Climate Policymaking under Dictatorship

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Abstract

Why do some non-democratic governments contribute more to climate change than others? I argue that climate action in non-democracies is shaped by a combination of fossil fuel wealth and executive constraints. Fossil fuel wealth creates incentives for autocratic leaders to capture oil and gas rents and undermine efforts to reduce emissions. Executive constraints, however, can moderate autocrats' opposition to climate action through oversight rules that limit opportunities for carbon-intensive rent-seeking. This argument provides a novel explanation for variation in non-democracies' climate action: institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain. I evaluate this argument using panel data on greenhouse gas emissions, oil and gas income, and executive constraints in 108 countries governed by non-democratic regimes between 1990-2014, finding that oil and gas income leads to higher emissions, but that these effects decline significantly with executive constraints.

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1 Introduction

The unprecedented rise in greenhouse gas emissions since the latter half of the 19th century has contributed to changes in Earth's climate unlike any witnessed in modern human history. Since the time before the Industrial Revolution, the earth's average surface temperature has risen by > 1.0°C and may likely exceed 1.5°C in as little as three decades (IPCC 2018). Further, each of the last four decades has been warmer on average than the previous one, and all of them have been warmer than any decade before the year 1850 (IPCC 2018). These changes have already brought about devastating consequences in the form of rising sea levels and increasing ocean acidification, more extreme heat waves, and more severe weather-related disasters, such as droughts, hurricanes, and wildfires that cause staggering amounts of physical and economic damage (IPCC 2018). Importantly, however, not all countries contribute equally to the climate crisis. Some countries emit greater amounts of greenhouse gases than others and thus bear greater responsibility for causing global warming. Conversely, some countries contribute more than others to reducing emissions.

Scholars often emphasize broad differences between the climate policymaking efforts of democratic compared with non-democratic governments (Bättig and Bernauer 2009; Farzin and Bond 2006; Li and Reuveny 2006) and between some democracies compared with others (Finnegan 2022; Mildenberger 2020; Povitkina 2018). Few, however, examine variation in climate action among authoritarian regimes despite the fact that these governments account for almost 40 percent of all per capita emissions since 1990 (Cf. Böhmelt 2014, 2015; Carlitz and Povitkina 2021; percentage computed using data from Crippa et al. 2020). And most existing research on environmental politics in non-democracies tends to focus on the single case of China (Beeson 2018; Ding 2020; Gilley 2012; Huang 2020; Schreurs 2011) without adopting a broader comparative approach. As a result, we know very little about whether and why efforts to reduce emissions vary across authoritarian regimes.[1]

[1] I use the terms dictatorship, authoritarian regime, autocracy, and non-democracy interchangeably to refer to governments not chosen through free and fair elections.

I argue that opportunities for climate action in non-democracies are shaped primarily by a combination of fossil fuel wealth and executive constraints. On the one hand, in states with abundant fossil fuel wealth, autocratic leaders face incentives to engage in carbon-intensive rent-seeking behaviors, expropriating oil and gas rents for themselves and undermining climate policymaking efforts. On the other hand, however, executive constraints can moderate opposition to climate action through oversight rules that restrict opportunities for carbon-intensive rent-seeking. This argument provides a novel explanation for variation in non-democracies' climate action: institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain.

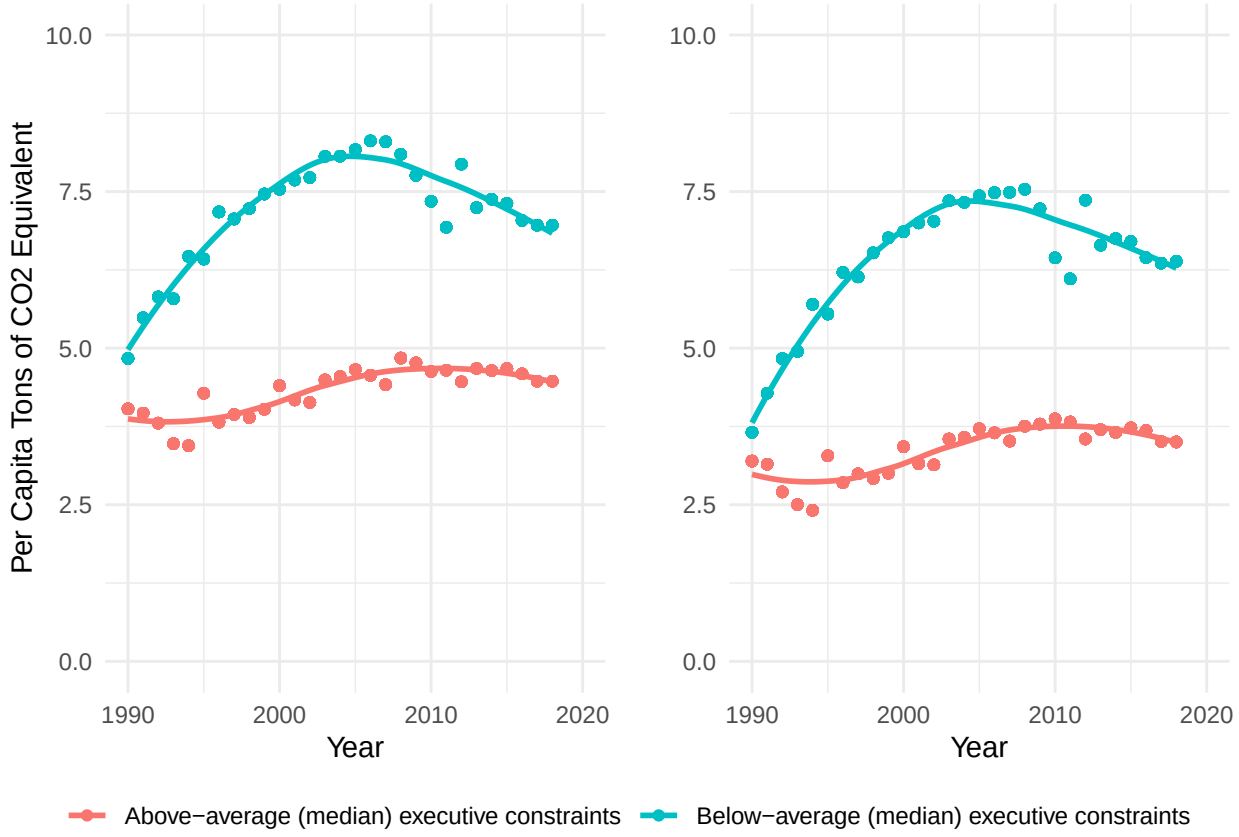
I evaluate these arguments using panel data on greenhouse gas emissions, oil and gas income, and executive constraints in 108 countries governed by authoritarian regimes between 1990-2014. I find that oil and gas income leads to higher emissions, suggesting that fossil fuel wealth leads to weaker climate policymaking efforts among non-democracies. But I also find that this relationship depends on the degree to which institutions constrain executives; higher levels of constraint lead to smaller effects on emissions. Fossil fuel wealth still produces a rise in emissions in constrained authoritarian regimes, but this increase is significantly lower than in unconstrained authoritarian regimes.

By providing an original account of climate policymaking under dictatorship, this article makes three scholarly contributions. First, it offers a novel explanation for climate action in non-democracies: institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain. Though emissions have, in general, risen in countries ruled by autocratic governments since 1990, this increase obscures an important distinction. Emissions in unconstrained authoritarian regimes have risen much faster than in constrained authoritarian regimes (see Figure 1).[2] Existing research documents inequalities in climate policymaking efforts among advanced industrialized democracies (Mildenberger 2020; Finnegan 2022;

[2]I refer to executive constraints as the degree to which political institutions restrict unilateral executive action. See Cox and Weingast (2018).

Meckling 2011; Aklin and Urpelainen 2018). Here I contribute to the political economy literature on climate change by demonstrating that such inequalities exist among autocracies as well.

Figure 1: Mean Total (left) and Fossil (right) Emissions, 1990-2018



Second, it contributes to ongoing debates about environmental authoritarianism. Some scholars posit that effectively addressing climate change may necessitate or inevitably lead to non-democratic forms of governance (Beeson 2010; Gilley 2012; Mittiga 2021). On this view, core features of democratic governance, including checks and balances and the separation of powers, impair governments' ability to impose costly and unpopular policies needed to reduce emissions (Beeson 2010). Rather, these scholars argue, combating climate change may require governments to centralize key decision-making powers in the executive branch (Mittiga 2021). The empirical analysis I present in this article complicates the idea that environmental authoritarianism benefits from concentrating power in the hands of the exec-

utive. Indeed, I demonstrate that when power is more equitably distributed in authoritarian regimes in ways that allow other institutional actors to constrain executives, the role of fossil fuels in undermining climate policymaking efforts declines significantly.

Third, it connects disparate literatures on natural resource governance, the political economy of climate change, and non-democratic political institutions, suggesting that these literatures have considerable analytical utility when combined in a single theoretical framework. A vast body of scholarly work has debated the potential for natural resource wealth to shape regime outcomes (Dunning 2008; Haber and Menaldo 2011; Liou and Musgrave 2016; Mahdavi 2020b; Ross 2013; Wright, Frantz, and Geddes 2015). In parallel, growing research indicates that political institutions can shape incentives for climate policymaking in advanced industrialized democracies (Finnegan 2022; Mildenberger 2020; Stokes 2020; Scruggs 2001, 1999). Still another literature examines the conditions under which institutions constrain executive action in authoritarian regimes (Boix and Svolik 2013; Gandhi and Przeworski 2006; Meng 2020; Wright 2008). None of these literatures on its own has sufficient insight to explain why some autocratic governments pursue more aggressive climate action than others, but taken together they help advance scholarly understandings of climate policymaking in authoritarian regimes.

