibility that the sample is selected. Specifically, this refers to the possibility that (i) natural disasters affect the roll out of the Afrobarometer surveys, (ii) conditional on the roll out of the surveys, the Afrobarometer interviews different "types" of individuals, and (iii)

[24]The sources for the country level variables in Table A12 are as follows. The public services index is a rescaled version—rescaled to range from 0 to 10 with 10 being the highest (best) score—of the public services component of the fragile states index (FSI). The two democracy variables rely on the polity2 measurement from the Polity5 project. This index, widely used in the literature (e.g., Burke and Leigh, 2010; Fuchs-Schündeln and Schündeln, 2015; Besley and Persson, 2019; Tabellini and Magistretti, 2022), ranges from -10 (autocracy) to $+10$ (democracy). A country is classified as being less democratic (compared to other countries in my sample) if it has a polity2 score of less than 6. To count the years as a democracy I county the number of years since 1990 that the polity2 measurement was larger than 0. Finally, a country is landlocked if it does not border the sea.

[25]Since my weather data only goes back to 1960, and since my sample ends in 2015, I can only calculate the number of droughts individuals are exposed to for respondents 55 or younger. They make up 78% of the sample.

[26]The dummy indicating no drought expose is the one excluded from the regression. The effect on the dummy indicating expose to 16 droughts should be taken with a grain of salt as only 8 individuals are exposed to 16 droughts.

individuals exhibit adaptation behavior (e.g., they migrate) due to natural disasters and thus change the composition of the sample. I show that neither of these possibilities pose serious concerns in my setting. Third, I conduct two tests aiming to provide evidence that my main outcome measurement really does capture the support for democracy and not just some other view of government. To do this, I first show that there is a very low (but significant) correlation between my outcome and other political attitudes. I then show that the main results persist when controlling for these political attitudes as well. The fourth robustness test considers dynamics. This is important as my outcome is "slow-moving" and likely highly correlated over time. Fifth, I show that the main results are robust when using codings 2 and 3 of the outcome variable (as described in section 2). Sixth and seventh, I allow for different sets of fixed effects and show that the results are also not altered when clustering the standard errors at different levels. Finally, I show that the results survive when controlling for temperature and precipitation levels.

4 Exposure to Non-Democratic Systems

This section explores the hypothesis that the main mechanism at play in the documented relationship is exposure to non-democratic systems. I proxy this exposure to non-democratic systems by exposure to development projects funded by the World Bank and China, the former being technocratic and the latter being autocratic.

The intuition behind the mechanism is as follows. As I will show, large shares of individuals in my dataset are exposed to development projects. Given that the World Bank and China are, respectively, technocratic and autocratic, this exposes people to such technocratic and autocratic systems of governance. This exposure can lead individuals to update their beliefs about democracy in extreme times (i.e., when a drought occurs). This is because in the previous section I showed that one dimension of the loss in support for democracy is the loss in freedom individuals experience. This freedom, I argued, is (at least partly) voluntary, as shown by respondents' increased support for one party and one man rule. In other words, individuals want a consolidation of power in response to extreme weather events. The exposure to technocracy and autocracy provides individuals with two non-democratic alternatives where power is consolidated, thus leading to the hypothesis that this exposure to non-democratic systems is driving the overall effect.

From a policy perspective, relying on ODA as a potential mechanisms is interesting for various reasons. First, on average, ODA makes up 28.2% (26.4%) of the central government expenses for the countries in my sample, with a minimum of 1.22% in South Africa and a maximum of 88.2% in Malawi.[27] These numbers highlight the potential influence of exposure to alternative systems of governance. Second, the fight against climate change requires huge sums of money to flow to developing countries, with, for example, the World Bank being the "largest financier of climate action in developing countries delivering over $31.7 billion in [the] fiscal year 2022."[28] If ODA indeed does act as a driver of the results, this describes a "catch 22" as combating droughts and associated climate change requires foreign funding and but simultaneously this funding, interacted with droughts, erodes democracy.

4.1 Views of the World Bank and China

Supposing that development aid from the World Bank and China act as a mechanism in explaining my result presumes that respondents hold some views about these entities. While there is, to my knowledge, not much information on such views for the World Bank, the latest round of the Afrobarometer surveys does have data on individuals' views on China.[29]

China. Table A13 summarizes a variety of views respondents in the Afrobarometer hold on China. Panel A shows that around two-thirds of respondents think that Chinese aid is useful. While more individuals view the United States, as opposed to China, as the best model for their country (34.7% for the US vs. 27.9% for China), a larger share already view China as having more influence on their country (24.0% for the US vs. 31.4% for China). Panel B shows that 80.6% of respondents view China as having a lot of economic influence on their country and 73.4% view this as a positive influence. Finally, Panel C lists the most important factor explaining this positive image of China. Over 50% of individuals name infrastructure projects and business investments as the primary reason.

[27]Source: World Bank Indicators in 2015. Note that there is no data for Mozambique and Nigeria.

[28]Source: https://www.worldbank.org/en/topic/climatechange/overview#2 (Last accessed: Oct 8, 2023)

[29]While I do not have data on how individuals view the World Bank's organizational structure, I assume that they view the World Bank as a technocratic institutions as it is technocratic.

To test whether these (positive) views of China correlate with political beliefs—in particular my outcome of interest—Table A14 regresses my support for democracy outcome on whether the respondent views China or the US as the best model for the development of their country in Columns 1 and 4. While the effects are not significant, the table shows that viewing China (the US) as the best model for development is associated with less (more) in the support for democracy.

In Columns 2 and 3 (5 and 6), I regress the same outcome on whether or not the respondent lives within 100km and 50km of a development project funded by China (the World Bank). The table shows that being exposed to a development project funded by China (the World Bank) correlates significantly (insignificantly) and negatively with the support for democracy.[30]

While I don't know what the non-democratic regime is that individuals see in China, it seems likely that it is an autocratic one (e.g., Wellner et al., 2022).

4.2 Data

World Bank. Geocoded data on development projects approved by the World Bank from 1995-2014 are taken from AidData's Research Lab at William & Mary (Version 1.4.2). I draw a radius of 50km as well as 100km around each development project and then define a dummy variable that equals to 1 if a respondent from the Afrobarometer lives within either of these radii.[31][32] The data shows that 65.6% (74.9%) of respondents are living within 50km (100km) of a development project funded by the World Bank.

Chinese projects. The data for development projects funded by China only are taken from AidData's Global Chinese Development Finance Dataset (Version 2.0). This data, introduced

[30]The fact that exposure to World Bank projects does not display a significant correlation with the outcome does not imply that this exposure to technocracy is not a mechanism. This result says that in normal times, on average, exposure to World Bank projects doesn't correlate with the outcome. The whole point of my analysis is to look at the effect in abnormal times, i.e., under the occurrence of extreme weather events.

[31]Knutsen et al. (2017) and Isaksson and Kotsadam (2018*a*) use 25km and 50km radii. The reason why I rely on 100km instead of 25km is that this would result in (too) few individuals being exposed to Chinese development projects (described below). I therefore rely on 50km and 100km radii.

[32]I keep only projects in the sample that have precision codes 1 or 2. Furthermore, I assume that once a development project has been implemented it will "stay forever". The idea behind this is that if, for example, a road was built from 2002 to 2005, the road will not disappear in 2005. An individual interviewed in the Afrobarometer in 2009, for example, would therefore still be coded as being exposed to this road in my sample.

by Strange et al. (2017) and geocoded by Dreher et al. (2016), has widely been used in research (e.g., Dreher and Fuchs, 2015; Dreher et al., 2018; Mueller, 2022).[33]

To code the exposure of individuals to these projects, I rely on two approaches. First, akin to the World Bank projects, I define a dummy variable that equals to 1 if an individual lives within 50km or 100km of a Chinese development project. The issue with this approach is that the geocoding of the dataset is incomplete, thus implying that some individuals, who are coded as not being exposed to a Chinese project are (most likely) exposed to one. To deal with this, the second approach makes use of the fact this dataset contains information on the date when projects are announced and when the actual implementation started. I therefore code a dummy variable ("inactive") that equals to 1 if an individuals lives within 50km or 100km of a development project funded by China that has been announced but has not yet started implementation. Similarly, I code a dummy variable ("active") that equals to 1 if an individual lives within 50km or 100km or a development project funded by China that has started to be implemented (or has been implemented).

Based on the first approach, the data shows that 16.6% (25.3%) of respondents are living within 50km (100km) of a development project funded by China. The second approach shows that 9.59% (14.0%) of respondents live within 50km (100km) of "inactive" Chinese projects and 12.0% (18.5%) live within 50km (100km) of "active" Chinese projects.

4.3 The Development Projects

Figure A3 displays the number of development projects by the World Bank (Panel A) and China (Panel B) by sector across time. While "government and civil society" and "other social infrastructure" rank high for both, the World Bank otherwise tends to focus more on "water supply and sanitation" and "agriculture, forestry, and fishing" projects while China stays in the "health" and "education" sectors.

Finally, Table A15 regresses dummy variables indicating whether the respondent lives within 100km or 50km of a development project on the SPEI index, thus assessing whether these

[33] I drop umbrella agreements (Dreher et al., 2021), only keep projects categorized as ODA (Isaksson and Kotsadam, 2018*a*), drop any co-financed projects, and only consider projects where the source of the project information comes from official sources.

projects are targeted towards drought areas. The table shows no correlation whatsoever between the variables, thus implying that areas subjected to disasters are not actively targeted.

4.4 The Exposure to Alternatives to Democracy

Empirical strategy. The empirical strategy to test whether development aid from the World Bank or China acts as a mechanism is a straightforward extension of the statistical model in (1)

$$\begin{aligned}\text{Support for democracy}_{igct} &= \delta_g + \tau_t + \beta_0 \text{Drought Index}_{gct} \\ &+ \beta_1(\text{Drought Index}_{gct} \times \text{DP}^{100km}_{igct}) + \beta_2 \text{DP}^{100km}_{igct} + \mathbf{x}_{igct}\gamma + \epsilon_{igct} \quad (2)\end{aligned}$$

where DP^{100km}_{igct} is a dummy variable indicating whether individual i in grid cell g and country c in year-month t is living within 100km of a development project funded with money from the World Bank or China. The remaining variables are defined as in equation (1).

In this specification, β_0 is the effect of the drought index on the support for democracy and β_1 represents the differential effect of the index on the support for democracy between respondents living within and outside of the radius around a development project. $\beta_0 + \beta_1$ is thus the effect of the drought index on the support for democracy for individuals exposed to a development project funded by the World Bank or China.

Results. Columns 1 (2) [3] in Table 5 present the results when DP^{100km}_{igct} represents exposure to a World Bank or Chinese (World Bank) [Chinese] project. The top panel of Table 5 presents the estimated coefficients $\widehat{\beta}_0$ and $\widehat{\beta}_1$. The second panel of the table then displays the sum of the estimates, $\widehat{\beta}_0 + \widehat{\beta}_1$, as well as the p-value associated with said coefficients. Finally, the third panel translates the effects of $\widehat{\beta}_0$ and $\widehat{\beta}_0 + \widehat{\beta}_1$ into percentage effects of one drought.

