Title
Why Do Governments Tax or Subsidize Fossil Fuels?

Journal
The Journal of Politics, 84(4)

ISSN
0022-3816

Authors
Mahdavi, Paasha
Martinez-Alvarez, Cesar B
Ross, Michael L

Publication Date
2022-10-01

DOI
10.1086/719272

The Journal of Politics

Why Do Governments Tax or Subsidize Fossil Fuels?

--Manuscript Draft--

Manuscript Number:	201028R3
Full Title:	Why Do Governments Tax or Subsidize Fossil Fuels?
Article Type:	Research Article
Section/Category:	Comparative Politics - Institutions
Corresponding Author:	Michael L. Ross, Ph.D. UCLA Los Angeles, CA UNITED STATES
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	UCLA
Corresponding Author's Secondary Institution:	
First Author:	Paasha Mahdavi, Ph.D.
First Author Secondary Information:	
Order of Authors:	Paasha Mahdavi, Ph.D.
	Cesar Martinez Alvarez, M.A.
	Michael L. Ross, Ph.D.
Order of Authors Secondary Information:	
Abstract:	Governments have long faced pressure to address the climate crisis by increasing taxes on fossil fuels. It is unclear how they have responded. Fossil fuel taxes and subsidies are hard to measure and often hidden in complex policy instruments. We collect and analyze an original high-frequency measure of gasoline taxes and subsidies, covering 157 countries. Our analysis yields three findings: despite rising alarm about climate change, from 2003 to 2015 there was little change in net fuel taxes and subsidies at a global level; these taxes and subsidies appear to be driven by the same fiscal conditions that determine other types of taxes; and reforms are overwhelmingly associated with idiosyncratic country-level conditions. These patterns suggest fossil fuel taxes are determined by a country's revenue needs, not its political institutions or environmental commitments. They also have significant implications for debates over policies to reduce greenhouse gas emissions.

Revision memo

This page is submitted to fulfill the EM requirement for a “revision memo” but is not intended to describe the substance of our paper.

main text

Why Do Governments Tax or Subsidize Fossil Fuels?*

Paasha Mahdavi†
Cesar B. Martinez-Alvarez‡
Michael L. Ross§

Abstract

Governments have long faced pressure to address the climate crisis by increasing taxes on fossil fuels. It is unclear how they have responded. Fossil fuel taxes and subsidies are hard to measure and often hidden in complex policy instruments. We collect and analyze an original high-frequency measure of gasoline taxes and subsidies, covering 157 countries. Our analysis yields three findings: despite rising alarm about climate change, from 2003 to 2015 there was little change in net fuel taxes and subsidies at a global level; these taxes and subsidies appear to be driven by the same fiscal conditions that determine other types of taxes; and reforms are overwhelmingly associated with idiosyncratic country-level conditions. These patterns suggest fossil fuel taxes are determined by a country's revenue needs, not its political institutions or environmental commitments. They also have significant implications for debates over policies to reduce greenhouse gas emissions.

Keywords: *Climate politics, fossil fuels, fuel subsidies, tax policy, carbon pricing*

---

*Supplementary material for this article is available in the appendix in the online edition. Replication files are available in the JOP Dataverse at https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/RX4JGK. The empirical analysis has been successfully replicated by the JOP replication analyst.

†paasha@polsci.ucsb.edu, Department of Political Science, University of California Santa Barbara, Santa Barbara, CA 93106-9420.

‡cbmartinez@ucla.edu, Department of Political Science, University of California Los Angeles, Los Angeles CA 90095-1472

§mlross@polisci.ucla.edu, Department of Political Science, University of California Los Angeles, Los Angeles CA 90095-1472.