2 Regimes and the Political Foundations of Climate Policymaking

Existing research, mainly drawing on median voter and selectorate theory, suggests that political regimes shape incentives for climate policymaking (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Fredriksson and Neumayer 2013; Li and Reuveny 2006; Farzin and Bond 2006; see also Mesquita et al. 2003; Downs 1957). These scholars generally argue that, because reducing emissions through climate policy is a public good, governments in which political leaders are chosen by large groups of people have stronger incentives to pursue ag-

gressive climate policy measures than those governed by only a handful of individuals (Congleton 1992; Payne 1995; Neumayer 2002). In other words, climate policymaking represents a public good that benefits most people, so pro-democracy frameworks expect governments that represent the interests of most people (democracies) to undertake greater environmental and climate policy action than governments that do not (non-democracies). These frameworks then provide the basis for more specific claims that voter preferences (Congleton 1992), civil society openness and environmental interest group representation (Payne 1995), international cooperation (Neumayer 2002), and elite competition (Bättig and Bernauer 2009) make democracies more environmentally and climate-friendly than autocracies.

Contemporary research on regimes, institutions, and the political economy of climate change demonstrates strong similarities to these pro-democracy frameworks. Böhmelt, Böker, and Ward (2016) find that more inclusive political regimes have higher levels of climate policy outputs, but not necessarily lower emissions, providing evidence of the same "words-deeds gap" identified by Bättig and Bernauer (2009). Aklin and Urpelainen (2014) find that political transitions increase the probability of newly democratic regimes establishing environmental ministries to signal their commitment to climate governance, reflecting the focus on international relations shared by Payne (1995) and Neumayer (2002). Hanusch (2018) finds that countries with higher levels of "democratic quality" have better climate change performance than others, similar to the claim that some democracies "have a better record with regard to environmental protection" than others (Lijphart 2012, 274–75). Indeed, pro-democracy frameworks remain hugely influential in the political economy literature on climate change. However, they generally neglect variation within regime categories, instead examining broad differences between democratic and non-democratic governments' efforts to combat climate change rather than variation among democratic or autocratic regimes themselves.

Moreover, the dominant position of pro-democracy frameworks for climate change is not

entirely uncontested in the literature. Theorists of environmental authoritarianism make two principal claims against proponents of democracy (Mittiga 2021; Beeson 2010, 2018; Gilley 2012). First, they claim that environmental authoritarianism represents a "possible, even likely, response to intensifying environmental problems" as authoritarian governments survive and democratic governments wither under increasingly severe climate impacts (Beeson 2018, 36–37). Second, they claim that environmental authoritarianism offers a more effective way of dealing with climate change than existing democratic approaches (Gilley 2012). Both of these claims are unpersuasive on theoretical and empirical grounds.

Theoretically, the argument that effectively addressing climate change could necessitate non-democratic governance depends on incoherent assumptions about the relationship between climate change and political legitimacy. For instance, Mittiga (2021) suggests that protecting foundational sources of political legitimacy – such as rights to life, safety, and security – in the wake of climate change may require removing contingent sources of political legitimacy – such as liberal-democratic rights – that prevent governments from imposing costly and unpopular policies needed to reduce emissions. This argument, though, suffers from tautological reasoning that reduces environmental authoritarianism to an argument that governments may be justified in violating human rights by adopting "authoritarian climate governance" (Mittiga 2021, 10) to prevent human rights from being violated by runaway climate change. In cases such as this, environmental authoritarianism cannot explain variation in climate action among authoritarian regimes because it relies on self-contradictory assumptions.

The second argument offered by environmental authoritarianism, though, makes an *empirical* claim about the effectiveness of climate policymaking in authoritarian regimes. Drawing implicitly on theoretical propositions developed in the 1960s and 1970s, some proponents of environmental authoritarianism claim that concentrating decision-making power in executive institutions promotes action to address increasingly severe environmental prob-

lems like climate change (Mittiga 2021; Gilley 2012; see also Hardin 1968; Orr and Hill 1978; Heilbroner 1974; Ophuls 1977; Shahar 2015). Generally, this argument suggests, checks and balances and the separation of powers lead to ineffective climate policymaking processes that undermine governments' ability to overcome barriers to reducing emissions. In other words, it is assumed that climate-friendly leaders in the executive branch cannot reduce emissions because of institutional constraints on their ability to do so unilaterally. Rather, strong executives acting independently of other institutional actors can effectively address climate change through direct interventions.

The empirical flaws in this argument stem partially from the conceptualization of authoritarian regimes as homogeneous, despite their institutional diversity. Clearly, non-democratic governments do not have equally centralized decision-making procedures (Geddes, Wright, and Frantz 2014), and neither are all of them equally good for the environment, as scholars in this tradition sometimes admit (Beeson 2010). More importantly, however, this argument leads to implausible empirical expectations because it attempts to infer autocratic leaders' preferences for environmental and climate policy action from their behavior. When authoritarian leaders in the executive display environmentally and climate-friendly behaviors, such as when they support domestic climate policy measures or sign international climate agreements, it does not necessarily indicate that they have preferences for policy action to reduce emissions. Instead, these behaviors may be motivated by strategic factors related to leaders' incentives for climate policy action or inaction. Still, the literature on environmental authoritarianism tends to accept uncritically the role of executives as climate-friendly but institutionally constrained actors without rigorously questioning the political foundations for climate policymaking in authoritarian regimes.

These two frameworks in the political economy literature on climate change and environmental authoritarianism frame the limitations of existing research nicely. We cannot account for variation in authoritarian regimes' efforts to combat climate change using pro-democracy

frameworks because these explanations apply to comparative analyses of democracies and autocracies. But we cannot rely on environmental authoritarianism either because of its unpersuasive theoretical assumptions and weak empirical foundations. Thus, we need an alternative explanation for why some non-democracies contribute more to climate change than others.

3 Fossil Fuel Wealth, Executive Constraints, and Climate Policymaking under Dictatorship

I offer a novel, alternative explanation for explaining climate policymaking in non-democracies: institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain. At its core, this argument emphasizes the combination of incentives and opportunities autocratic leaders have to engage in carbon-intensive rent-seeking behaviors, and thus to support or undermine climate action. On the one hand, fossil fuel wealth creates incentives for autocratic leaders to undermine efforts to reduce emissions and capture oil and gas rents they can use to maintain power. On the other hand, however, executive constraints that reduce opportunities for carbon-intensive rent-seeking through oversight rules can moderate leaders' opposition to climate action. Considering that climate policymaking in non-democracies depends on a combination of fossil fuel wealth and executive constraints is not only a more theoretically attractive position than those discussed above but also, I argue, helps explain empirical variation across authoritarian regimes.

3.1 Fossil Fuels, Rent-Seeking, and Political Survival

Fossil fuel wealth creates incentives for autocratic leaders to undermine climate action and capture oil and gas rents they can use to maintain power. Previous research suggests that fossil fuel wealth makes it easier for autocratic leaders to stay in power, especially by providing financing for mechanisms of repression and co-optation (Svolik 2012; Greitens 2016;

Frantz and Kendall-Taylor 2014; Gandhi and Przeworski 2007; Xu 2021; Wright, Frantz, and Geddes 2015; Ishak 2019; Ahmadov 2014). By generating huge economic rents for the regime, especially for autocrats and their allies, fossil fuels increase the ease with which dictators can gain support from other elites and from ordinary people in society. Both the literature on the rentier state[3] and an overwhelming amount of historical evidence have shown that money from oil and gas production helps dictators stay in power by giving them money to put down protests, jail political opponents, pay bribes, and grant titles. In short, fossil fuel wealth supports a variety of political survival strategies based on repression and co-optation used by autocratic leaders.

Previous research has underexamined, however, the fact that by making it easier for autocrats to repress and co-opt their way into power, fossil fuel wealth creates incentives for autocrats to undermine climate action. Leaders of authoritarian regimes rich in fossil fuels have consistently avoided, delayed, and outright opposed both national and international climate policy action. For example, when asked whether he would sign the Kyoto Protocol, Vladimir Putin said in 2003, "Maybe climate change is not so bad in such a cold country as ours? 2-3 degrees wouldn't hurt – we'll spend less on fur coats, and the grain harvest would go up" (Times 2021). And though he has grown to accept the scientific evidence on climate change, Putin cast doubt on the benefits of renewable energy technologies as recently as 2019. Vladimir Putin also owns millions of dollars worth of oil-related assets that he hides in offshore accounts, intermediaries, and proxies (Harding 2016) and ushered in a new wave of crackdowns on free speech and political opposition when he became president for the second time in 2012.

Mohammed bin Salman, for another example, bases the Saudi net zero commitment primarily on unproven carbon capture and storage technologies, which his government lobbied the Intergovernmental Panel on Climate Change (IPCC) to include in place of references to proven mitigation actions in the IPCC sixth assessment report (BBC 2021). The Saudi

[3]See Barma (2014); Ross (2013); Yamada and Hertog (2020).

welfare state – one of the main tools the government uses to maintain support for the regime – is funded primarily through the country's sovereign wealth fund, which is financed using oil and gas rents.

For a third example, Xi Jinping briefly suspended bilateral climate change negotiations with the United States in 2022 and in the same year refused to reaffirm the country's 2017 climate pledge under the Paris Agreement. China also hosts the largest coal-fired power capacity of any country in the world by far and has increased coal capacity every year since 2000, even while it has increased renewable energy capacity (You 2022). Cheap electricity from burning coal is commonly cited as the main reason for the country's rapid economic growth, which is commonly cited in turn as the main source of support for the regime. In short, autocratic leaders governing regimes rich in fossil fuels undermine climate action because they have an interest to use fossil fuel rents to maintain power. Thus, one observable implication of this argument is:

Hypothesis 1 ($\mathbf{H_1}$) Fossil fuel wealth leads to weaker climate action in authoritarian regimes.

3.2 Executive Constraints for Climate Action

Executive constraints can moderate autocratic leaders' opposition to climate action by reducing opportunities for carbon-intensive rent-seeking. As in the case of the fossil fuel-funded political survival strategies described above, there is no shortage of previous research on executive constraints in authoritarian regimes. Existing scholarship suggests that political institutions constrain executives in non-democracies when they create credible commitments to power-sharing among elites (Boix and Svolik 2013; Meng 2019, 2020; Wright 2008; Gandhi and Przeworski 2006; Finkel 2012). Executive constraints actually increase the durability of authoritarian regimes by making it easier for dictators and other elites to co-ordinate amongst themselves when deciding how power and economic resources should be distributed.

Thus, the main reason for the presence of formal institutions like legislatures and political parties in most dictatorships is that these regimes have outlasted those in which a single dictator tries desperately and often unsuccessfully to hold onto power alone.