All three columns tell the same story. The drought index has no significant negative effect on the support for democracy for respondents living further away than 100km of a development project. The differential effect of the index for individuals living outside and inside of the radius is -2.3, -2.3, and -1.9 percentage points, respectively, in Columns 1, 2, and 3. This different is statistically significant at the 1% level. This then culminates in an effect of the drought index on the support for democracy of -2.3, -2.3, and-2.5 percentage points. In other words, respondents living in areas exposed to alternatives to democracy and exposed to one drought experience a reduction in the support for democracy of 5.36 to 5.82 percent.

4.5 Robustness

Development projects are unlikely to be randomly allocated throughout SSA, likely targeting areas with particular characteristics (like poorer areas). It is therefore possible that my results conflate other mechanisms. Examples include exposure to conflict or the income/wealth, health or education levels of the local population. The aim here is to mitigate this concern.

Doughnuts. The first approach relies on a doughnut design. The premise of this idea is that if the exposure to alternatives to democracy (i.e., the presence of ODA) is orthogonal to some x, then this x cannot be a mechanism because the relationship between climate change and the support for democracy only exists for individuals exposed to alternatives to democracy. This relatively simple insight thus has the power to rule out a whole range of possible mechanisms.

Clearly, these development projects are not simply orthogonal to local conditions. To show this, Table 6 regresses a dummy variable indicating whether the respondent is employed on a dummy variable indicating whether the respondent lives within a radius of, respectively, 10km, 20km, 30km, 40km, or 50km or a development project funded by the World Bank or China. The idea behind this regression is simply that it is likely that development projects benefit respondents living close by a project and that at some point this economic benefit fades out. The table shows that individuals living within 10km of a development project benefit economically from it, while individuals living further away do not benefit from the project. As such, for individuals living beyond 10km of a development project, there is no correlation between employment and the presence of development projects.

Employment, or income, are potential mechanisms that may be confounding my results from the previous subsection. Because there is no relationship between the presence of development projects and employment beyond 10km of the project, replicating the results from Table 5 while excluding individuals who live within a 10km radius of a development project serves as a test whether I am conflating income and exposure to non-democratic systems as mechanisms above.

Table A16 replicates Table 6 but replaces the outcome with the gender and age of the respondent, and four dummies indicating whether the village has a school, access to electricity, a sewage system, and piped water. The effect always fades out after 10km, except for sewage systems where the effect persists for 20km around a development project. This table does not cover all possible mechanisms that could be at play here, but it does suggest that overall, a radius of 20km should capture most confounding factors at play.

Column 1 in Table 7 therefore replicates Column 1 from Table 5 but drops individuals living within 20km of a development projects from a regression. As can be seen, the results are unchanged. This suggests that the finding from the previous subsection that droughts only affect the support for democracy for individuals exposed to development projects was unlikely to be driven by confounding factors such as income, gender, age, or schooling.

Anticipation effects. Given the fact that for Chinese data I know the date when projects where announced and started to be implemented, I can rely on a second empirical strategy for Chinese projects also. Specifically, I build on the identification strategy used in Knutsen et al. (2017) and Isaksson and Kotsadam (2018*a*) to get

$$\begin{aligned} \text{Support for democracy}_{igct} &= \delta_g + \tau_t + \beta_0 \text{Drought Index}_{gct} \\ &+ \beta_1(\text{Drought Index}_{gct} \times \text{Inactive}^{100km}_{igct}) + \beta_2(\text{Drought Index}_{gct} \times \text{Active}^{100km}_{igct}) \\ &+ \beta_3 \text{Inactive}^{100km}_{igct} + \beta_4 \text{Active}^{100km}_{igct} + \mathbf{x}_{igct}\gamma + \epsilon_{igct} \end{aligned} \quad (3)$$

where $\text{Inactive}^{100km}_{igct}$ ($\text{Active}^{100km}_{igct}$) indicate whether the individual lives within 100km of a project that has been announced but has not yet started implementation (that has started to be implemented or has been implemented). The exposure to China effect in equation (3) is given by $\beta_2 - \beta_1$. In words, this effect compares the difference between two differential effects. The first (second) is the additional effect of the drought index on the support for democracy of individuals living within 100km of an inactive (active) Chinese project compared to "control" individuals, i.e., individuals not exposed to an inactive or active project.

Column 2 in Table 7 presents the results. First, the table replicates the main result from Column 3 in Table 5, showing that the relationship between droughts and the support for democracy only exists for individuals exposed to Chinese projects.

Second, this specification can be used to test for anticipation effects. The interaction between the drought index and inactive Chinese projects (i.e., projects announced but not yet started) is insignificant. Areas that receive a project only after experiencing a drought do not exhibit any relationship between droughts and the support for democracy. If projects target certain types of areas, and certain characteristics of these areas drive the overall results, the drought index in these areas with these announced Chinese project would display significant effects. Therefore, this test rules out local conditions as a potential mechanism.[34]

Sectors of ODA. Table 8 asks whether the results in Table 5 are driven by development projects in particular sectors. As can be seen, when defining (a) “government and civil society” and “other social infrastructure” as “infrastructure projects”, (b) “health” and “education” as “health and education projects”, and (c) “water supply and sanitation” and “energy” as “sanitation and energy” projects, no sector in particular seems to be driving the results displayed above. This is further evidence that the development projects here do indeed act as proxies for exposure to non-democratic systems of governance and are not targeting a particular need of some people which may be driving the result.

5 Conclusion

To the best of my knowledge, this paper is the first to establish a relationship between individuals’ beliefs for what type of political system should govern their country and climate change. The main takeaway is that exposure to non-democratic systems of governance is a key mechanism when considering the relationship between climate change and the support for democracy.

The paper opens the doors to many more research questions. Taken together, these avenues for future work lay out an exciting and policy relevant research agenda.

[34] I unfortunately cannot do the same exercise with World Bank projects as I do not have data on when projects were announced. Furthermore, notice that World Bank projects have been around for a long time and cover a large share of my sample. The World Bank data, however, only starts in 2000. Therefore, I do not know which areas have been exposed to projects prior to 2000. This therefore means that I cannot just use a future project (say one that will be built in an area in two years) instead of the “announcement date” (exactly because I don’t know whether a place has been exposed in the past, and the large shares of exposure suggest that the answer is likely yes).

First, there is a need for more granular data on individuals' preferences on and beliefs about climate change and how they relate to a variety of political outcomes in developing countries. Specifically, the process of how individuals update their beliefs about climate change and politics is largely untouched in this paper.[35] Related to this is a need specific to this paper. Given that the support for democracy decreases, it is pertinent to understand what alternatives individuals have in mind.

Second, there is to my knowledge no theoretical work in political economy showing how individuals update their beliefs about the system they live in based on some conditions. In the case of my paper, these conditions are extreme weather events in 16 SSA countries, but more generally this might be something different. To date we lack theoretical models to help us understand this relationship in more detail. Detailed data collection processes on beliefs about climate change and political systems (point 1) can complement this theoretical undertaking.

Third, I have not analyzed whether (and if so, under what conditions) the loss in the support for democracy documented in this paper translates into any actions by individuals. Some actions that might be affected are voter turnout, voting outcomes, participating in demonstrations, or, more extreme, participating in revolutions.[36]

Finally, this paper has solely focused on developing countries. Climate change and the erosion of democratic norms are big policy issues in developed countries as well—it is therefore important to study this relationship in these countries as well. As a teaser, Table A17 presents predictions of the impact of the total number of unprecedented drought years from 2010 to 2099, taken from Satoh et al. (2022), on the support for democracy for different regions in the world relying on simple back of the envelope calculations for two climate change scenarios. The two climate change scenarios used are the RCP2.6—an emissions scenario largely in line with the Paris agreement—and the RCP8.5—a scenario where emissions continue to rise throughout the 21st century. The predictions rely on a conservative estimate of my results which imply that exposure to one extra drought year reduces the support for democracy by 1.5 percentage points and assume a linear relationship (see Panel B of Figure A2). The table suggests that the

[35] There is some work on how individuals update beliefs about climate change in developed countries (e.g., Deryugina, 2013), but much more work is needed in developing countries. There is work on attitudes about climate change (e.g., Dechezleprêtre et al., 2022).

[36] Egorov and Sonin (2021) study the relationship between elections in non-democracies and participation in protests theoretically.

relationship between droughts and the support for democracy likely also exists in other parts of the world and has the potential to become problematic if climate change is left unchecked.

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7 Tables and Figures

Table 1: Summary Statistics of Political Variables (1)

	(1) Full Sample	(2) Eastern Africa	(3) Western Africa	(4) Southern Africa
A. Support for Democracy				
Respondent supports democracy (cond.)	0.859	0.872	0.872	0.818
	(0.348)	(0.334)	(0.334)	(0.386)
Respondent supports democracy (uncond.)	0.756	0.780	0.785	0.681
	(0.430)	(0.414)	(0.411)	(0.466)
Respondent indifferent to politics	0.120	0.106	0.100	0.167
	(0.325)	(0.307)	(0.300)	(0.373)
B. Meaning of Democracy				
Personal freedom	0.435	0.456	0.436	0.401
	(0.496)	(0.498)	(0.496)	(0.490)
Government for/by the people	0.099	0.072	0.135	0.094
	(0.299)	(0.258)	(0.342)	(0.292)
Voting	0.102	0.133	0.074	0.093
	(0.303)	(0.339)	(0.261)	(0.290)
C. Personal Freedom				
Freedom of speech	0.769	0.753	0.779	0.786
	(0.421)	(0.432)	(0.415)	(0.410)
Freedom to join organization	0.818	0.789	0.837	0.845
	(0.386)	(0.408)	(0.370)	(0.362)
Freedom to vote	0.843	0.831	0.849	0.857
	(0.363)	(0.375)	(0.358)	(0.350)
D. Erosion of Democracy				
Respondent doesn't support one party rule	0.741	0.701	0.833	0.699
	(0.438)	(0.458)	(0.373)	(0.459)
Respondent doesn't support army rule	0.798	0.837	0.769	0.765
	(0.402)	(0.370)	(0.422)	(0.424)
Respondent doesn't support one man rule	0.833	0.851	0.839	0.795
	(0.373)	(0.356)	(0.368)	(0.404)
Observations	128740	61043	37803	29894

Notes: The table displays mean sample characteristics and standard deviations (in parentheses) for a variety of political preferences. Panel A displays the share of individuals who indicate they support democracy (vs. any other system of government) (conditional on them not having answered that they are indifferent between democracy and other systems and unconditionally) as well as the share of individuals who are indifferent to politics. Panel B displays the three most mentioned meanings respondents associated with democracy: personal freedom, government by and for the people, and voting. Panel C display summary statistics for three dimensions of personal freedom. Finally, Panel D displays summary statistics for three political variables relating to the erosion of democracy. Column 1 displays the characteristics across the full sample, while Columns 2—4 split the sample by regions in Africa. All summary statistics are calculated across all survey rounds.