We are remarkably ignorant about what governments are doing to address the most important challenge of the 21st century. The gravity of the climate change problem has been widely-acknowledged by most governments since the mid-1990s.[1] Yet, most studies that seek to explain—or even describe—climate change policies are limited to one or several countries. There are relatively few cross-national studies, and most cover the advanced industrialized democracies but not the rest of the world (Bättig and Bernauer, 2009; Bayer and Urpelainen, 2016; Aklin and Urpelainen, 2013; Purdon et al., 2015; Mildenberger, 2020; Ward and Cao, 2012; Finnegan, 2019).

In part, this reflects the challenge of identifying policies that are equally salient in a wide range of settings: the most appropriate policies vary widely, depending on a country's geographic characteristics, economic structure, and level of development. Hence measuring a government's "mitigation efforts" in ways that are comparable across countries and over time has been a major stumbling block for researchers and policy architects alike (Christoff and Eckersley, 2011; O'Neill et al., 2013; Aldy, Pizer et al., 2016; Bernauer and Böhmelt, 2013). For some scholars, the measurement problem is so intractable that "the quest to find a single cause, or even a common set of drivers, to explain climate leaders or climate laggards is a near-futile exercise" (Christoff and Eckersley, 2011).

We approach this problem by developing a fine-grained, direct measure of policies that encourage or discourage the use of fossil fuels, which since 2000 have been the source of about 78 percent of all anthropogenic greenhouse gas pollution (Clarke and Jiang, 2015). We concentrate on transportation fuels, which generate about 23 percent of global energy-related emissions, and whose market price can be readily observed (Sims, 2014). All governments have policies that encourage or discourage the consumption of transportation fuels, typically through a complex web of policies that have the effect of taxing or subsidizing the retail price. These varied policies have led to remarkable

[1] Since the mid-1990s, almost all countries have been members of the United Nations Framework Convention on Climate Change (UNFCCC), whose stated objective is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic interference with the climate system."

country-to-country differences in prices: in July 2021, a liter of gasoline sold for \$0.02 in Venezuela and \$2.56 in Hong Kong.[2]

Taxes and subsidies for fossil fuels have profound consequences: they affect fuel consumption (Charap, da Silva and Rodriguez, 2013; Fattouh and El-Katiri, 2013), air pollution (Erickson et al., 2020), renewable energy investments (Aghion et al., 2016), inequality (Del Granado, Coady and Gillingham, 2012), and the fiscal health of governments. They also affect political stability: between 2006 and 2019, attempts to raise gasoline prices were followed by protests in at least 24 countries.[3] The 1999 overthrow of Indonesia's Suharto government, Myanmar's 2007 "Saffron Rebellion," and France's 2018-19 "Gilets jaune" movement all began as protests against higher gasoline prices. As Ansolabehere and Konisky (2014, 17) note, "people are acutely aware of energy prices."

There is strong international support for removing subsidies and raising taxes on fossil fuels. The Intergovernmental Panel on Climate Change (IPCC) describes the removal of fossil fuel subsidies as one of the simplest and cheapest ways for countries to curtail carbon pollution (Sims, 2014). Other international institutions—including the World Bank, the International Monetary Fund, the United Nations Environmental Program, and the International Energy Agency—have also urged governments to abolish these subsidies (McFarland and Whitley, 2014). Many governments nominally support fuel price reforms: in September 2009, the G20 heads of state agreed to phase out "inefficient fossil fuel subsidies," while the 21 governments of the Asia Pacific Economic Cooperation group made a similar vow (McFarland and Whitley, 2014). In June 2010, nine additional governments formed the "Friends of Fossil Fuel Subsidy Reform" to support these efforts. Moreover, international calls to remove fossil fuel subsidies have become stronger since the Paris Agreement (Organization for Economic Cooperation and Development, 2021; Coady et al., 2019).

Despite these initiatives, fossil fuel taxes and subsidies can be remarkably hard to

[2]Globalpetrolprices.com, accessed July 16, 2021.