An underappreciated aspect of such "limited authoritarian government," (Boix and Svolik 2013) however, is the role of executive constraints in shaping opportunities for climate action in non-democracies. Executive constraints give dictators a way to survive politically that depends less on using fossil fuels to repress or co-opt their opponents and more on sharing power with them. Because they restrict unilateral executive action and force autocrats to share power, executive constraints can reduce opportunities for leaders to engage in carbon-intensive rent-seeking behaviors that are used to finance mechanisms of repression and co-optation. As a result, they can also reduce the interest leaders have in opposing climate action. In effect, institutions that make it harder for autocratic leaders to maintain power simply by exploiting fossil fuel wealth for their own political gain promote climate action. Thus, this argument has a second observable implication:

Hypothesis 2 ($\mathbf{H_2}$) Fossil fuel wealth leads to weaker climate action in authoritarian regimes, conditional on executive constraints; stronger (weaker) constraints produce weaker (stronger) effects of fossil fuel wealth on climate action.

Similar to previous research (Meng 2019, 2020), I argue that some institutions are more effective than others at constraining executives and therefore are more effective than others at moderating incentives to undermine climate action that stem from fossil fuel wealth. In particular, oversight rules, by which I mean official rules that give institutional actors the power to conduct investigations and hold hearings about executive activities, increase the amount of information other elites in the autocratic regime have about the executive branch (Gandhi, Noble, and Svolik 2020; Williamson and Magaloni 2020; Finkel 2012). This information sheds light on carbon-intensive rent-seeking by autocrats that have an interest in using oil and gas rents to finance mechanisms of repression and co-optation and provides

an opportunity for other elites to detect and punish these behaviors. Then, since autocrats risk losing the benefits of fossil fuel wealth to a damaging hearing or investigation anyway, opposing measures to reduce emissions no longer plays the same role in protecting their fossil fuel wealth.

Empirically, oversight can be exercised by legislative actors, such as committees or individual legislators, non-legislative actors, such as ombudsmen and prosecutors, or both. Because this theory is one of executive constraint through oversight, I remain agnostic about empirical variation in the sources of constraining oversight rules. In other words, whether by legislators or other institutional actors, effective oversight that constrains executive rent-seeking transforms fossil fuel rents into a political liability, not just an asset, for dictators. This theoretical claim and its empirical distinction raise two more observable implications:

Hypothesis 3 ($\mathbf{H_3}$) Fossil fuel wealth leads to weaker climate action in authoritarian regimes, conditional on legislative oversight; stronger (weaker) oversight produces weaker (stronger) effects of fossil fuel wealth on climate action.

Hypothesis 4 ($\mathbf{H_4}$) Fossil fuel wealth leads to weaker climate action in authoritarian regimes, conditional on non-legislative oversight; stronger (weaker) oversight produces weaker (stronger) effects of fossil fuel wealth on climate action.

While leaders like Putin, bin Salman, and Xi have busied themselves profiting off of fossil fuels and undermining climate action, oil-rich autocracies with comparatively higher levels of executive constraint have tended to raise fewer obstacles to reducing emissions. Between 2008-2009, members of the Kuwait National Assembly cancelled several multibillion-dollar contracts concluded by the emir Sabah al-Sabah and oil minister Mohammad al-Oliam due to suspicions the contracts were awarded without public tender and misappropriated funds earmarked for economic recovery after the Global Financial Crisis (Gamal and Kasolowsky 2009).

Legislators threatened to bring al-Oliam before the legislature for questioning and

also raised the possibility of a no-confidence vote against the prime minister, Nasser al-Mohammad, nephew and appointee of the emir. To be clear, Kuwait is *not* a shining example of climate action. But it does suggest that executive constraints can sometimes restrict opportunities for carbon-intensive rent-seeking and create small pockets of climate action, such as cancelled oil contracts, even in oil-rich autocracies.

Crucially, the role of executive constraints here lies in moderating the incentives autocratic leaders have to undermine climate action because of their fossil fuel wealth; there is little reason to expect them to have an independent effect on climate action in autocracies with low levels of fossil fuel wealth. Constrained autocrats governing oil-poor regimes also enter into power-sharing arrangements and grant concessions to their opponents. Yet, for oil-rich autocrats, these concessions come at the expense of opportunities for carbon-intensive rent-seeking, disrupting the political power of fossil fuels and reducing opposition to climate action.

Also crucial is the rather flexible conceptualization of climate policymaking here. This theory imposes few assumptions about the preferences of executives or other institutional actors – each set of actors may prefer fossil fuel rents to climate policy action. But this framework does consider any policy that reduces emissions to be a climate policy, regardless of its ostensible purpose. As a result, policy changes that limit carbon-intensive rent-transfers from dictators to other elites – such as restrictions on oil-related bribes (Mahdavi 2020a) – represent a form of climate action, regardless of whether the policymakers initiating this change view it as or prefer it to be a climate policy *per se*. There are both theoretical and practical advantages to this conceptualization. Theoretically, policies that reduce emissions have the same direct effect on climate change, regardless of whether they are labelled climate policies, energy strategies, development plans, legislative reforms, or something else. Their effect is to reduce emissions. Practically, many climate policies around the world are purely symbolic, having little to no effect on emissions, which makes it unclear if "climate policy

outputs" reflect climate action in any way similar to "climate policy outcomes" (Bernauer and Böhmelt (2013); see section 4 for a discussion of this distinction).

Thus, I theorize that climate policymaking under dictatorship depends on a combination of fossil fuel wealth and executive constraints that shapes incentives and opportunities for carbon-intensive rent-seeking. Authoritarian leaders with access to large amounts of fossil fuel wealth have few incentives to pursue aggressive climate action. But political institutions can constrain carbon-intensive rent-seeking through oversight rules, reducing their opposition to climate action.

4 Empirical Strategy

To evaluate the arguments presented above, I compile an observational panel dataset on greenhouse gas emissions, oil and gas income, executive constraints, and relevant covariates in 108 countries governed by authoritarian regimes between 1990-2014. These data come from the Emissions Database for Global Atmospheric Research (Crippa et al. 2020), Ross and Mahdavi (2015), the Varieties of Democracy Institute (VDEM) (Coppedge et al. 2021), and the World Development Indicators (World Bank 2020).[4]

4.1 Data

Anthropogenic emissions of greenhouse gases are the primary cause of climate change (IPCC 2014). Therefore, I track cross-national efforts to combat climate change using the sum of country-year emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from fossil and non-fossil fuel sources measured in the same per capita tons of CO_2 equivalent. Some scholars advocate for distinguishing between emissions and the policies governments enact to reduce emissions, often referring to this as the distinction between climate policy

[4]See Appendix B in the Supporting Information for for a full list of variable names, descriptions, measurements, and sources.

outputs and climate policy outcomes (Bernauer and Böhmelt 2013). Though plausible in theory, this distinction raises important methodological problems. Most importantly, climate policy outputs are not directly comparable to one another when they differ in terms of stringency, policy instrument type, enactment timing, level of implementation, and other factors. And variation on any one of these characteristics means that climate policy outputs do not necessarily correspond to actual reductions in emissions, such as when policies have low stringency, inadequate financing, late enactment timing, or poor implementation. By contrast, high-quality emissions data are plentiful, readily available, and directly comparable across time and space.

I measure fossil fuel wealth using the real per capita value of crude oil and natural gas production in each country-year (Ross and Mahdavi 2015). Comparatively less debate exists about measuring fossil fuel wealth than measuring climate action, but some scholars argue that oil and gas income does not necessarily capture governments' fiscal reliance on oil and gas revenues (Haber and Menaldo 2011; Lucas and Richter 2016). Measures of fiscal reliance, though, assume that government budgets accurately reflect the full amount of countries' fossil fuel wealth. This assumption means that "off the books" transfers of oil and gas rents go unobserved in practice (Wright and Frantz 2017). Fiscal reliance measures are thus likely biased when autocratic leaders engage in rent-transfers that are not recorded in government budgets, as I posit they do in regimes rich in oil and gas. Therefore, I adopt oil and gas income as a reliable measure of regimes' overall levels of fossil fuel wealth and indeed the entire potential revenue base autocratic leaders could exploit for political gain.

The distinction between legislative and non-legislative oversight rules indicates a need to measure different types of constraints differently. I begin by specifying a model where executive constraints are measured using VDEM's aggregate index of executive constraints to obtain a baseline estimate of the empirical relationships I expect to observe based on my theory (Coppedge et al. 2021). Then, I distinguish between the components of this

index that measure the degree to which oversight is exercised by the legislature or by other institutional actors.

I sample all countries governed by authoritarian regimes for which data are available between 1990-2014. This sampling approach contrasts with cross-sectional approaches (Bättig and Bernauer 2009; Fredriksson and Neumayer 2013). The rationale for this approach is threefold. First, although the scientific consensus on the carbon dioxide theory of global warming began to coalesce around the 1960s, reducing emissions through direct policy interventions largely remained an inconspicuous issue for governments until 1990, when the first IPCC report confirmed the existence of anthropogenic warming trends (Weart 2008). Second, the use of panel as opposed to cross-sectional data reduces selection issues from country- and year-specific idiosyncrasies (Mummolo and Peterson 2018), allowing for robust inferences. Third, given this article's focus on authoritarianism, I exclude country-years governed by democracies from the sample based on VDEM's (Coppedge et al. 2021) Regimes of the World measure.[5]

4.2 Method

In the main results, I analyze these data using two-way fixed-effects estimators. I begin by fitting a restricted model without the inclusion of time-varying covariates, yielding an initial estimate of the marginal effects of oil and gas income on emissions. Then I consider potential confounders by including countries' level of electoral democracy, real per capita gross domestic product (GDP), the real per capita volume of international trade, and population density (Coppedge et al. 2021; World Bank 2020) in a less restrictive model specification. These models provide a test of H_1. If fossil fuel wealth leads to weaker climate action in authoritarian regimes, then oil and gas income should lead to higher emissions.