Table 2: Summary Statistics of Political Variables (2)

	(1) Full Sample	(2) Eastern Africa	(3) Western Africa	(4) Southern Africa
A. Trust in Government				
Respondent trusts president	0.622	0.646	0.562	0.652
	(0.485)	(0.478)	(0.496)	(0.476)
Respondent trusts parliament	0.556	0.593	0.487	0.576
	(0.497)	(0.491)	(0.500)	(0.494)
Respondent trusts local government	0.513	0.545	0.472	0.506
	(0.500)	(0.498)	(0.499)	(0.500)
B. Capabilities of Government				
Gov. Cap. of Managing Economy	0.485	0.480	0.420	0.574
	(0.500)	(0.500)	(0.494)	(0.494)
Gov. Cap. of Managing Health	0.615	0.611	0.565	0.682
	(0.487)	(0.487)	(0.496)	(0.466)
Gov. Cap. of Managing Education	0.652	0.667	0.560	0.736
	(0.476)	(0.471)	(0.496)	(0.441)
Gov. Cap. of Fighting Corruption	0.433	0.423	0.409	0.478
	(0.495)	(0.494)	(0.492)	(0.500)
C. Trust in Institutions				
Respondent trusts police	0.539	0.530	0.510	0.588
	(0.498)	(0.499)	(0.500)	(0.492)
Respondent trusts courts	0.622	0.642	0.552	0.671
	(0.485)	(0.479)	(0.497)	(0.470)
Respondent trusts army	0.672	0.694	0.658	0.649
	(0.470)	(0.461)	(0.474)	(0.477)
Observations	128539	61016	37684	29839

Notes: The table displays mean sample characteristics and standard deviations (in parentheses) for a variety of political preferences. Panel A displays the share of respondents who trust (a) the president, (b) parliament, and (c) local government. Panel B reports summary statistics for four variables indicating whether the respondent believes that the government is capability of (a) managing the economy, (b) managing health services, (c) managing education services, or (d) of fighting corruption. Finally, Panel C displays the shares of individuals who trust (a) the police, (b) the courts, or (c) the army. Column 1 displays the characteristics across the full sample, while Columns 2—4 split the sample by regions in Africa. All summary statistics are calculated across all survey rounds from the Afrobarometer surveys.

Table 3: Extreme Weather Events and the Support for Democracy

	Respondent supports democracy					
	(1)	(2)	(3)	(4)	(5)	(6)
Drought index	-0.011***	-0.011**	-0.012***	-0.011**	-0.013***	-0.011**
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Drought index x educated		-0.001				
		(0.005)				
Drought index x below 25			0.001			
			(0.005)			
Drought index x male				-0.001		
				(0.004)		
Drought index x employed					0.003	
					(0.004)	
Drought index x urban						0.001
						(0.006)
Coefficient of index + interaction		-0.012	-0.011	-0.012	-0.009	-0.010
p-value: Coefficient of index + interaction		[0.020]	[0.066]	[0.008]	[0.058]	[0.067]
Mean of outcome	0.859					
Effect of one drought (2 SDs) (no interaction)	-2.56%	-2.56%	-2.79%	-2.56%	-3.03%	-2.56%
Effect of one drought (2 SDs) (interaction)		-2.79%	-2.56%	-2.79%	-2.10%	-2.33%
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63077	63077	63077	63077	63077	62337

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI) as well as a variety of household characteristics, all of which are described in Table A1 in detail. In Columns 2—6, the table adds an interaction of the SPEI index with a dummy variable and that dummy variable itself. The dummies added indicate whether the respondent (a) has completed high school or more, (b) is in their impressionable years, (c) is male, (d) is currently employed, or (e) lives in an urban area. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table 4: Dimensions of Democracy

	Index of freedom	Index of democratic governance	Index of trust	Index of capabilities	Index of institutions
	(1)	(2)	(3)	(4)	(5)
Drought index	-0.031***	-0.033***	-0.060***	-0.035***	-0.068***
	(0.011)	(0.012)	(0.011)	(0.012)	(0.010)
Mean of outcome	0.000	0.000	0.000	0.000	0.000
Effect of one drought (2 SDs)	0.062SD	0.066SD	0.120SD	0.070SD	0.136SD
Household controls	Yes	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes
Observations	76289	76160	76143	76111	76062

Notes: The table displays OLS regressions of five indices representing different dimensions of democracy on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI) as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level. Each index is constructed in two steps. First, I average the components of the index, which are always dummy variables. Second, I standardize this average to get the final index. The freedom index has three components: perceived freedom of speech, freedom to join any political organization, and freedom to vote. The democratic governance index has three components: no support for one party rule, no support for army rule, and no support for one man rule (i.e., abolishing parliament and elections). The trust in government index has three components: trust (a) in the president, (b) in parliament, and (c) in the local government. The capabilities index has four components: the respondent's belief that the government is capable (a) of managing the economy, (b) of managing health services, (c) of managing education services, and (d) of fighting corruption. Finally, the institutions index has three components: trust (a) in the police, (b) in the courts, and (c) in the local army.

Table 5: The Exposure to Alternatives to Democracy

	Respondent supports democracy		
	(1)	(2)	(3)
Drought index	-0.000	-0.001	-0.006
	(0.006)	(0.006)	(0.005)
Drought index x dev. project exposure	-0.023***		
	(0.007)		
Drought index x World Bank project exposure		-0.023***	
		(0.007)	
Drought index x Chinese project exposure			-0.019**
			(0.009)
Coefficient of exposure to project	-0.023	-0.023	-0.025
p-value: Coefficient of exposure to project	[0.000]	[0.000]	[0.002]
Mean of outcome		0.859	
Effect of one drought (2 SDs) (no project exposure)	0.00%	0.23%	-1.40%
Effect of one drought (2 SDs) (project exposure)	-5.36%	-5.36%	-5.82%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	60044	59902	63077

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), an interaction of the SPEI index with a dummy variable indicating whether the respondent lives within a radius of 100km of a development project funded by the World Bank or China, said dummy itself, as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table 6: Employment Status and Distances to Development Projects

	Respondent is employed					
	(1)	(2)	(3)	(4)	(5)	(6)
Lives within 10km of project	0.023***					
	(0.008)					
Lives within 20km of project		0.007				
		(0.010)				
Lives within 30km of project			-0.006			
			(0.010)			
Lives within 40km of project				-0.020		
				(0.013)		
Lives within 50km of project					-0.011	-0.023
					(0.014)	(0.017)
Mean of outcome	0.345					
Household controls	No	No	No	No	No	Yes
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	121481	121519	121551	121565	121585	72563

Notes: The table displays OLS regressions of a dummy variable indicating whether the respondent is employed on a dummy variable indicating whether the respondent lives within a radius of, respectively, 10km, 20km, 30km, 40km, or 50km of a development project funded by the World Bank or China, as well as (in Column 6) a variety of household characteristics, all of which are described in Table A1 in detail. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table 7: Robustness of Main Mechanism

	Respondent supports democracy	
	(1)	(2)
Drought index	0.007	-0.003
	(0.008)	(0.005)
Drought index x dev. project exposure	-0.022**	
	(0.010)	
Drought index x inactive Chinese project		0.004
		(0.015)
Drought index x active Chinese project		-0.035***
		(0.010)
Coefficient of exposure to project	-0.015	-0.039
p-value: Coefficient of exposure to project	[0.069]	[0.057]
Mean of outcome	0.859	
Effect of one drought (2 SDs) (no project exposure)	1.63%	-0.70%
Effect of one drought (2 SDs) (project exposure)	-3.49%	-9.08%
Household controls	Yes	Yes
Cell fixed effects	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes
Observations	32310	63077

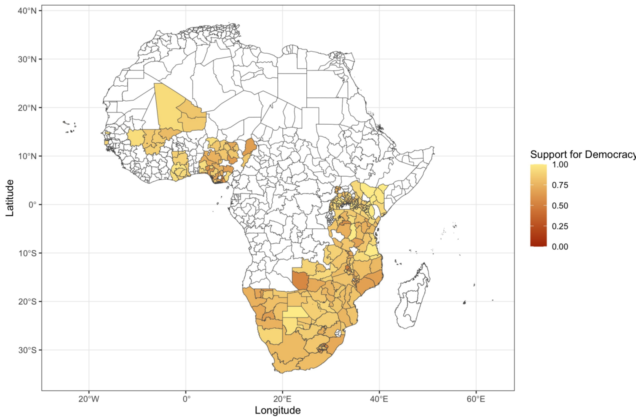
Notes: Column 1 replicates Column 1 from Table 5 but drops all individuals living within 20km of a development project. In Column 2, the table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), an interaction of the SPEI index with a dummy variable indicating whether the respondent lives within a radius of 100km of an announced but not yet built/started development project funded by China, an interaction of the SPEI index with a dummy variable indicating whether the respondent lives within a radius of 100km of a built/started development project funded by China, and said dummies themselves, as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table 8: The Exposure to Different Types of Development Projects

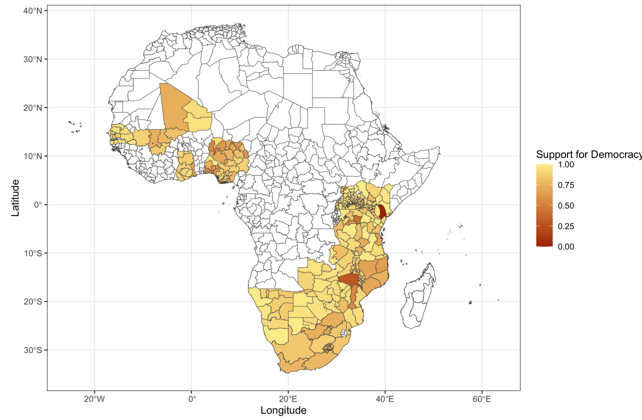
	Respondent supports democracy		
	(1)	(2)	(3)
Drought index	0.003	0.013*	-0.002
	(0.007)	(0.008)	(0.007)
Drought index x infrastructure project (100km)	-0.028***		
	(0.008)		
Drought index x health/education project (100km)		-0.028***	
		(0.010)	
Drought index x sanitation/energy project (100km)			-0.022***
			(0.009)
Coefficient of exposure to project	-0.024	-0.016	-0.024
p-value: Coefficient of exposure to project	[0.000]	[0.047]	[0.000]
Mean of outcome		0.859	
Effect of one drought (2 SDs) (no project exposure)	0.70%	3.03%	0.47%
Effect of one drought (2 SDs) (project exposure)	-5.59%	-3.73%	-5.59%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	52443	36245	54498

Notes: The table replicates Column 1 from Table 5, but instead of looking at exposure to overall development projects funded by the World Bank or China, displays results for three sectors in particular. These are (i) infrastructure projects, which comprise the sectors "government and civil society" and "other social infrastructure"; (ii) health and education projects, which comprise the sectors "health" and "education"; and (iii) sanitation and energy projects, which comprise the sectors "water supply and sanitation" and "energy".