[3]See Appendix Table S3 for a list of countries, dates and sources.

change. The federal gasoline tax in the US was last changed in 1994. More recent efforts to reduce subsidies in Angola, Mexico, Nigeria, Indonesia, Sudan, Egypt, Azerbaijan, and Venezuela have all been rolled back or nullified by falling exchange rates or rising inflation. As a result, fossil fuel subsidies remain large: depending on how they are measured, they are worth between $500 billion and $5.2 trillion dollars a year (Kojima and Koplow, 2015; Coady et al., 2017). After falling in 2015 and 2016, they rose in 2017 and 2018, returning to their 2014 levels (Matsumura and Zakia, 2019).

Cross-national research on the politics of fossil fuel taxes and subsidies has been limited, partly because data have been scarce. As a result, previous analyses have been based on either compilations of case studies (e.g., Inchauste and Victor, 2017; Skovgaard and van Asselt, 2018; Clements et al., 2013), or a public data set that measures prices at two-year intervals, and hence tells us relatively little about the frequency and timing of reforms (Cheon, Urpelainen and Lackner, 2013; Wagner, 2013). Their findings fall into two broad groups. The first, which we call the "democratic institutions" view, suggests that fossil fuel taxes and subsidies are strongly affected by political institutions, including democratic elections and well-functioning bureaucracies, which can facilitate policy compromises and compensate the losers from environmental reforms (Kyle, 2018; Cheon, Urpelainen and Lackner, 2013; Cheon, Lackner and Urpelainen, 2015). The second, which we call the "local politics" perspective, emphasizes the importance of each country's unique configuration of actors, events, constraints and opportunities (Clements et al., 2013; Skovgaard and van Asselt, 2018; Inchauste and Victor, 2017; Rabe, 2018).

Alongside these two perspectives we consider a third possibility: that fuel taxes and subsidies are driven by the same factors that determine other types of taxes. This includes income per capita, which is positively correlated with disposable income, the demand for public goods, and the size of government (Ortiz-Ospina and Roser, 2020; Akitoby et al., 2006; Drazen, 2004; Luttmer and Singhal, 2011); government debt, which tends to boost pressure for higher taxes (Schneider and Heredia, 2003); and oil and gas wealth, which tends to reduce taxes by providing governments with an alternative source of revenues

(Prichard, Salardi and Segal, 2018; Brautigam, Fjeldstad and Moore, 2008). We call this the "fiscal politics" approach.

To evaluate these three explanations we employ an original data set on the monthly value of net gasoline taxes and subsidies in 157 countries from 2003 to 2015, totaling 23,550 observations. It is the most detailed and accurate dataset ever compiled on fuel taxes.[4] Having monthly-level data allows us to capture a large number of reforms that were quickly reversed and hence do not show up in existing biennial data. It also allows us to look for correlations with other events for which we have monthly data, including elections, leadership turnover, and oil discoveries.

We find three robust patterns. First, fuel taxes and subsidies are surprisingly resistant to change at a global level. At a country level, trends varied widely: fuel taxes rose modestly in 73 countries, fell modestly in 63 countries, and were unchanged in five. Yet at a global level taxes either rose or declined slightly, depending on the way the trend is measured: if all country are weighted equally, net global gasoline taxes rose by 2.05 percent per year; if we weight each country to reflect its annual gasoline consumption, net global gas taxes fell by 5.43 percent per year. In either case, governments collectively made little or no progress toward raising net gasoline and diesel taxes over the 2003-15 period.

Second, fuel taxes are not correlated with democratic institutions; this result does not support recent studies that used either sub-national data (Kyle, 2018) or sparser cross-national data (Wagner, 2013; Cheon, Urpelainen and Lackner, 2013; Cheon, Lackner and Urpelainen, 2015). Instead, the results are consistent with our fiscal politics argument, suggesting that income, debt, and fossil fuel revenues tend to drive fuel taxes. These factors change slowly, and may help keep fuel taxes and subsidies in place through what Victor (2009, 7) calls "a political logic that is often difficult to alter."