Next, I estimate the conditional marginal effects of oil and gas income on emissions by

[5]See Appendix E in the Supporting Information for a discussion of alternative measurement and sampling assumptions.

fitting separate models for each measure of executive constraints discussed above. To do this, I interact the executive constraints variable with oil and gas income, allowing the marginal effects of oil and gas on emissions to vary as a function of overall executive constraints compared to executive constraints from legislative and non-legislative oversight. Examining possible conditional relationships offers a test of H_2 when considering that the marginal effects of oil and gas depend on overall levels of executive constraint and H_3 and H_4 when considering that they depend on oversight capacity. In other words, these tests assess whether fossil fuel wealth has a significantly different effect on climate action in constrained compared with unconstrained authoritarian regimes.

Two-way fixed-effects estimators are a common technique for analyzing observational panel data because they help combat two threats to inference (Cunningham 2021). First, they eliminate bias from confounding due to unobserved cross-sectional heterogeneity through the inclusion of unit fixed-effects and, second, they eliminate bias from common time trends through the inclusion of time fixed-effects. Of course, the use of observational as opposed to experimental data raises concerns about causal identification. Therefore, to further interrogate the credibility of the results of the main analysis, I conduct several placebo tests in Appendix C of the Supporting Information as well as several model diagnostic tests in Appendix D of the Supporting Information. These tests facilitate triangulation (Hammerton and Munafò 2021) by comparing the main results to those of alternative tests based on different assumptions.

5 Fossil Fuel Wealth Weakens Authoritarian Climate Action Conditional on Executive Constraints

Here I examine whether fossil fuel wealth leads to weaker climate action in authoritarian regimes (H_1) and whether the effects of fossil fuel wealth on climate action depend on levels

of executive constraint (H_2) and oversight (H_3 and H_4).[6]

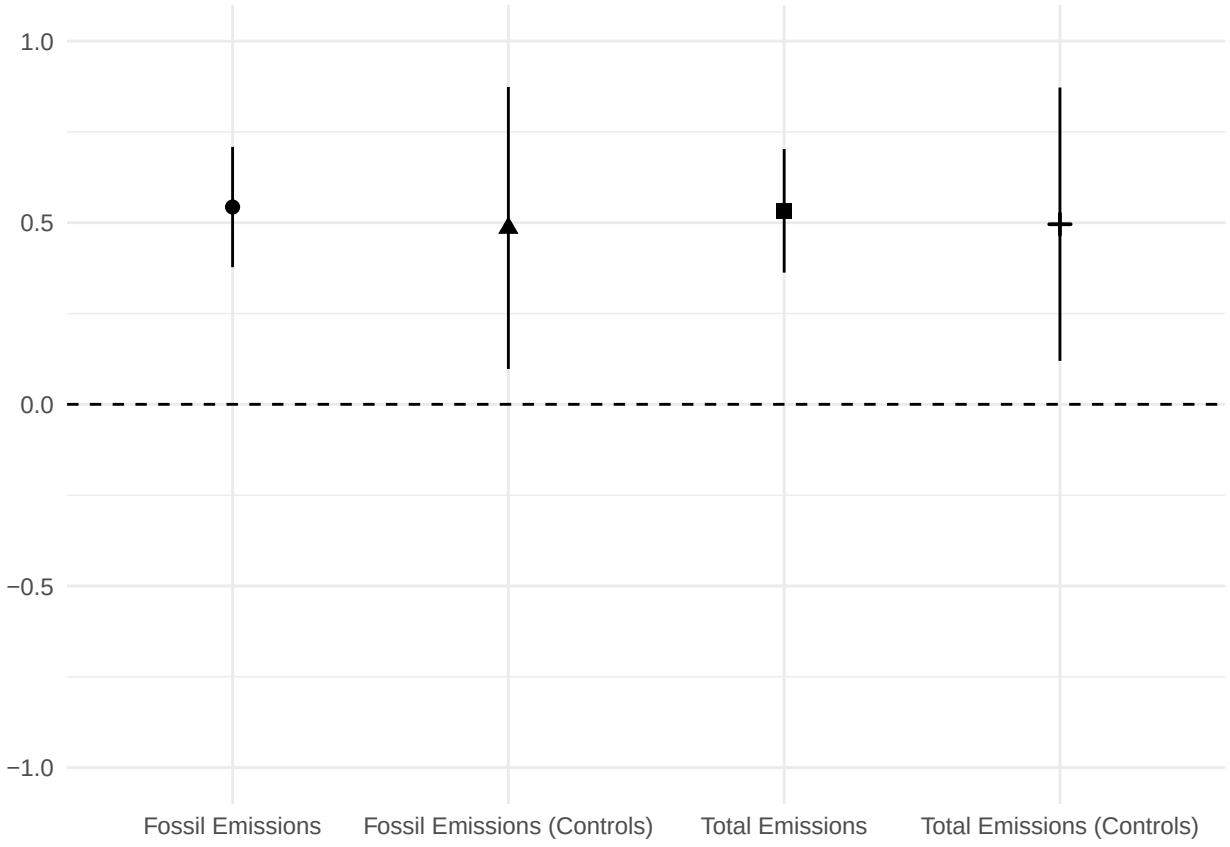
5.1 Main Results

Figure 2 plots the marginal effects of oil and gas income on emissions from several two-way fixed-effects models with country-clustered errors. This figure contains four different specifications based on whether the dependent variable measures total or fossil emissions per capita and whether control variables are included in the model.

The results in Figure 2 indicate that fossil fuel wealth, measured by real per capita oil and gas income, leads to weaker climate action, measured by per capita emissions, in authoritarian regimes. This figure shows that for every $1,000 increase in real per capita oil and gas income between 1990-2014, both total and fossil emissions rose by roughly 0.5 ton per capita on average ($p < 0.01$). This result, moreover, is substantively significant, with an effect size roughly 9 to 14 percent of the sample means of total and fossil emissions. The results in Figure 2 thus support H_1. Fossil fuel wealth from oil and gas income generally leads to weaker climate action reflected in higher emissions in authoritarian regimes.

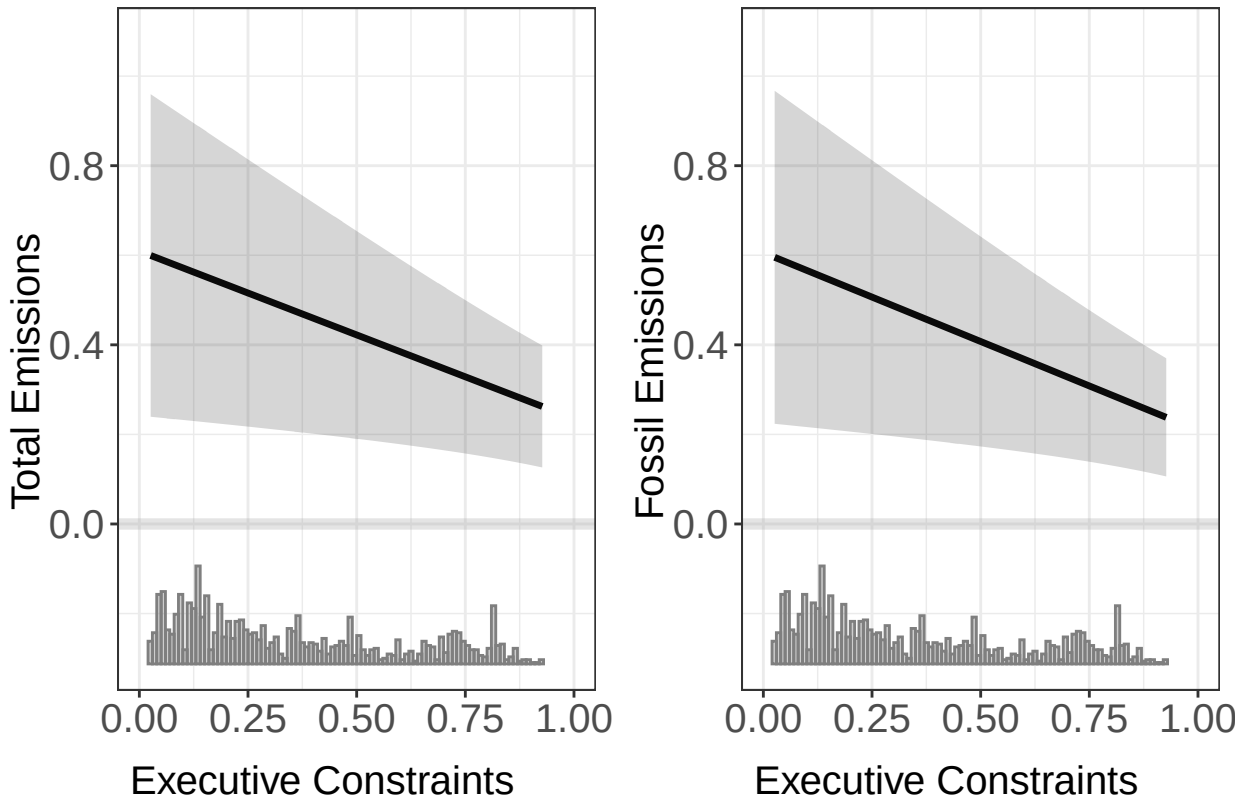
[6]See Appendices A and B in the Supporting Information for the full results, descriptive statistics, and other details.

Figure 2: Marginal Effects of Oil and Gas and 95% CIs



Perhaps more importantly, though, the results presented in Figure 3 suggest that the precise amount by which total (left) and fossil (right) emissions per capita rise in response to increasing oil and gas income depends on authoritarian governments' levels of executive constraint. For the least constrained autocracies in the sample, oil and gas income led to an estimated rise in emissions of roughly 0.6 ton per capita between 1990-2014. But the rise in emissions produced by oil and gas during this period was less dramatic for the most constrained autocracies in the sample, at only about 0.25 ton per capita. In other words, the effects of oil and gas income on emissions are significantly lower ($p < 0.05$) in constrained compared with unconstrained authoritarian regimes. This finding supports H_2. Fossil fuel wealth from oil and gas income leads to weaker climate action in the form of increasing emissions in authoritarian regimes, but the size of this increase depends on executive constraints.