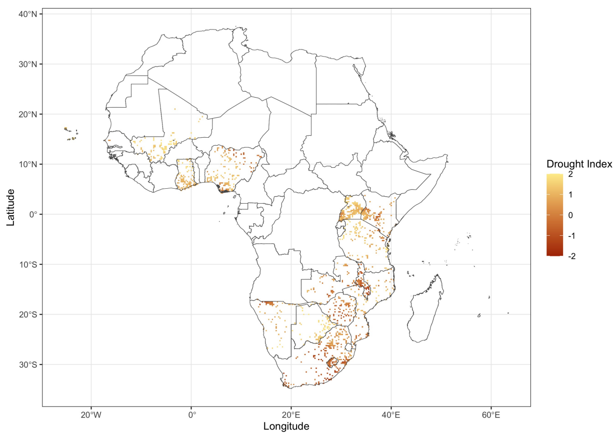
Figure 1: Distribution of the Support for Democracy and Drought Index



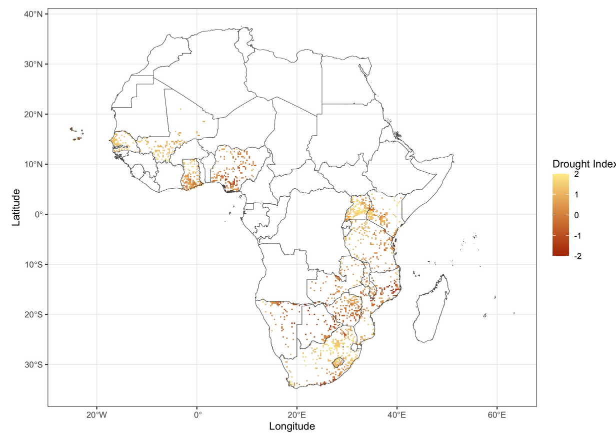
(a) Survey Round 2



(b) Survey Round 6



(c) Survey Round 2



(d) Survey Round 6

Notes: Panels A and B of the figure display the distribution of the support for democracy at the regional level in each survey round. Support for democracy is measured as a dummy variable indicating support for democracy vs. other systems of government at the individual level and is here aggregated to the regional level to preserve the anonymity of all respondents. Panels C and D of the figure displays the distribution of the drought index used in this paper, i.e., the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), across all grid cells that appear in the data in each survey round. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations.

A Appendix Tables and Figures

Table A1: Household Characteristics

	(1) Full Sample	(2) Eastern Africa	(3) Western Africa	(4) Southern Africa
Age	36.868	35.553	37.353	38.547
	(15.006)	(13.817)	(15.241)	(16.419)
High school education or more	0.270	0.242	0.244	0.352
	(0.444)	(0.428)	(0.429)	(0.478)
Male	0.498	0.498	0.499	0.497
	(0.500)	(0.500)	(0.500)	(0.500)
Race: black	0.946	0.992	0.904	0.915
	(0.226)	(0.091)	(0.295)	(0.279)
Race: white	0.012	0.002	0.004	0.035
	(0.107)	(0.043)	(0.067)	(0.185)
Religious	0.947	0.964	0.963	0.899
	(0.223)	(0.186)	(0.189)	(0.301)
Aligned with political party in power	0.518	0.519	0.394	0.645
	(0.500)	(0.500)	(0.489)	(0.479)
Employed (salaried)	0.345	0.333	0.376	0.329
	(0.475)	(0.471)	(0.484)	(0.470)
Occupation affected by climate change	0.710	0.747	0.737	0.600
	(0.454)	(0.435)	(0.440)	(0.490)
Observations	128988	61208	37870	29910

Notes: The table displays mean sample characteristics and standard deviations (in parentheses) for a variety of household characteristics. The variables displayed are the age of the respondent in years and dummy variables indicating (a) whether the respondent completed high school education or more, (b) whether the respondent is male, (c) the race of the respondent (black or white), (d) whether the respondent is religious, (e) whether the respondent is aligned with the political party in power, (f) whether the respondent is employed, and (g) whether the respondent's occupation is affected by climate change. Column 1 displays the characteristics across the full sample, while Columns 2—4 split the sample by regions in Africa. All summary statistics are calculated across all survey rounds from the Afrobarometer surveys.

Table A2: Village Characteristics

	(1) Full Sample	(2) Eastern Africa	(3) Western Africa	(4) Southern Africa
Post office	0.206	0.139	0.210	0.315
	(0.404)	(0.346)	(0.407)	(0.465)
School	0.835	0.857	0.866	0.758
	(0.371)	(0.350)	(0.341)	(0.428)
Police station	0.300	0.297	0.299	0.306
	(0.458)	(0.457)	(0.458)	(0.461)
Electricity	0.584	0.448	0.696	0.678
	(0.493)	(0.497)	(0.460)	(0.467)
Piped water	0.520	0.327	0.598	0.751
	(0.500)	(0.469)	(0.490)	(0.433)
Sewage	0.255	0.149	0.306	0.372
	(0.436)	(0.356)	(0.461)	(0.483)
Health clinic	0.534	0.528	0.573	0.495
	(0.499)	(0.499)	(0.495)	(0.500)
Market stalls	0.594	0.675	0.540	0.523
	(0.491)	(0.468)	(0.498)	(0.499)
Urban	0.372	0.276	0.460	0.436
	(0.483)	(0.447)	(0.498)	(0.496)
Observations	128988	61208	37870	29910

Notes: The table displays mean sample characteristics and standard deviations (in parentheses) for a variety of village characteristics. The variables displayed are dummy variables indicating whether the respondent's village (a) has a post office, (b) has a school, (c) has a police station, (d) has access to electricity, (e) has access to piped water, (f) has a sewage system, (g) has a health clinic, (h) has market stalls, and (i) is urban. Column 1 displays the characteristics across the full sample, while Columns 2—4 split the sample by regions in Africa. All summary statistics are calculated across all survey rounds from the Afrobarometer surveys.

Table A3: Correlates of the Support for Democracy: Household Characteristics

	Respondent supports democracy								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Household Characteristics									
Age	0.000***								
	(0.000)								
High school education or more		0.017***							
		(0.003)							
Male			0.015***						
			(0.003)						
Race: black				0.026***					
				(0.008)					
Race: white					-0.053***				
					(0.017)				
Religious						0.022***			
						(0.007)			
Aligned with political party in power							0.024***		
							(0.004)		
Employed (salaried)								0.003	
								(0.003)	
Occupation affected by climate change									-0.008*
									(0.004)
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	101941	102750	102935	97120	97120	101724	70122	102596	50235

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on a variety of household characteristics, all of which are described in Table A1 in detail. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table A4: Further Heterogeneities: Individual Attributes

	Respondent supports democracy			
	(1)	(2)	(3)	(4)
Drought index	-0.013**	-0.014**	-0.014***	-0.002
	(0.005)	(0.006)	(0.005)	(0.009)
Drought index x politically aligned	0.002			
	(0.005)			
Drought index x access to electricity		0.003		
		(0.006)		
Drought index x lagged nightlights			-0.000	
			(0.000)	
Drought index x occ. affected				0.013*
				(0.007)
Coefficient of SPEI + interaction	-0.011	-0.012	-0.014	0.012
p-value: Coefficient of SPEI + interaction	[0.021]	[0.010]	[0.005]	[0.137]
Mean of outcome	0.859			
Effect of one drought (2 SDs) (no interaction)	-3.03%	-3.26%	-3.26%	-0.47%
Effect of one drought (2 SDs) (with interaction)	-2.56%	-2.79%	-3.26%	2.79%
Household controls	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes
Observations	63077	62215	48722	31448

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), an interaction of the SPEI index with a variable, said variable itself, and a variety of household characteristics, all of which are described in Table A1 in detail. The first, second, and fourth variables are dummies and indicate whether the respondent (a) is politically aligned with the party in power, (b) lives in a village with access to electricity, and (c) has an occupation affected by climate change. The third variable is lagged nightlights at the grid cell level. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A5: Further Heterogeneities: Exposure to Conflict

	Respondent supports democracy					
	(1)	(2)	(3)	(4)	(5)	(6)
Drought index	-0.012***	-0.012***	-0.011***	-0.013***	-0.011***	-0.011***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Drought index x any conflict	0.002					
	(0.007)					
Drought index x battles		0.006				
		(0.012)				
Drought index x violence against civilians			-0.003			
			(0.006)			
Drought index x riots				0.006		
				(0.007)		
Drought index x non-violent activities					0.004	
					(0.012)	
Drought index x fatalities						-0.000
						(0.009)
Coefficient of exposure to conflict	-0.010	-0.006	-0.014	-0.007	-0.008	-0.012
p-value: Coefficient of exposure to conflict	[0.156]	[0.657]	[0.050]	[0.362]	[0.506]	[0.218]
Mean of outcome			0.859			
Effect of one drought (2 SDs) (not exposed to conflict)	-2.79%	-2.79%	-2.56%	-3.03%	-2.56%	-2.56%
Effect of one drought (2 SDs) (exposed to conflict)	-2.33%	-1.40%	-3.26%	-1.63%	-1.86%	-2.79%
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63077	63077	62838	63077	63077	63077

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index as well as interactions terms of this index with dummy variables indicating whether the respondent was exposed to (a) any type of conflict, (b) battles of any kind, regardless of whether control of the contested location changes, (c) a conflict that included violence against civilians, (d) riots and protests against a government institution, (e) non-violent conflicts such as establishments of bases or headquarters, and (f) conflicts that resulted in fatalities. All conflict variables are lagged. The regressions control for each respective conflict type in addition to the interaction term and control for household controls, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. All regressions include grid cell and month fixed effects and cluster standard errors at the grid cell × month level.