Figure 3: Conditional Marginal Effects and 95% CIs (Executive Constraints)

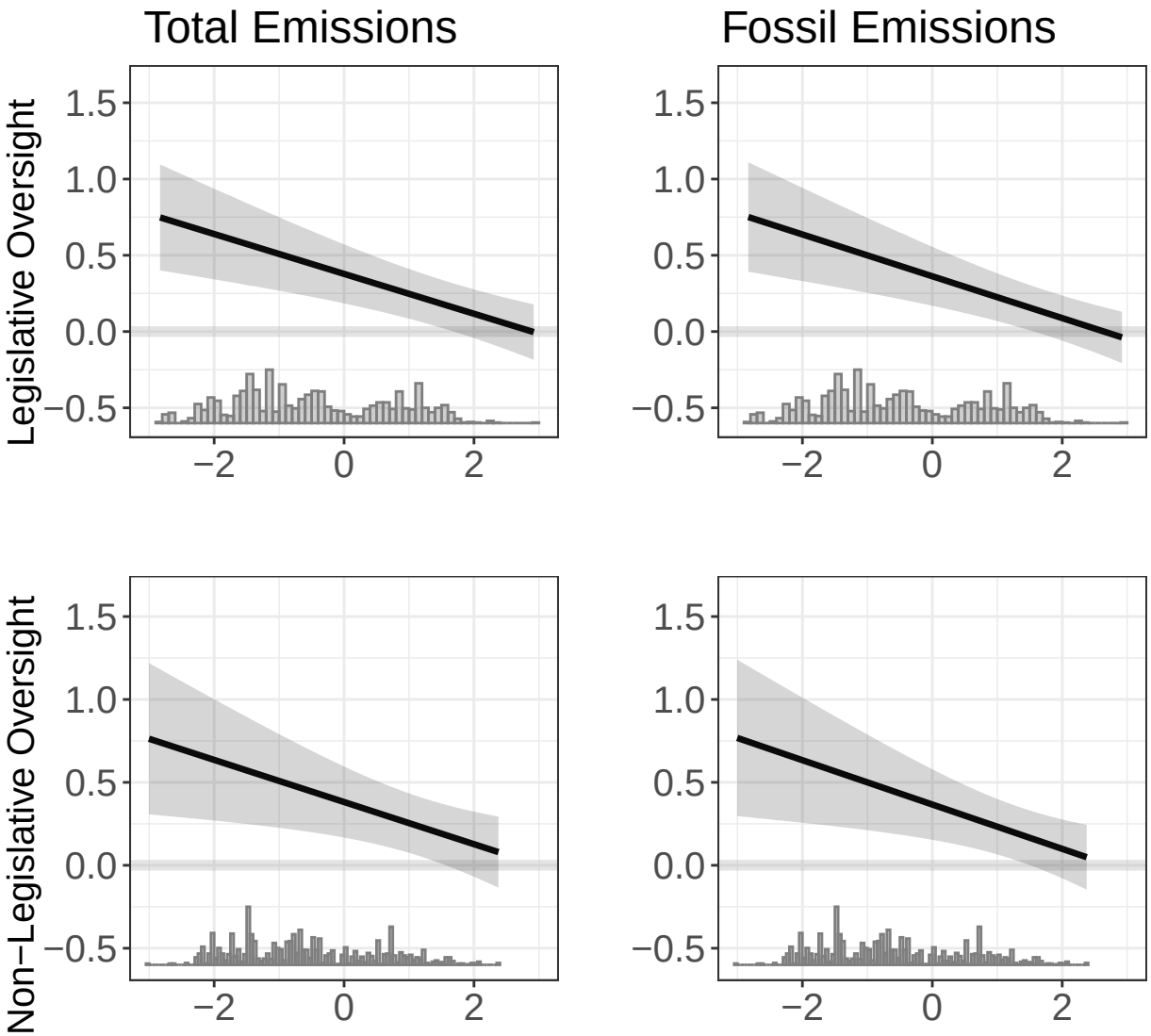


The above results are consistent with the argument that, conditional on executive con-

straints, fossil fuel wealth weakens climate action in authoritarian regimes. But my theory also suggests that oversight rules serve as an especially effective form of executive constraint. Here I examine directly the potential for oversight to moderate the effects of fossil fuel wealth on climate action in non-democracies depending on whether oversight powers are exercised by legislative (H_3) or non-legislative (H_4) institutions. Figure 4 below plots the conditional marginal effects of oil and gas on emissions separately for models of oversight exercised by actors in legislative and non-legislative institutions. Figure 4 suggests that legislative and non-legislative oversight both moderate the effects of oil and gas on emissions, leading so significantly lower ($p < 0.01$) effects in constrained compared with unconstrained autocracies. In other words, although oversight rules matter, their particular institutional design may not, so long as they constrain executives. This finding supports H_3 and H_4. Fossil fuel wealth (oil and gas income) weakens climate action (greenhouse gas emissions) conditional on legislative and non-legislative oversight.

The results presented in this section demonstrate the strikingly divergent paths facing oil-rich autocracies deciding whether and how to address the climate crisis. As some scholars point out, the "oil curse" was neither intended nor inevitable (Ross 2013). Its effects on regime dynamics were the result of contingent political strategies and institutional arrangements that developed over lengthy historical periods. The findings here suggest that the effects of oil and gas income on emissions are not inevitable either. In autocratic regimes where political institutions constrain executives, fossil fuel wealth tends to have significantly lower effects on emissions than those in which dictators are unconstrained. Oversight rules in particular serve as an effective form of constraint that may reduce barriers to climate action in authoritarian regimes.

Figure 4: Conditional Marginal Effects and 95% CIs (Oversight Rules)



5.2 Competing Explanations

The above results provide evidence in favor of H_1 – H_4. Among non-democracies, fossil fuel wealth leads to weaker climate action conditional on executive constraints. In this section, I consider four potential competing explanations and show that none of them convincingly accounts for the results observed in the main analysis. Moreover, I show that any competing explanation would need to account for an omitted variable that is > 3 times stronger a confounder as GDP to reduce the effects observed in the main analysis to 0. In other words, the findings presented above are generally robust to competing explanations.

The first competing explanation suggests that oil and gas exports confound the relationship between fossil fuel wealth and climate action in non-democracies. Exporting oil and gas products could in theory allow authoritarian governments to capture carbon-intensive resource rents while avoiding responsibility for the environmental impact of burning fossil fuels (Ross 2001). The second competing explanation suggests that state capacity accounts for variation in climate policy outcomes. Scholars have proposed that some governments display a greater ability to overcome opposition to climate action because they have greater state capacity and therefore a greater ability to achieve climate policy goals (Meckling and Nahm 2022). The third competing explanation suggests that opportunities for carbon-intensive rent-seeking depend on the ownership structure of economic institutions managing fossil fuel wealth. If state-owned oil companies create opportunities for carbon-intensive rent-seeking, leaders' incentives for climate action may depend on these institutions (Luong and Weinthal 2010). The fourth competing explanation suggests that legislative opposition, not formal institutions, create executive constraints in non-democracies. Executive constraints from oversight rules could simply reflect opposition from legislators unaligned with the ruling coalition (Tavana and York 2020).

I address these competing explanations, first, through statistical control. Holding constant real per capita net oil and gas exports (Ross and Mahdavi 2015), state capacity (Hanson

and Sigman 2021), the presence of a nationalized oil company (NOC) that is majority state-owned (Mahdavi 2020a), and the proportion of seats held by opposition legislators (Lindberg et al. 2022) generally does not change the statistical or substantive conclusions of the main results. The results in Tables 1 – 4 still tend to suggest that oil and gas income leads to higher emissions conditional on executive constraints. Importantly, however, controlling for additional variables does not come without additional assumptions.

If, for example, oil and gas export volumes depend causally on domestic production, then controlling for oil and gas exports risks introducing post-treatment bias. For another example, controlling for legislative opposition risks sampling bias by shifting the unit of analysis to the country-election year and systematically excluding observations without elections. More generally, addressing competing explanations through statistical control relies on strong assumptions about the functional form of treatment assignment, the underlying distribution of unobserved confounders, and other aspects of the data generating process.

Table 1: Oil and Gas Exports Results

	Dependent variable:			
	Total Emissions		Fossil Emissions	
	(1)	(2)	(3)	(4)
Oil and Gas	0.857^{***}	0.892^{***}	0.828^{***}	0.865^{***}
	(0.270)	(0.261)	(0.283)	(0.274)
Executive Constraints	1.150	1.302^{*}	0.773	0.936
	(0.705)	(0.724)	(0.597)	(0.621)
Exports	-0.512^{**}	-0.419^{*}	-0.487^{**}	-0.388^{*}
	(0.207)	(0.226)	(0.207)	(0.226)
Oil and Gas × Executive Constraints		-0.307^{**}		-0.329^{**}
		(0.124)		(0.130)
Country FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1,427	1,427	1,427	1,427
Adjusted R^2	0.978	0.978	0.983	0.983

Note: *p<0.1; **p<0.05; ***p<0.01
Country-clustered errors in parentheses.

Table 2: State Capacity Results

	Dependent variable:			
	Total Emissions		Fossil Emissions	
	(1)	(2)	(3)	(4)
Oil and Gas	0.503***	0.619***	0.491**	0.612***
	(0.191)	(0.184)	(0.197)	(0.190)
Executive Constraints	1.149	1.351*	0.762	0.973
	(0.725)	(0.746)	(0.629)	(0.658)
State Capacity	−0.431	−0.474	−0.238	−0.283
	(0.312)	(0.318)	(0.270)	(0.280)
Oil and Gas × Executive Constraints		−0.381**		−0.398**
		(0.146)		(0.155)
Country FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1,531	1,531	1,531	1,531
Adjusted R^2	0.975	0.976	0.980	0.981

Note: *p<0.1; **p<0.05; ***p<0.01
Country-clustered errors in parentheses.

Table 3: Ownership Structure Results

	Dependent variable:			
	Total Emissions		Fossil Emissions	
	(1)	(2)	(3)	(4)
Oil and Gas	0.500^{**}	0.614^{***}	0.491^{**}	0.612^{***}
	(0.191)	(0.183)	(0.197)	(0.188)
Executive Constraints	1.315^{*}	1.510^{*}	0.795	1.004
	(0.768)	(0.802)	(0.683)	(0.726)
NOC	-0.658	-0.700	-0.966^{**}	-1.010^{**}
	(0.423)	(0.433)	(0.426)	(0.425)
Oil and Gas × Executive Constraints		-0.376^{**}		-0.400^{**}
		(0.145)		(0.153)
Country FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1,568	1,568	1,568	1,568
Adjusted R^2	0.975	0.975	0.980	0.981

Note: *p<0.1; **p<0.05; ***p<0.01
Country-clustered errors in parentheses.

Table 4: Legislative Opposition Results

	Dependent variable:			
	Total Emissions		Fossil Emissions	
	(1)	(2)	(3)	(4)
Oil and Gas	−0.018	0.112	−0.078	0.060
	(0.082)	(0.149)	(0.060)	(0.163)
Executive Constraints	0.328	0.447	0.505	0.631
	(0.522)	(0.537)	(0.575)	(0.595)
Opposition	0.478**	0.503**	0.238	0.265
	(0.213)	(0.236)	(0.237)	(0.257)
Oil and Gas × Executive Constraints		−0.198		−0.210
		(0.232)		(0.242)
Country FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	327	327	327	327
Adjusted R^2	0.985	0.985	0.989	0.989
Note:				*p<0.1; **p<0.05; ***p<0.01
				Country-clustered errors in parentheses.

Fortunately, though, the competing explanations analyzed in this section all rely on a theory of unobserved confounding. In other words, they all assume that the baseline models in the main analysis contain bias due to omitted variables that causally affect the dependent and independent variables. To address concerns about unobserved confounding more comprehensively and with fewer assumptions than are required for doing so through statistical control, I conduct a sensitivity analysis that exploits variance in the least restrictive models specified in the main analysis and computes adjusted coefficient estimates for the explanatory variables of interest given a hypothetical omitted variable that is k-times stronger a confounder than a given covariate in the model (Cinelli and Hazlett 2020).

In Figures 5 and 6 below, I plot the partial R^2 values for the outcomes of interest (y-axis) against the partial R^2 values for the explanatory variables of interest (x-axis) in the two-way fixed-effects models, including time-varying covariates, estimated in the main analysis. The adjusted coefficient estimates in these figures reveal that any hypothetical confounder would

need to be > 3 times more predictive of the outcomes and explanatory variables of interest than real per capita GDP to reduce the effects of either oil and gas income or the interaction between oil and gas income and executive constraints to 0. Given the strong, persistent relationship between GDP, emissions, and macroeconomic and institutional outcomes like oil and gas income and executive constraints throughout space and time, it is highly unlikely that the main results suffer from bias due to confounding from oil and gas exports, state capacity, ownership structure, legislative opposition, or any other omitted variables.

Figure 5: Sensitivity Analysis Results

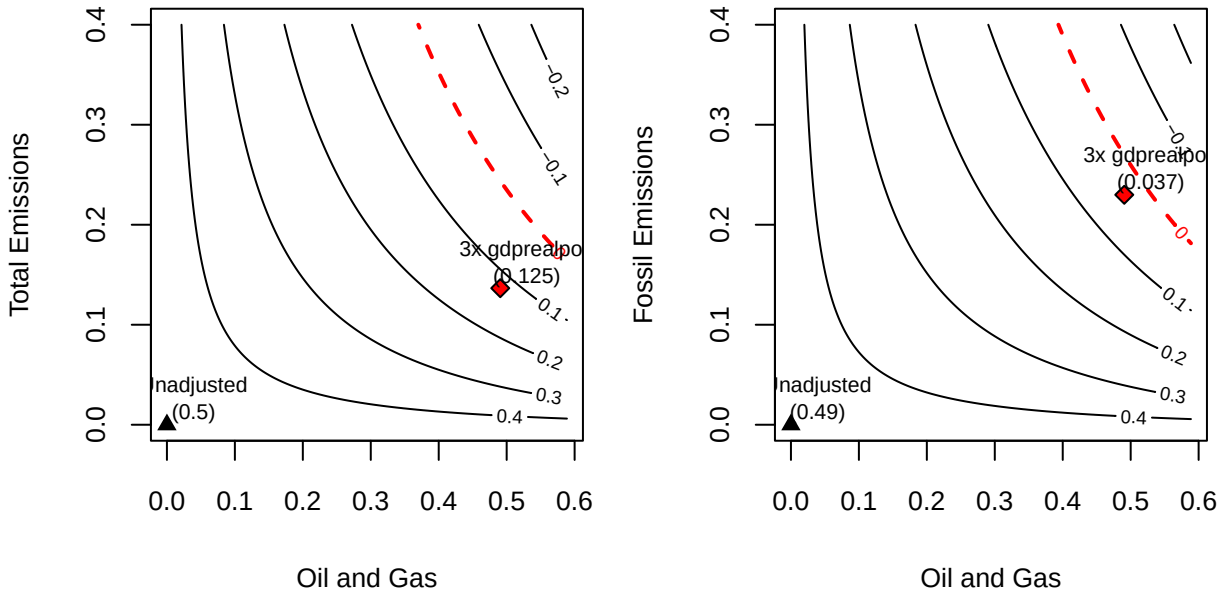
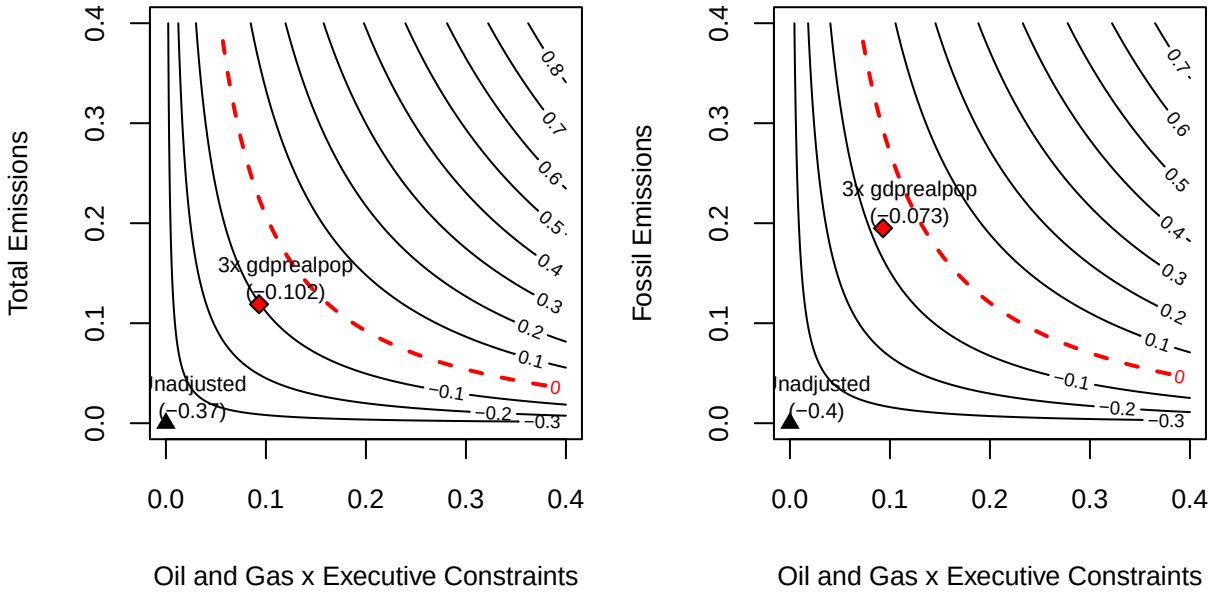


Figure 6: Sensitivity Analysis Results (continued)



6 Discussion and Implications

The above results support the two major findings of this article. First, oil and gas income led to higher levels of greenhouse gas emissions in authoritarian regimes between 1990-2014, suggesting that fossil fuel wealth weakens autocratic governments' efforts to combat climate change. Climate action reduces potential oil and gas rents autocratic leaders could use to to maintain power, as in the case of repression and co-optation. Thus, fossil fuel wealth creates incentives for autocratic leaders to undermine governments' climate action.

Second, however, oil and gas income produced a significantly lower rise in emissions in constrained versus unconstrained regimes during this period, indicating that institutional rules that restrict unilateral executive action through oversight rules moderate leaders of oil-rich autocracies' opposition to climate policy efforts. Effective climate action in non-democracies demands that governments restrict opportunities for carbon-intensive rent-seeking. One way to do so may be through governing arrangements that limit autocratic leaders' exploit fossil fuel wealth for their political gain. Empirically, both legislative and non-legislative oversight may fulfill this role.

These findings both support and challenge existing research in interesting ways. First, they complement recently proposed models of distributional conflict applied to the political economy of climate change in advanced industrialized democracies. Scholars of distributive climate politics tend to find that the unequal allocation of climate policy costs creates winners and losers that compete to influence the design, enactment, and implementation of emissions reduction measures (Aklin and Urpelainen 2018; Aklin and Mildenberger 2020; Mildenberger 2020; Stokes 2020). The two findings offered above offer indirect support for these models to the degree they suggest that politicking over potential climate action also occurs in authoritarian regimes. But I also suggest that the distributive politics of climate change in authoritarian regimes encompasses competition primarily between executives that have an incentive to maintain power by exploiting oil and gas rents and institutions that constrain (or do not constrain) their opportunities for carbon-intensive rent-seeking through oversight rules. Other factors commonly identified in existing research would seem to have less importance for climate policymaking efforts in non-democracies than in advanced industrialized democracies.

Second, these findings complicate the theory that environmental authoritarianism benefits from concentrating political power in the hands of the executive. Recently, scholars have proposed that centralizing decision-making on climate policy matters in the executive branch holds promise for overcoming perceived limitations democratic governments' ability to impose costly and unpopular emissions reduction measures (Mittiga 2021). This argument echoes earlier challenges to the ability of liberal-democratic governments to effectively combat global climate change (Beeson 2010; Gilley 2012). My findings provide evidence of a more nuanced relationship between environmentalism and authoritarianism. Political institutions that decentralize power, spreading it more evenly between the executive branch and other institutions in authoritarian governments significantly decrease the effects of fossil fuel wealth on emissions, suggesting they may also promote climate action. To be perfectly clear, I do not advocate for "authoritarian climate governance" (Mittiga 2021). But my findings

do provide evidence of empirical variation in authoritarian regimes' approaches to climate governance based on institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain.