Table A6: Dimensions of Democracy: Personal Freedom

	Freedom of speech	Freedom to join organization	Freedom to vote
	(1)	(2)	(3)
Drought index	-0.019***	-0.013***	-0.012***
	(0.005)	(0.004)	(0.004)
Mean of outcome	0.769	0.818	0.843
Effect of one drought (2 SDs)	-4.94%	-3.18%	-2.85%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	75780	75475	75752

Notes: The table displays OLS regressions of dummy variables indicating the perceived freedom of speech, freedom to join any political organization, and freedom to vote of respondents on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI) as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A7: Dimensions of Democracy: Consolidation of Power

	Respondent doesn't support		
	one party rule	army rule	one man rule
	(1)	(2)	(3)
Drought index	-0.022***	0.002	-0.012**
	(0.005)	(0.005)	(0.005)
Mean of outcome	0.741	0.798	0.833
Effect of one drought (2 SDs)	-5.94%	0.50%	-2.88%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	75489	74944	74479

Notes: The table displays OLS regressions of dummy variables indicating no support for one party rule, no support for army rule, and no support for one man rule (i.e., abolishing parliament and elections) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A8: Dimensions of Democracy: Trust in Government

	Respondent trusts		
	the president	the parliament	the local government
	(1)	(2)	(3)
Drought index	-0.035***	-0.027***	-0.012**
	(0.005)	(0.006)	(0.006)
Mean of outcome	0.622	0.556	0.513
Effect of one drought (2 SDs)	-11.3%	-9.71%	-4.68%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	74900	73869	71406

Notes: The table displays OLS regressions of dummy variables indicating trust in the president, in parliament, and in the local government on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table A9: Dimensions of Democracy: Capabilities of the Government

	Government is capable of managing/fighting			
	the economy	health services	education services	corruption
	(1)	(2)	(3)	(4)
Drought index	-0.020***	-0.003	-0.018***	-0.006
	(0.006)	(0.005)	(0.005)	(0.007)
Mean of outcome	0.485	0.615	0.652	0.433
Effect of one drought (2 SDs)	-8.25%	-0.98%	-5.52%	-2.78%
Household controls	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes
Observations	73449	75392	75209	71830

Notes: The table displays OLS regressions of dummy variables indicating the respondent's belief whether the government is capable of managing the economy, of managing health services, of managing education services, and of fighting corruption on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A10: Dimensions of Democracy: Trust in Institutions

	Respondent trusts		
	Instituions index	the police	the courts
	(1)	(2)	(3)
Drought index	-0.034***	-0.024***	-0.018***
	(0.005)	(0.005)	(0.005)
Mean of outcome	0.539	0.622	0.672
Effect of one drought (2 SDs)	-12.6%	-7.72%	-5.36%
Household controls	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	75639	73996	61706

Notes: The table displays OLS regressions of dummy variables indicating trust in the police, in the courts, and in the local army on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A11: Effects by Country

Effect of Floods	Null Effect	Effect of Droughts
Zimbabwe (-8.79%)	Botswana	Lesotho (-27.8%)
South Africa (-8.42%)	Ghana	Cape Verde (-16.8%)
Namibia (-6.52%)	Malawi	Tanzania (-9.61%)
	Mali	Senegal (-8.12%)
	Mozambique	Zambia (-8.01%)
	Nigeria	Kenya (-5.07%)
	Uganda	

Notes: The table replicates the regression from Column 1 in Table 3 for each country in the sample individually and reports the percentage effect of a disaster for each country where the effect is significant.

Table A12: Country-Level Heterogeneities

	Respondent supports democracy			
	(1)	(2)	(3)	(4)
Drought index	-0.013**	-0.019**	-0.018**	-0.006
	(0.005)	(0.010)	(0.009)	(0.005)
Drought index x less democratic country	0.003			
	(0.008)			
Drought index x public services index		0.006*		
		(0.003)		
Drought index x years as democracy			0.000	
			(0.001)	
Drought index x country is landlocked				-0.016**
				(0.008)
Coefficient of index + interaction	-0.010	-0.014	-0.018	-0.022
p-value: Coefficient of index + interaction	[0.115]	[0.069]	[0.033]	[0.001]
Mean of outcome	0.859			
Effect of one drought (2 SDs) (no interaction)	-3.03%	-4.42%	-4.19%	-1.40%
Effect of one drought (2 SDs) (interaction)	-2.33%	-3.26%	-4.19%	-5.12%
Household controls	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes
Observations	63077	42557	63077	63077

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), an interaction of the SPEI index with a country-level variable, said variable itself, as well as a variety of household characteristics, all of which are described in Table A1 in detail. The four country-level variables are (a) a dummy indicating whether the respondent lives in a country that is less democratic/more authoritarian, (b) a public services index—from 0 to 10—measuring whether basic functions of the state (health, education, shelter, and infrastructure) are available, (c) the number of years the country has been a democracy since 1990, and (d) a dummy variable indicating whether the country is landlocked. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Table A13: Summary Statistics of Views on Chinese Aid and Influence

	(1) Full Sample	(2) Eastern Africa	(3) Western Africa	(4) Southern Africa
A. Views on China				
Chinese aid is useful	0.622	0.630	0.668	0.555
	(0.485)	(0.483)	(0.471)	(0.497)
Best model for my country: China	0.279	0.295	0.278	0.255
	(0.449)	(0.456)	(0.448)	(0.436)
Best model for my country: US	0.347	0.333	0.412	0.288
	(0.476)	(0.471)	(0.492)	(0.453)
Most influence on my country: China	0.314	0.378	0.218	0.324
	(0.464)	(0.485)	(0.413)	(0.468)
Most influence on my country: US	0.240	0.256	0.252	0.196
	(0.427)	(0.437)	(0.434)	(0.397)
B. Chinas has [...] on my country				
a lot of economic influence	0.806	0.796	0.836	0.785
	(0.396)	(0.403)	(0.370)	(0.411)
a positive influence	0.734	0.747	0.769	0.669
	(0.442)	(0.435)	(0.421)	(0.471)
C. Factors explaining positive Chinese image				
Infrastructure and business investments	0.577	0.597	0.527	0.605
	(0.494)	(0.491)	(0.499)	(0.489)
Observations	29943	15556	8397	5990

Notes: The table displays mean sample characteristics and standard deviations (in parentheses) for a variety of variables related to China. The variables in the table are dummy variables indicating (a) whether China's overall economic development assistance is doing a good job of meeting the country's needs, (b) which country is the best model for the future development of the respondent's country, (c) which country has the most influence on the respondent's country, (d) whether China has a lot of economic influence on the respondent's country, (e) whether China has a positive economic and political influence on the respondent's country, and (f) whether infrastructure and business investments are factors explaining the positive Chinese image. All variables rely on data from the sixth round of the Afrobarometer surveys.

Table A14: Views on China and the US and the Support for Democracy

	Respondent supports democracy					
	(1)	(2)	(3)	(4)	(5)	(6)
Best model for my country: China	-0.010					
	(0.009)					
Exposure to Chinese Project (100km)		-0.025***				
		(0.010)				
Exposure to Chinese Project (50km)			-0.028***			
			(0.011)			
Best model for my country: US				0.014		
				(0.009)		
Exposure to World Bank Project (100km)					-0.018	
					(0.014)	
Exposure to World Bank Project (50km)						-0.004
						(0.012)
Mean of outcome	0.859					
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	No	Yes	Yes	No	Yes	Yes
SEs clustered at cell level	Yes	No	No	Yes	No	No
SEs clustered at cell x Y-M level	No	Yes	Yes	No	Yes	Yes
Observations	13045	63077	63077	13045	59902	59902

Notes: The table displays OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on, in Columns 1 and 4, a dummy variable indicating whether the respondent believes that, respectively, China or the US, is the best model for the future development of the respondent's own country and, in Columns 2—3 and 5—6, on dummy variables indicating whether the respondent lives within 100km or 50km of, respectively, a Chinese or World Bank development projects, as well as a variety of household characteristics, all of which are described in Table A1 in detail. Regressions include grid cell fixed effects and cluster standard errors at the grid cell level in Columns 1 and 4 and include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level in Columns 2, 3, 5, and 6.

Table A15: Extreme Weather Events and the Exposure to Alternatives to Democracy

	Respondent lives close to project	
	100km radius	50km radius
	(1)	(2)
Drought index	0.014	0.015
	(0.010)	(0.011)
Mean of outcome	0.772	0.673
Household controls	Yes	Yes
Cell fixed effects	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes
Observations	72694	72563

Notes: The table displays OLS regressions of a dummy variable indicating whether the respondent lives within 100km or 50km of a development project funded by the World Bank or China on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level.

Table A16: Potential Mechanisms and Distances to Development Projects

	Respondent is male			Age of respondent		
	(1)	(2)	(3)	(4)	(5)	(6)
Lives within 10km of project	-0.004*			-0.974***		
	(0.002)			(0.229)		
Lives within 20km of project		-0.003			-0.037	
		(0.002)			(0.243)	
Lives within 30km of project			-0.001			-0.432
			(0.002)			(0.281)
Mean of outcome		0.498			36.9	
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	121923	121962	121994	120337	120376	120408

	Village has a school			Village has electricity		
	(1)	(2)	(3)	(4)	(5)	(6)
Lives within 10km of project	0.009			0.094***		
	(0.015)			(0.017)		
Lives within 20km of project		0.021			0.024	
		(0.018)			(0.020)	
Lives within 30km of project			0.009			-0.004
			(0.019)			(0.021)
Mean of outcome		0.835			0.584	
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	119895	119934	119966	120180	120219	120251

	Village has sewage system			Village has piped water		
	(1)	(2)	(3)	(4)	(5)	(6)
Lives within 10km of project	0.092***			0.110***		
	(0.015)			(0.019)		
Lives within 20km of project		0.036**			0.020	
		(0.017)			(0.020)	
Lives within 30km of project			0.022			0.000
			(0.020)			(0.023)
Mean of outcome		0.255			0.520	
Cell fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes	Yes	Yes
Observations	118109	118148	118180	119757	119796	119828

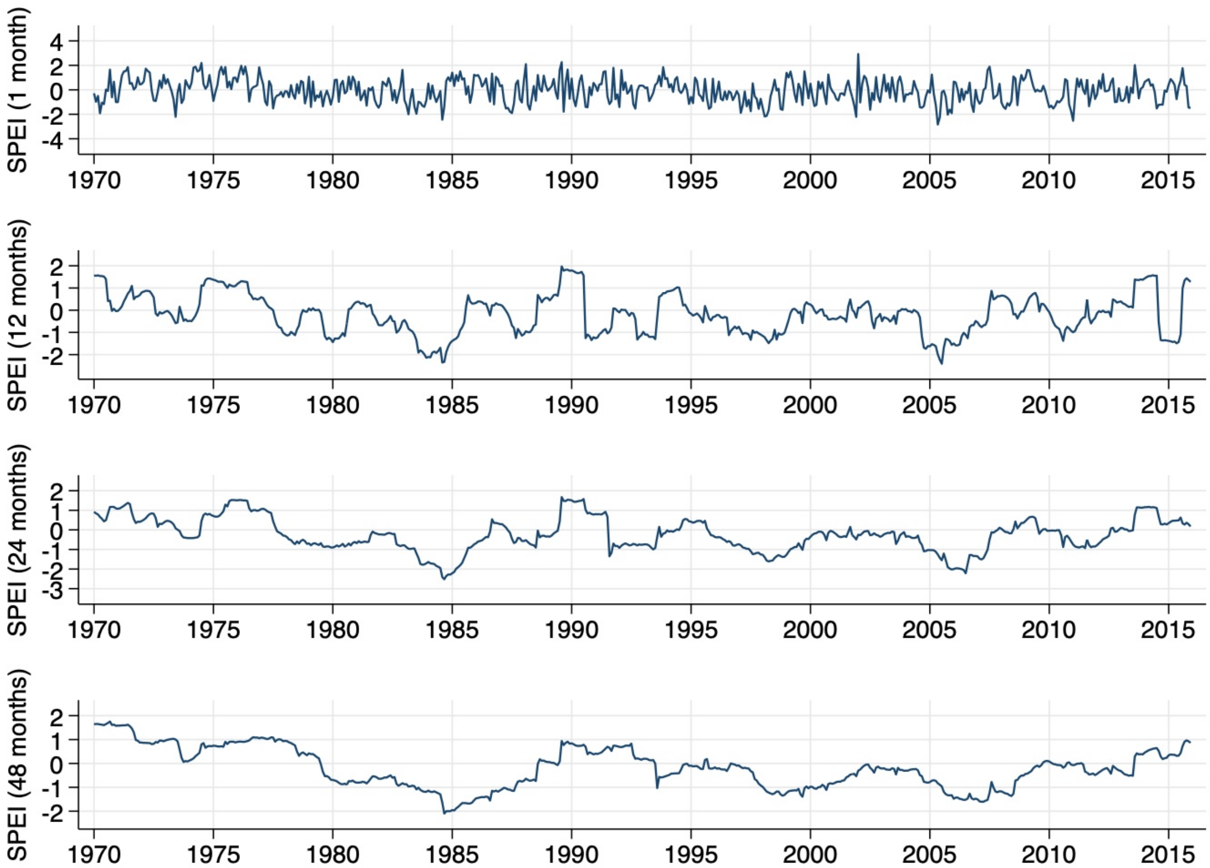
Notes: The table displays OLS regressions of variables indicating potential mechanisms on a dummy variable indicating whether the respondent lives within a radius of, respectively, 10km, 20km, or 30km of a development project funded by the World Bank or China. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level. The dummy variables are: a gender dummy, the age of the respondent, and dummy variables indicating whether the respondent lives in a village with (a) a school, (b) access to electricity, (c) a sewage system, and (d) piped water.

Table A17: Back of the Envelope Predictions for the World (2010-2099)

Region	RCP2.6	RCP8.5
Western Africa	-0pp	-7.5pp
Southern Africa	-0pp	-31.5pp
Northern Africa	-7.5pp	-75pp
Europe	-10pp	-56pp
Middle East	-7.5pp	-27pp
South East Asia	-7.5pp	-0pp
North America	-4pp	-43.5pp
South America	-46.5pp	-71.5pp

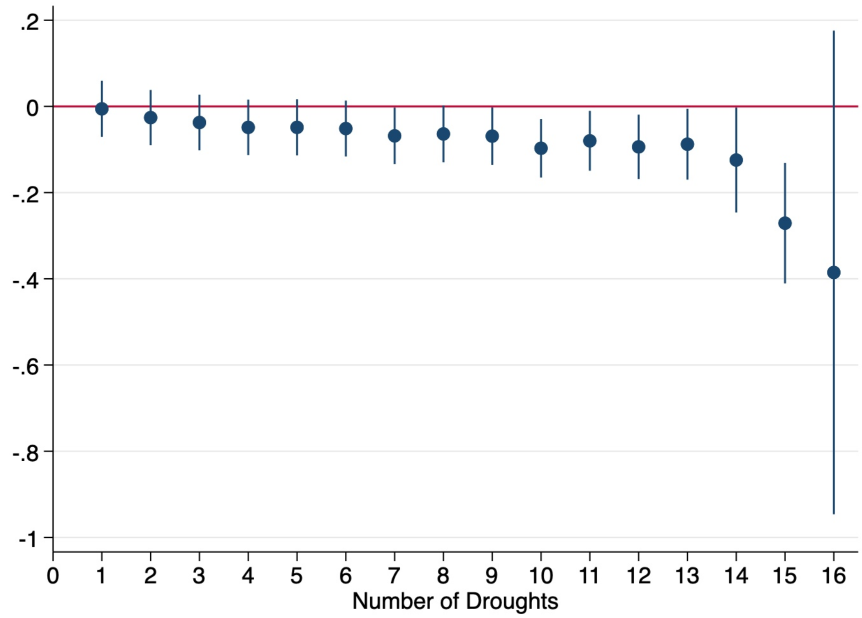
Notes: The table displays predictions of the impact of the total number of unprecedented drought years from 2010-2099 on the support for democracy for different regions in the world relying on simple back of the envelope calculations for two different climate change scenarios. The total number of unprecedented drought years—drought conditions that exceed the magnitude of past drought occurrences—are taken from Figure 3 in Satoh et al. (2022), who estimate the time of the first emergence of unprecedented droughts for different regions that last over several consecutive years. They define the onset of unprecedented drought conditions as "a departure in which the time series of the regional average drought frequency exceeds the upper bounds of its historical climate variability consecutively for [five] years." The two climate change scenarios used are the RCP2.6—an emissions scenario largely in line with the Paris agreement—and the RCP8.5—a scenario where emissions continue to rise throughout the 21st century. The predictions rely on a conservative estimate of my results which imply that exposure to one extra drought year reduces the support for democracy by 1.5 percentage points and assume a linear relationship.

Figure A1: Four Timescales of the Drought Index

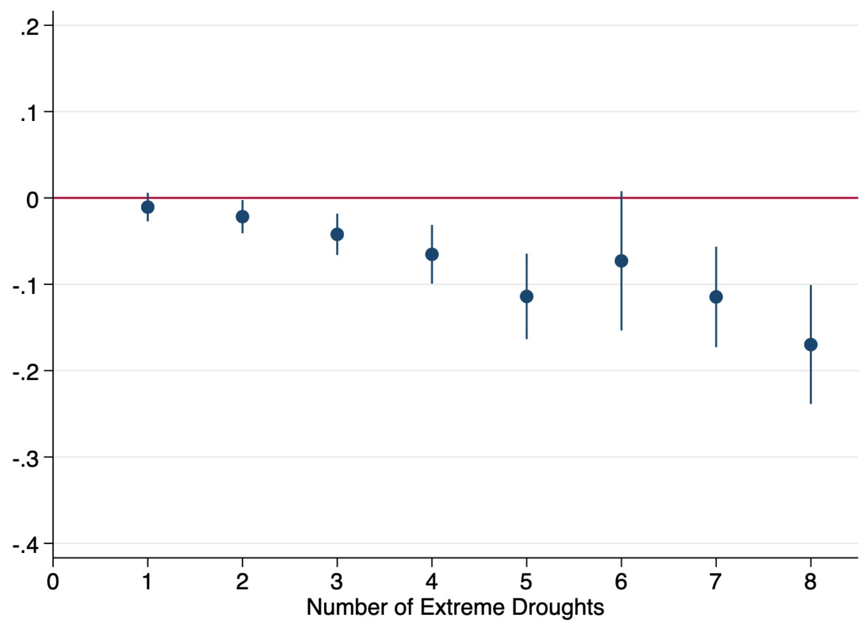


Notes: The figure displays four different drought indices—the 1, 12, 24, and 48 months SPEI index—in Dakar (Senegal) from January 1970 until December 2015.

Figure A2: Cumulative Effects of Droughts on the Support for Democracy



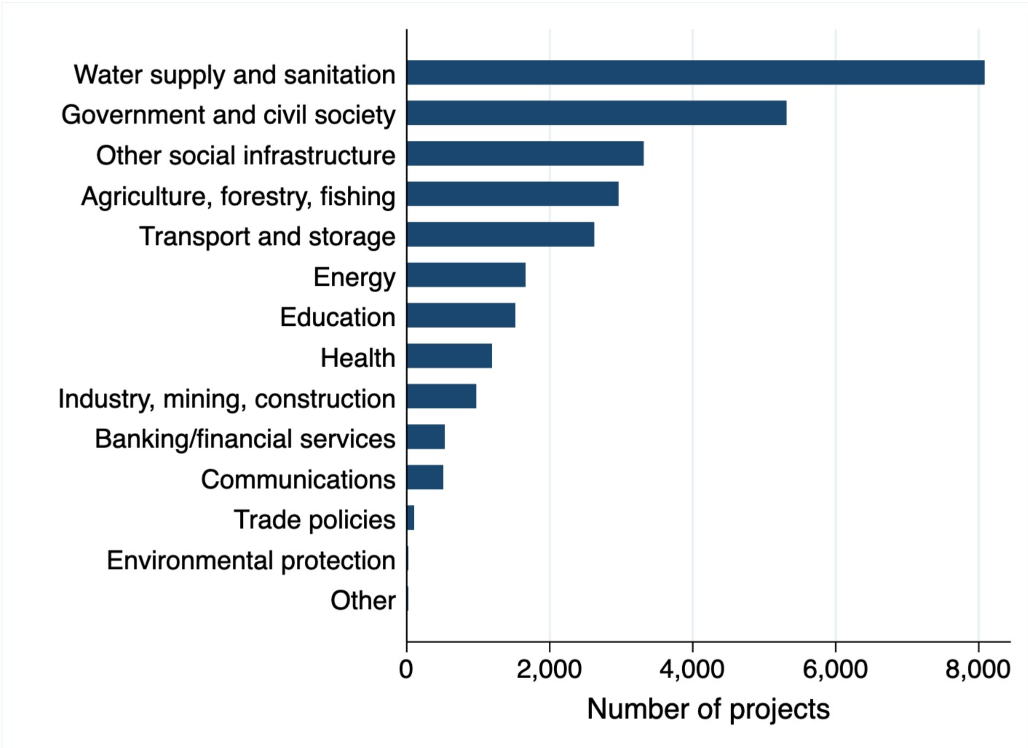
(a) Cumulative Exposure to Droughts



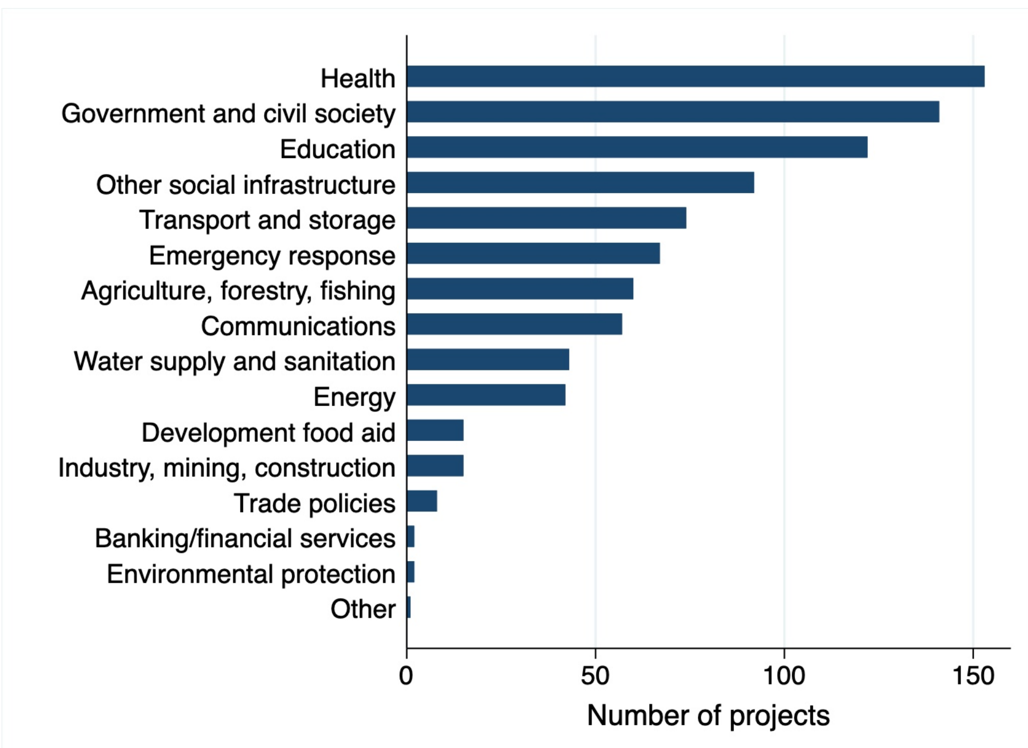
(b) Cumulative Exposure to Extreme Droughts

Notes: The figure displays the coefficients from OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on dummy variables indicating how many drought years (Panel A) or extreme drought years (Panel B) the respondent has been exposed to throughout their lifetime, as well as a variety of household characteristics, all of which are described in Table A1 in detail. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell × year-month level.