Third, this article suggests that integrating existing work on the political economy of climate change, natural resource governance, and non-democratic political institutions goes a long way toward explaining why some authoritarian governments do more than others to combat climate change. In large part, the disjointedness in these literatures stems from the fact that none of them ever intended to explain variation in climate action among authoritarian regimes. Nevertheless, I suggest, the explanation of climate policymaking under dictatorship that arises from a theoretical framework that incorporates diverse insights from scholars of climate politics (Mildenberger 2020), natural resource governance (Ross 2013), and institutional constraints on authoritarian leaders (Boix and Svolik 2013) has considerable analytical utility that demands further investigation.

Finally, I offer implications for ongoing policy debates about how to obtain credible climate policy commitments from oil-rich autocracies. There is substantial popular debate about how to promote climate action in the Gulf states (Luomi 2021), as well as in other oil-rich autocracies like Iran, Russia, and Venezuela (Bordoff 2020). The results of this analysis suggest an important, but so far overlooked mechanism that could motivate such commitments: domestic political reforms. Policymakers seeking credible climate action in these cases should consider the potential for reforms that provide institutional actors with oversight authority to reshape incentives for and against climate policymaking. When domestic political reforms support oversight rules that place fossil fuels out of the reach of autocratic leaders, they may allow governments to chart a new course for pro-climate action even in countries rich in fossil fuels. In other words, considering that climate policymaking under dictatorship depends on the combination of incentives and opportunities that autocratic leaders have to engage in carbon-intensive rent-seeking behaviors not only leads to impor-

tant implications for scholarly research on climate change, but also for climate policymaking efforts outside of academia.

7 Conclusion

In this article, I consider why some non-democratic governments contribute more to climate change than others. I theorize that climate policymaking under dictatorship depends on a combination of fossil fuel wealth and executive constraints. Reducing emissions means reducing oil and gas rents autocratic leaders could use to finance mechanisms of repression and co-optation and maintain power, providing incentives to undermine climate action. But institutional constraints on opportunities for carbon-intensive rent-seeking from oversight rules can moderate incentives against reducing emissions.

Climate action in non-democracies seems a tall order to fill given these problems. But testing this argument using panel data on greenhouse gas emissions, oil and gas income, and executive constraints in 108 countries governed by authoritarian regimes between 1990-2014, I find that oil and gas income indeed led to higher emissions during this period, suggesting that fossil fuel wealth weakens climate action in authoritarian regimes, but that executive constraints moderate this relationship, leading to significantly smaller effects in constrained compared with unconstrained regimes. Oversight powers exercised by both legislative and non-legislative actors appear particularly effective forms of constraint. In developing and evaluating this argument, I offer a novel explanation of climate policymaking under dictatorship: institutional constraints on autocratic leaders' use of fossil fuel wealth for political gain.

This theory, supported by the empirical findings in this article, lends credence to distributive models of climate politics but complicates the argument that environmental authoritarianism benefits from centralized executive decision-making. It also implies a greater need to incorporate insights from diverse literatures on the political economy of climate change,

natural resource governance, and non-democratic political institutions to understand why some authoritarian governments do more than others to combat climate change. Future research should expand the availability of high-quality data on climate policy measures to include authoritarian regimes. Economists have developed sophisticated measures of climate policy stringency, such as the shadow carbon price (Althammer and Hille 2016), and political scientists have begun to employ these data to remarkable effect (Finnegan 2022; Gard-Murray 2019). But these data are generally only available for member-states of the Organization for Economic Co-operation and Development, most of of which are advanced industrialized democracies. As a result, while important theoretical insights are still needed to understand climate action in authoritarian regimes, empirical advances are needed as well. We still know quite little about climate policymaking under dictatorship, but there is appreciable room to explore in the future.

References

Ahmadov, Anar K. 2014. "Oil, Democracy, and Context: A Meta-Analysis." *Comparative Political Studies* 47: 1238–67.

Aklin, Michaël, and Matto Mildenberger. 2020. "Why Distributive Conflict, Not Collective Action, Characterizes the Politics of Climate Change." *Global Environmental Politics* 20: 4–26. https://doi.org/10.1162/glep_a_00578.

Aklin, Michaël, and Johannes Urpelainen. 2014. "The Global Spread of Environmental Ministries: Domestic-International Interactions." *International Studies Quarterly* 58: 764–80. https://doi.org/10.1111/isqu.12119.

———. 2018. *Renewables: The Politics of a Global Energy Transition*. MIT Press.

Althammer, Wilhelm, and Erik Hille. 2016. "Measuring Climate Policy Stringency: A Shadow Price Approach." *International Tax and Public Finance* 23: 607–39. https://doi.org/10.1007/s10797-016-9405-4.

Barma, Naazneen H. 2014. "The Rentier State at Work: Comparative Experiences of the Resource Curse in East Asia and the Pacific." *Asia and the Pacific Policy Studies* 1: 257–72.

Bättig, Michèle B., and Thomas Bernauer. 2009. "National Institutions and Global Public Goods: Are Democracies More Cooperative in Climate Change Policy?" *International Organization* 63: 281–308. https://doi.org/10.1017/S0020818309090092.

BBC. 2021. "Cop26: Document Leak Reveals Nations Lobbying to Change Key Climate Report." *BBC News*.

Beeson, Mark. 2010. "The Coming of Environmental Authoritarianism." *Environmental Politics* 19: 276–94. https://doi.org/10.1080/09644010903576918.

———. 2018. "Coming to Terms with the Authoritarian Alternative: The Implications and Motivations of China's Environmental Policies." *Asia and the Pacific Policy Studies* 5: 34–46. https://doi.org/10.1002/app5.217.

Bernauer, Thomas, and Tobias Böhmelt. 2013. "National Climate Policies in International

Comparison: The Climate Change Cooperation Index." *Environmental Science and Policy* 25: 196–206. https://doi.org/10.1016/j.envsci.2012.09.007.

Bernauer, Thomas, and Vally Koubi. 2009. "Effects of Political Institutions on Air Quality." *Ecological Economics* 68: 1355–65. https://doi.org/10.1016/j.ecolecon.2008.09.003.

Böhmelt, Tobias. 2014. "Political Opportunity Structures in Dictatorships? Explaining ENGO Existence in Autocratic Regimes." *Journal of Environment and Development* 23: 446–71. https://doi.org/10.1177/1070496514536396.

———. 2015. "Environmental Interest Groups and Authoritarian Regime Diversity." *Voluntas* 26: 315–35. https://doi.org/10.1007/s11266-013-9434-x.

Böhmelt, Tobias, Marit Böker, and Hugh Ward. 2016. "Democratic Inclusiveness, Climate Policy Outputs, and Climate Policy Outcomes." *Democratization* 23: 1272–91. https://doi.org/10.1080/13510347.2015.1094059.

Boix, Carles, and Milan W. Svolik. 2013. "The Foundations of Limited Authoritarian Government: Institutions, Commitment, and Power-Sharing in Dictatorships." *Journal of Politics* 75 (April): 300–316. https://doi.org/10.1017/S0022381613000029.

Bordoff, Jason. 2020. "Everything You Think about the Geopolitics of Climate Change Is Wrong." *Foreign Policy*.

Carlitz, Ruth D., and Marina Povitkina. 2021. "Local Interest Group Activity and Environmental Degradation in Authoritarian Regimes." *World Development* 142: 105425. https://doi.org/10.1016/j.worlddev.2021.105425.

Cinelli, Carlos, and Chad Hazlett. 2020. "Making Sense of Sensitivity: Extending Omitted Variable Bias." *Journal of the Royal Statistical Society. Series B: Statistical Methodology* 82 (February): 39–67. https://doi.org/10.1111/rssb.12348.

Congleton, Roger D. 1992. "Political Institutions and Pollution Control." *The Review of Economics and Statistics* 74: 412–21.

Coppedge, Michael, John Gerring, Carl Henrik Knutsen, Staffan I. Lindberg, Jan Teorell, David Altman, Michael Bernhard, et al. 2021. "V-Dem Codebook V11.1." Varieties of

Democracy (V-Dem) Project.

Cox, Gary W., and Barry R. Weingast. 2018. "Executive Constraint, Political Stability, and Economic Growth." *Comparative Political Studies* 51: 279–303.

Crippa, Monica, Efisio Solazzo, Ganlin Huang, Diego Guizzardi, Ernest Koffi, Marilena Muntean, Christian Schieberle, Rainer Friedrich, and Greet Janssens-Maenhout. 2020. "High Resolution Temporal Profiles in the Emissions Database for Global Atmospheric Research." *Scientific Data* 7: 1–17. https://doi.org/10.1038/s41597-020-0462-2.

Cunningham, Scott. 2021. *Causal Inference: The Mixtape*. Yale University Press.

Ding, Iza. 2020. "Performative Governance." *World Politics* 72 (October): 525–56. https://doi.org/10.1017/S0043887120000131.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. Harper.

Dunning, Thad. 2008. *Crude Democracy Natural Resource Wealth and Political Regimes*. Cambridge University Press.

Farzin, Y. Hossein, and Craig A. Bond. 2006. "Democracy and Environmental Quality." *Journal of Development Economics* 81: 213–35. https://doi.org/10.1016/j.jdeveco.2005.04.003.

Finkel, Evgeny. 2012. "The Authoritarian Advantage of Horizontal Accountability: Ombudsmen in Poland and Russia." *Comparative Politics* 44: 291–310. https://doi.org/10.5129/001041512800078940.

Finnegan, Jared J. 2022. "Institutions, Climate Change, and the Foundations of Long-Term Policymaking." *Comparative Political Studies*. https://doi.org/10.1177/00104140211047416.

Frantz, Erica, and Andrea Kendall-Taylor. 2014. "A Dictator's Toolkit: Understanding How Co-Optation Affects Repression in Autocracies." *Journal of Peace Research* 51: 332–46. https://doi.org/10.1177/0022343313519808.

Fredriksson, Per G., and Eric Neumayer. 2013. "Democracy and Climate Change Policies: Is History Important?" *Ecological Economics* 95: 11–19. https://doi.org/10.1016/j.ecol

econ.2013.08.002.