Figure A3: Sectors of Development Projects funded by the World Bank and China



(a) World Bank Projects



(b) Chinese Projects

Notes: The figure displays the number of development projects funded by the World Bank (Panel A) and China (Panel B) by sector across time.

B Robustness Tests

Heterogeneous treatment effects. The recent literature on heterogeneous treatment effects, summarized by De Chaisemartin and d'Haultfoeuille (2022*b*) and Roth et al. (2023), shows that the assumption underlying simple TWFE regression is one of homogeneous treatment effects, i.e., β in equation (1) is assumed to be constant across geography and time.[37][38]

To my knowledge, the only paper that allows for continuous treatments at every period in the sample is de Chaisemartin et al. (2022). Intuitively, the procedure they propose is as follows (in the case of multiple time periods). First, one estimates the treatment effects they propose (relying on their "did_multiplegt" package) for each consecutive pair of time periods. In my case, given my five survey waves, this yields four estimates (i.e., one for survey waves two to three, a second for survey waves three to four, etc.). Each treatment effect essentially compares switchers (i.e., individuals who changes their treatment from one period to the other) to stayers (i.e., individuals who did not change their treatment from one period to the other) conditional on them having had the same treatment status in the initial period (sections 4.3 and 5.3). Second, one calculates weights to take a weighted average and calculate the overall treatment effect (see Point 1 in Theorem 8 in section 5.3 for the weights).

While there are multiple differences between my set-up and theirs, two are especially relevant. First, there are no stayers in my sample as the values of the drought index always change for everyone (i.e., the weather is never the same at two time periods). Second, there are (almost) no individuals (or grid cells) with the same value of the drought index at the initial treatment period (i.e., the first time period of the two). The first issue can be resolved by specifying a number such that individuals whose treatment changes by less than said number between two subsequent periods act as "quasi-stayers." The second issue cannot be addressed and, if I run

[37] More specifically, the TWFE regressions, under a parallel trend assumption, estimate a weighted sum of treatment effects across geography and time, with some negative weights. Due to these negative weights, the overall treatment effect might, for example, be negative even if the treatment effect is positive for every unit × period.

[38] Three types of estimators have been proposed to address this issue. The first type applies to designs with binary and absorbing treatments (Borusyak et al., 2021; Callaway and Sant'Anna, 2021; Sun and Abraham, 2021). The second type extends this and applies to binary or discrete treatments (De Chaisemartin and d'Haultfoeuille, 2020; De Chaisemartin and d'Haultfoeuille, 2022*a*). The third type of estimators allows for continuously distributed treatments, but imposes that all units start with no treatment (De Chaisemartin and d'Haultfoeuille, 2022*a*). Neither directly applies to my setting as the drought index is continuously distributed at every period in my sample.

their procedure, significantly reduces the sample size in my case. Specifically, each estimator in the first step of the procedure is estimated with a sample size of roughly 800-1000 observations. Given that my original sample contains 129,002 observations, relying on at best 5,000 of these to conduct a robustness test is suboptimal. It follows that unfortunately even this procedure is not applicable in my setting.[39]

To at least improve on the homogeneous treatment effects assumption from my main results, I therefore rely on Wooldridge (2021). Wooldridge (2021) proposes a simple two-step procedure to deal with heterogeneous treatment effects. Step 1 of the procedure consists of running the TWFE regression at the desired "level of heterogeneity." In my case, I estimate equation (1) at the country level, yielding 16 β_cs. In terms of econometric assumptions, this assumes homogeneous treatment effects within each country (and over time). While this may still not be fully realistic, it is a step in the right direction since assuming that treatment effects are constant within a country is a much milder assumption than the assumption that they are constant across all 16 countries. Step 2 of the procedure aggregates these 16 β_cs by taking a simple average. I bootstrap standard errors.

Table B1 displays the final results of the procedure. The table shows that one drought significantly reduces the support for democracy by 4.42%. These numbers are just above the coefficient found in Column 1 in Table 3 and hence, in the aggregate, confirm the main results.

Sample selection. Sample selection presents a serious concern for the analysis presented in this paper. The assumption of no selected sample refers to the possibility that: (i) natural disasters can affect the roll out of the Afrobarometer surveys and (ii) conditional on the roll out of the surveys, the Afrobarometer interviews different "types" of individuals.

Timing of survey. Table B2 regresses the number of days needed to conduct all interviews within a region or subregion (Columns 1—4) or the number of people interviewed within a region or subregion (Columns 5—8) on dummy variables indicating whether the region or subregion was hit by a (extreme) disaster (and a full set of unit and time fixed effects). With the exception

[39] If I nonetheless run their procedure, relying on a variety of different threshold values and bootstrapping standard errors, the resulting estimates are always positive and larger in magnitude than my estimates from Table 3.

of one coefficient, the table suggests that (extreme) disasters do not affect the outcomes, thus suggesting that neither droughts nor floods affect the timing of the survey.

Balancedness of interviewees. Table B3 compares household and village characteristics between respondents interviewed before and after a (extreme) disaster hit a region where the the interview process took more than one month. The table shows that the characteristics are largely balanced, thus suggesting that, conditional on the roll out of the survey, the Afrobarometer's targeting of individuals is not affected by natural disasters.

Adaptation behavior. There is ample evidence that individuals adapt to climate change. The most concerning adaptation behavior in my case is migration in response to climate change (e.g., Burzyński et al., 2022; Castells-Quintana et al., 2022; Conte, 2022). I unfortunately do not have data on adaptation behaviors and therefore have to rely on assuming that individuals do not endogenously migrate away from drought hit regions.

Other political beliefs. The aim of the next two robustness tests is to show that my outcome variable really does capture individuals' support for democracy and that this variable isn't just a proxy for individuals' view of the government and/or of their politicians.

Raw correlations. To start, Figure B1 displays raw correlations between the support for democracy and a set of other political preferences found in the Afrobarometer surveys, using only data from the latest survey round. The correlations highlighted in yellow are the correlations of interest, i.e., the ones between the support for democracy and other political preferences, while the correlations highlighted in orange represent the correlations amongst the other political preferences. The figure clearly highlights that the correlations between political preferences other than the support for democracy are much higher than the correlation between the support for democracy and these political preferences. For example, the correlation between trust in the president and trust in parliament is 0.575, while the correlation between the support for democracy and these two preferences is 0.073 and 0.054, respectively. If the support for democracy was capturing individuals' view of the government instead of their support for democracy, the correlations in the yellow part of the figure should be higher.

Views of the government. This robustness check asks whether the effects persist even after accounting for people's trust in government and their beliefs about the capabilities of the government, both of which can plausibly influence an individual's support for democracy.

Table B4 reproduces Column 1 from Table 3 but additionally controls for trust in government (Columns 1 and 3) and individuals' beliefs in the capabilities of the government (Columns 2 and 3).[40] The results perfectly replicate the main results (Column 1 in Table 3), thus indicating that the effect of droughts on the support for democracy holds above and beyond the effect on individuals' views of the government and/or of their politicians.

Dynamic considerations. The support for democracy is a "fundamental" belief, i.e., one that is slow moving. Given that the Afrobarometer is a repeated cross-section, I can unfortunately not control for the lagged value of an individual's support for democracy. This would be ideal as it would tell me how much one drought shifts the outcome conditional on where this support was last period. Put differently, it would account for the fact that this outcome evolves slowly. The continuity of the drought index furthermore complicates the inclusion of lags and dynamic TWFE specifications.

Table B5 tries to circumvent this by controlling for the lagged value of the country wide support for democracy. The result confirms the main effect.

Different codings of outcome. Table B6 relies on the three codings of the outcome described in section 2. Column 1 replicates Column 1 from Table 3, while Columns 2 and 3 rely on codings 2 and 3, respectively. While the significance of the effect vanishes for coding 2 of the outcome, for coding 3 the results are robust and double in magnitude.[41]

The finding in Column 3 suggests that there are individuals who "move" from supporting democracy to becoming indifferent and that there are respondents who are indifferent who "move" to supporting non-democratic systems in response to droughts. Column 4 shows that droughts have no effect on political indifference (vs. whether the respondent has a clear opinion

[40] Since these trust and capabilities controls are themselves affected by the treatment (see Tables A8 and A9), they are technically bad controls. However, given the cross-sectional data nature of the Afrobarometer, I cannot circumvent this issue easily and hence note that these results are to be taken with a grain of salt.

[41] While the main result is insignificant when relying on coding 2 of the outcome, the results when considering the main mechanism are significant for all three codings. These results are available upon request.

on whether democracy or non-democratic systems are better). This suggests that roughly the same number of individuals "move" from supporting democracy to being indifferent as there are individuals "moving" from being indifferent to supporting non-democratic systems.

Three other econometric concerns. Table B7 presents three further robustness checks. First, in Column 1, I cluster standard errors at the strata $\times$ year-month level (instead of the grid cell $\times$ year-month level). In the Afrobarometer, every region (state level) in each country has two strata: one for urban households and one for rural households. Second, Column 2 builds on Column 1 and adds strata fixed effects (instead of grid cell fixed effects). Finally, Column 3 goes back to the original specification from equation (1), but adds weather controls (temperature and precipitation and their squares, measured in degrees Celsius and mm, respectively). My main specification is robust to all these tests.

Table B1: Heterogeneous Treatment Effects

	Respondent supports democracy
	(1)
Drought index	-0.019***
	(0.005)
Mean of outcome	0.859
Effect of one drought (2 SDs)	-4.42%
Household controls	Yes
Cell fixed effects	Yes
Year-Month (Y-M) fixed effects	Yes
Bootstrapped SEs	Yes
Observations	63077

Notes: The table displays robustness checks to the main results in Column 1 in Table 3, following the procedure described in Wooldridge (2021). The coefficient displayed stems from OLS regressions of a dummy variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects and cluster standard errors at the grid cell $\times$ year-month level. Step 1 of the procedure consists of a country level regression in the same spirit as the one run in Column 1 in Table 3. Step 2 of the procedure aggregates these individual effects by taking a simple average. The standard errors are bootstrapped in step 2.

Table B2: Sample Selection: Roll Out of Survey

	Nr. days needed for interviews				Nr. people interviewed			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Region hit by disaster	0.162				-2.015			
	(0.650)				(6.204)			
Subregion hit by disaster		0.068				2.283		
		(0.189)				(3.056)		
Region hit by extreme disaster			4.067**				15.104	
			(2.046)				(17.043)	
Subregion hit by extreme disaster				-0.934				4.608
				(0.954)				(10.265)
Mean of outcome	8.78	4.46	8.78	4.46	155	64.7	155	64.7
Region level	Yes	No	Yes	No	Yes	No	Yes	No
Subregion level	No	Yes	No	Yes	No	Yes	No	Yes
Region/Subregion fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey round fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at region x survey level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	129002	129002	129002	129002	129002	129002	129002	129002

Notes: The table displays OLS regressions of a variable indicating the number of days needed to conduct all interviews within a region/subregion (Columns 1—4) or the number of people interviewed within a region/subregion (Columns 5—8) on a dummy variable indicating whether that region/subregion was hit by a disaster (i.e., a flood or drought) or an extreme disaster (i.e., an extreme flood or extreme drought). Regressions include region/subregion and survey wave fixed effects and cluster standard errors at the region/subregion $\times$ survey wave level.

Table B3: Sample Selection: Balance of Household and Village Characteristics

	Age	Educated	Male	Black	White	Religious	Politically aligned	Employed	Occ Affected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interviewed after disaster	-1.371*	0.024	0.016*	-0.010	-0.001	-0.016	-0.022	0.009	-0.003
	(0.757)	(0.040)	(0.009)	(0.033)	(0.014)	(0.015)	(0.029)	(0.033)	(0.032)
Region x survey wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at region x survey level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3442	3491	3503	3196	3196	3423	2149	3482	1788

	Post office	School	Police station	Electricity	Piped water	Sewage	Health clinic	Market stalls	Urban
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interviewed after disaster	-0.002	-0.039	-0.023	-0.050	0.034	-0.070	-0.037	-0.003	0.002
	(0.042)	(0.039)	(0.044)	(0.057)	(0.052)	(0.041)	(0.055)	(0.058)	(0.061)
Region x survey wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at region x survey level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3412	3483	3416	3479	3477	3453	3414	3478	3336

	Age	Educated	Male	Black	White	Religious	Politically aligned	Employed	Occ Affected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interviewed after extreme disaster	-1.140	-0.011	0.009	0.054	0.025	0.017	-0.075	-0.093	-0.025
	(1.330)	(0.056)	(0.016)	(0.033)	(0.040)	(0.023)	(0.052)	(0.049)	(0.073)
Region x survey wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at region x survey level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1108	1111	1114	1114	1114	1086	657	1111	726

	Post office	School	Police station	Electricity	Piped water	Sewage	Health clinic	Market stalls	Urban
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interviewed after extreme disaster	0.158	0.094	0.089*	-0.024	-0.279	-0.075	0.149*	0.154*	-0.249
	(0.151)	(0.088)	(0.040)	(0.183)	(0.170)	(0.063)	(0.067)	(0.073)	(0.200)
Region x survey wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SEs clustered at region x survey level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1114	1114	1114	1114	1114	1114	1109	1114	1114

Notes: This table compares household and village characteristics between respondents interviewed before and after a disaster (i.e., a flood or drought) or an extreme disaster (i.e., an extreme flood or extreme drought) hit a region where the interviewing process took more than one month. The coefficients come from a regression of the household or village characteristic in question on a dummy indicating whether the respondent was interviewed after the disaster or extreme disaster hit the region. Regressions include region × survey wave fixed effects and cluster standard errors at the region × survey wave level.

Table B4: Controlling for Trust in Government and Government Capabilities

	Respondent supports democracy		
	(1)	(2)	(3)
Drought index	-0.011**	-0.011**	-0.011**
	(0.005)	(0.004)	(0.005)
Mean of outcome		0.859	
Effect of one drought (2 SDs)	-2.56%	-2.56%	-2.56%
Household controls	Yes	Yes	Yes
Trust controls	Yes	No	Yes
Capabilities controls	No	Yes	Yes
Cell fixed effects	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes
Observations	57240	58051	53617

Notes: The table replicates Column 1 of Table 3, controlling for three variables indicating the respondent's trust in government (as defined in Table A8) and four variables indicating the respondent's belief in the government's capabilities of doing a variety of tasks (as defined in Table A9).

Table B5: Dynamic Considerations

	Respondent supports democracy
	(1)
Drought index	-0.008*
	(0.004)
Mean of outcome	0.859
Effect of one drought (2 SDs)	-1.86%
Lagged support for democracy	Yes
Household controls	Yes
Cell fixed effects	Yes
Year-Month (Y-M) fixed effects	Yes
SEs clustered at cell x Y-M level	Yes
Observations	51276

Notes: The table builds on Column 1 from Table 3, controlling for lagged mean country-wide support for democracy.

Table B6: Different Codings of the Outcome

	Respondent supports democracy			
	Coding 1	Coding 2	Coding 3	Respondent feels politically indifferent
	(1)	(2)	(3)	(4)
Drought index	-0.011***	-0.007	-0.018**	-0.004
	(0.004)	(0.005)	(0.008)	(0.003)
Mean of outcome	0.859	0.756	0.631	0.120
Effect of one drought (2 SDs)	-2.56%	-1.85%	-5.71%	-6.67%
Household controls	Yes	Yes	Yes	Yes
Cell fixed effects	Yes	Yes	Yes	Yes
Year-Month (Y-M) fixed effects	Yes	Yes	Yes	Yes
SEs clustered at cell x Y-M level	Yes	Yes	Yes	Yes
Observations	63077	70371	70371	70371

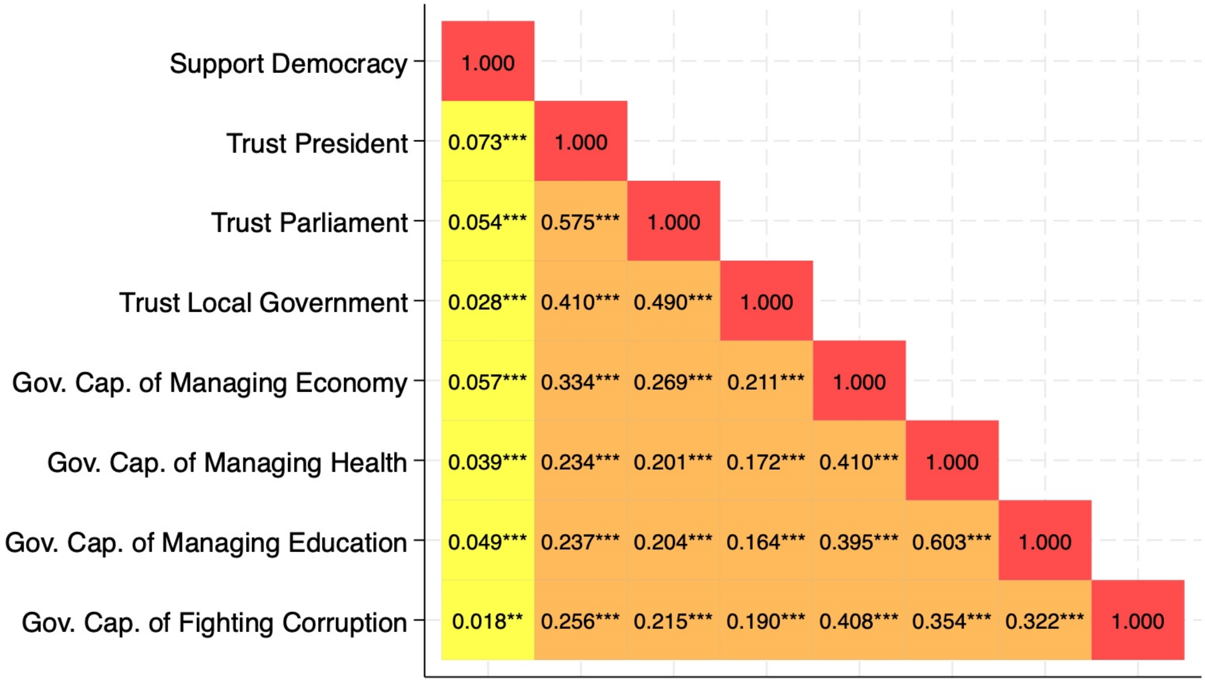
Notes: Columns 1—3 display OLS regressions of three different codings of a variable indicating support for democracy (vs. other systems of government) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI) as well as a variety of household characteristics, all of which are described in Table A1 in detail. Column 4 displays an OLS regression of a dummy variable indicating whether the respondent feels indifferent between a democratic or non-democratic system of governance (vs. having a clear opinion which one is better) on the 12 months Standardized Precipitation Evapotranspiration Index (SPEI), as well as a variety of household characteristics, all of which are described in Table A1 in detail. The SPEI index is a standardized drought index, where negative values indicate wet weather conditions and positive values indicate drought-like conditions. A drought corresponds to a shock of approximately two standard deviations. Regressions include grid cell and year-month fixed effects, and cluster standard errors at the grid cell $\times$ year-month level.

Table B7: Further Robustness Tests

	Respondent supports democracy		
	(1)	(2)	(3)
Drought index	-0.011**	-0.009**	-0.009**
	(0.005)	(0.004)	(0.004)
Mean of outcome		0.859	
Effect of one drought (2 SDs)	-2.56%	-2.10%	-2.10%
Household controls	Yes	Yes	Yes
Weather controls	No	No	Yes
Cell fixed effects	Yes	No	Yes
Strata fixed effects	No	Yes	No
Year-Month (Y-M) fixed effects	Yes	Yes	Yes
SEs clustered at cell x Y-M level	No	No	Yes
SEs clustered at strata x Y-M level	Yes	Yes	No
Observations	62337	62473	62319

Notes: The table replicates Column 1 of Table 3 but, in Column 1, clusters standard errors at the strata $\times$ year-month level, in Column 2, includes strata fixed effects and clusters standard errors at the strata $\times$ year-month level, and, in Column 3, controls for weather controls (temperature and precipitation and their squares, measured in degrees Celsius and mm, respectively).

Figure B1: Raw Correlations Between Political Preferences



Notes: The figure displays correlations between my main outcome variable (the support for democracy vs. other systems of government) with other political variables using data from the latest survey round only. These are the respondent's trust in the president, the parliament, and the local government, as well as the respondent's belief in the government's capabilities of managing the economy, managing health services, managing education services, and fighting corruption.