Gamal, Rania El, and Raissa Kasolowsky. 2009. *Reuters*.

Gandhi, Jennifer, Ben Noble, and Milan Svolik. 2020. "Legislatures and Legislative Politics Without Democracy." *Comparative Political Studies* 53: 1359–79. https://doi.org/10.1177/0010414020919930.

Gandhi, Jennifer, and Adam Przeworski. 2006. "Cooperation, Cooptation, and Rebellion Under Dictatorships." *Economics and Politics* 18: 1–26. https://doi.org/10.1111/j.1468-0343.2006.00160.x.

———. 2007. "Authoritarian Institutions and the Survival of Autocrats." *Comparative Political Studies* 40: 1279–1301.

Gard-Murray, Alexander Sayer. 2019. "Splitting the Check : A Political Economy of Climate Change Policy." University of Oxford.

Geddes, Barbara, Joseph Wright, and Erica Frantz. 2014. "Autocratic Breakdown and Regime Transitions: A New Data Set." *Perspectives on Politics* 12: 313–31.

Gilley, Bruce. 2012. "Authoritarian Environmentalism and China's Response to Climate Change." *Environmental Politics* 21: 287–307. https://doi.org/10.1080/09644016.2012.651904.

Greitens, Sheena Chestnut. 2016. *Dictators and Their Secret Police: Coercive Institutions and State Violence*. Cambridge University Press.

Haber, Stephen, and Victor Menaldo. 2011. "Do Natural Resources Fuel Authoritarianism? A Reappraisal of the Resource Curse." *American Political Science Review* 105: 1–26. https://doi.org/10.1017/S0003055410000584.

Hammerton, Gemma, and Marcus R. Munafò. 2021. "Causal Inference with Observational Data: The Need for Triangulation of Evidence." *Psychological Medicine*. Cambridge University Press. https://doi.org/10.1017/S0033291720005127.

Hanson, Jonathan K., and Rachel Sigman. 2021. "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research." *Journal of Politics* 83.

Hanusch, Frederic. 2018. *Democracy and Climate Change*. Routledge.

Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* 162: 1243–48.

Harding, Luke. 2016. *The Guardian*.

Heilbroner, Robert L. 1974. *An Inquiry into the Human Prospect*. W. W. Norton; Co.

Huang, Yanzhong. 2020. *Toxic Politics: China's Environmental Health Crisis and Its Challenge to the Chinese State*. Cambridge University Press.

IPCC. 2014. "Climate Change 2014: Synthesis Report. Contribution of Working Groups i, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change." Vol. 218. IPCC. https://doi.org/10.1016/S0022-0248(00)00575-3.

———. 2018. "Global Warming of 1.5°c." IPCC.

Ishak, Phoebe W. 2019. "Autocratic Survival Strategies: Does Oil Make a Difference?" *Peace Economics, Peace Science and Public Policy* 25.

Li, Quan, and Rafael Reuveny. 2006. "Democracy and Environmental Degradation." *International Studies Quarterly* 50: 935–56. https://doi.org/10.1111/j.1468-2478.2006.00432.x.

Lijphart, Arend. 2012. *Patterns of Democracy: Government Forms and Performance in Thirty-Six Countries*. 2nd ed. Yale University Press.

Lindberg, Staffan I., Nils Düpont, Masaaki Higashijima, Yaman Berker Kavasoglu, Kyle L. Marquardt, Michael Bernhard, Holger Döring, et al. 2022. "Codebook Varieties of Party Identity and Organization (v-Party) V2." Varieties of Democracy (V-Dem) Project.

Liou, Yu Ming, and Paul Musgrave. 2016. "Oil, Autocratic Survival, and the Gendered Resource Curse: When Inefficient Policy Is Politically Expedient." *International Studies Quarterly* 60: 440–56. https://doi.org/10.1093/isq/sqw021.

Lucas, Viola, and Thomas Richter. 2016. "State Hydrocarbon Rents, Authoritarian Survival and the Onset of Democracy: Evidence from a New Dataset." *Research and Politics* 3 (July). https://doi.org/10.1177/2053168016666110.

Luomi, Mari. 2021. "Pressure Builds on Gulf Countries to Take Climate Action." *Arab Gulf*

States Institute in Washington.

Luong, Pauline Jones, and Erika Weinthal. 2010. *Oil Is Not a Curse: Ownership Structure and Institutions in Soviet Successor States*. Cambridge University Press.

Mahdavi, Paasha. 2020a. "Institutions and the 'Resource Curse': Evidence from Cases of Oil-Related Bribery." *Comparative Political Studies* 53: 3–39. https://doi.org/10.1177/0010414019830727.

———. 2020b. *Power Grab: Political Survival Through Extractive Resource Nationalization*. Cambridge University Press.

Meckling, Jonas. 2011. *Carbon Coalitions: Business, Climate Politics, and the Rise of Emissions Trading*. MIT Press.

Meckling, Jonas, and Jonas Nahm. 2022. "Strategic State Capacity: How States Counter Opposition to Climate Policy." *Comparative Political Studies* 55.

Meng, Anne. 2019. "Accessing the State: Executive Constraints and Credible Commitment in Dictatorship." *Journal of Theoretical Politics* 31: 568–99. https://doi.org/10.1177/0951629819875515.

———. 2020. *Constraining Dictatorship: From Personalized Rule to Institutionalized Regimes*. Cambridge University Press.

Mesquita, Bruce Bueno de, Alastair Smith, Randolph M. Morrow, and James D. Siverson. 2003. *The Logic of Political Survival*. MIT Press.

Mildenberger, Matto. 2020. *Carbon Captured: How Business and Labor Control Climate Politics*. MIT Press.

Mittiga, Ross. 2021. "Political Legitimacy, Authoritarianism, and Climate Change." *American Political Science Review*. https://doi.org/10.1017/S0003055421001301.

Mummolo, Jonathan, and Erik Peterson. 2018. "Improving the Interpretation of Fixed Effects Regression Results." *Political Science Research and Methods* 6 (October): 829–35. https://doi.org/10.1017/psrm.2017.44.

Neumayer, Eric. 2002. "Do Democracies Exhibit Stronger International Environmental

Commitment? A Cross-Country Analysis." *Journal of Peace Research* 39: 139–64.

Ophuls, William. 1977. *Ecology and the Politics of Scarcity: Prologue to a Political Theory of the Steady State*. W. H. Freeman; Co.

Orr, David W., and Stuart Hill. 1978. "Leviathan, the Open Society, and the Crisis of Ecology." *The Western Political Quarterly* 31: 457–69.

Payne, Rodger A. 1995. "Freedom and the Environment." *Journal of Democracy* 6: 41–53. https://doi.org/10.1080/08913819408443352.

Povitkina, Marina. 2018. "The Limits of Democracy in Tackling Climate Change." *Environmental Politics* 27: 411–32. https://doi.org/10.1080/09644016.2018.1444723.

Ross, Michael. 2001. "Does Oil Hinder Democracy?" *World Politics* 53: 325–61.

———. 2013. *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.

Ross, Michael, and Paasha Mahdavi. 2015. "Oil and Gas Data, 1932-2014." *Harvard Dataverse*. https://doi.org/10.7910/DVN/ZTPW0Y.

Schreurs, Miranda A. 2011. "Climate Change Politics in an Authoritarian State: The Ambivalent Case of China." Edited by John S. Dryzek, Richard B. Norgaard, and David Schlosberg. *The Oxford Handbook of Climate Change and Society*. Oxford University Press.

Scruggs, Lyle A. 1999. "Institutions and Environmental Performance in Seventeen Western Democracies." *British Journal of Political Science* 29: 1–31. https://doi.org/10.1017/S0007123499000010.

———. 2001. "Is There Really a Link Between Neo-Corporatism and Environmental Performance? Updated Evidence and New Data for the 1980s and 1990s." *British Journal of Political Science* 31: 686–92.

Shahar, Dan Coby. 2015. "Rejecting Eco-Authoritarianism, Again." *Environmental Values* 24: 345–66. https://doi.org/10.3197/096327114X13947900181996.

Stokes, Leah. 2020. *Short Circuiting Policy: Interest Groups and the Battle over Clean*

Energy and Climate Policy in the American States. Oxford University Press.

Svolik, Milan W. 2012. *The Politics of Authoritarian Rule*. Cambridge University Press.

Tavana, Daniel L., and Erin York. 2020. "Cooptation in Practice: Measuring Legislative Opposition in an Authoritarian Regime."

Times, Moscow. 2021. "Skepticism to Acceptance: How Putin's Views on Climate Change Evolved over the Years." *Moscow Times*.

Weart, Spencer. 2008. *The Discovery of Global Warming*. Revised an. Harvard University Press.

Williamson, Scott, and Beatriz Magaloni. 2020. "Legislatures and Policy Making in Authoritarian Regimes." *Comparative Political Studies* 53: 1525–43. https://doi.org/10.1177/0010414020912288.

World Bank. 2020. "World Development Indicators." World Bank Group.

Wright, Joseph. 2008. "Do Authoritarian Institutions Constrain? How Legislatures Affect Economic Growth and Investment." *American Journal of Political Science* 52: 322–43.

Wright, Joseph, and Erica Frantz. 2017. "How Oil Income and Missing Hydrocarbon Rents Data Influence Autocratic Survival: A Response to Lucas and Richter (2016)." *Research and Politics* 4 (July). https://doi.org/10.1177/2053168017719794.

Wright, Joseph, Erica Frantz, and Barbara Geddes. 2015. "Oil and Autocratic Regime Survival." *British Journal of Political Science* 45: 287–306. https://doi.org/10.1017/S0007123413000252.

Xu, Xu. 2021. "To Repress or to Co-Opt? Authoritarian Control in the Age of Digital Surveillance." *American Journal of Political Science* 65: 309–25. https://doi.org/10.1111/ajps.12514.

Yamada, Makio, and Steffen Hertog. 2020. "Introduction: Revisiting Rentierism—with a Short Note by Giacomo Luciani." *British Journal of Middle Eastern Studies* 47: 322–43.

You, Xiaoying. 2022. "Analysis: What Does China's Coal Push Mean for Its Climate Goals?" *Carbon Brief*.