Finally, our analysis is consistent with the "local politics" hypothesis: short-term fluc-

[4]Throughout this paper we use the term "fossil fuel taxes" to refer to *net* taxes and subsidies. Subsidies can be characterized as negative taxes.

tuations in fuel taxes—while small—were overwhelmingly associated with unobserved, time-varying, country-specific factors. This result is also consistent with theories of public policy that emphasize the incremental pace of policy change, driven by local idiosyncrasies, and interrupted by periodic bursts of reform (Baumgartner and Jones, 1993; Kingdon, 1984).

In sum, our analysis suggests that over the medium-to-long run, fuel tax policies are determined by the same slow-moving macro-level economic factors that drive other types of taxes, while in the short-run, changes in these policies are largely determined by shifting political conditions that are highly context-specific. Our results are robust to many alternative specifications and the use of instrumental variables for fossil fuel wealth.

To explain these results, we develop a model in which net fuel taxes are first and foremost *taxes*, not instruments of environmental policy. As such, they are jointly driven by a government's demand for revenues and the public's willingness to supply them; these in turn are affected by a country's income, debt, and natural resource endowment. When there is a gap between the net fuel taxes that a government seeks to impose and the amount that citizens are willing to pay, the outcome is resolved by shifting country-specific political factors. Our model demonstrates how these four factors—income, fossil fuel dependence, government debt, and local politics—can jointly explain our statistical results.

Our research makes two contributions to the broader study of climate change politics (Bernauer, 2013; Hughes and Lipscy, 2013; Javeline, 2014). First, we offer a significantly improved way to measure the actions that governments are taking to curb greenhouse gas emissions. Unlike other climate policy indicators, our monthly measure of net gasoline taxes and subsidies does not rely on subjective judgments; it only records implemented policies, not nominal ones; and it allows researchers to make fine-grained comparisons of policies across countries and over time. Since it captures both taxes and subsidies, it covers both "cost-based policy sticks" and "subsidy-based policy carrots," a balance that tends to elude other, indirect measures of climate policy (Mildenberger, 2020, 10). To the best of our knowledge, it is the most accurate and fine-grained measure of an important climate policy for a large number of countries over a significant period of time. Appendix section 1.2 compares our measure to other climate policy indicators.

Second, we provide new insights about global progress on altering the price of carbon fuels. Our analysis covers the thirteen-year period leading up to the 2015 Paris Accord, which was characterized by growing alarm about the consequences of global climate change, and heightened international support for both reducing subsidies and raising taxes on fossil fuels. Several studies focus on the adoption of broad-based carbon taxes, which tend to have a large effect on the power sector—especially coal—but little impact on the transportation sector, which is the source of almost a quarter of the world's energy-related emissions (Mildenberger, 2020; Rabe, 2018). Our analysis complements this earlier research and reports similar findings: that it is exceptionally difficult for governments to raise the cost of carbon fuels, even during a period of rising awareness of the climate crisis. Less contentious emissions-reduction strategies—like making renewable energy cheaper, curtailing fossil fuel use through standards instead of prices, and encouraging subnational political action—may ultimately be more effective.

We also bring several innovations to the study of fossil fuel taxes and subsidies. Most research on this topic has been based on in-depth, highly granular, qualitative case studies; quantitative analyses have lagged behind, in part because of limited data. Our analysis is the first to use both monthly and annual data covering a large number of countries and years, to correct for distortions caused by broad-based taxes, to more carefully test alternative arguments, and to address the endogeneity of natural resource wealth. It also develops a novel theory of fiscal politics and demonstrates that it can account for our statistical results. These innovations give us a stronger platform to evaluate the sources of fossil fuel taxes and subsidies.

The next section explains how we measure net taxes and subsidies for gasoline and diesel, along with other key variables. Our empirical analysis is in section three. We discuss our results in section four, where we develop our model of fiscal politics and show

how it can explain the joint effects of income, debt, fossil fuel dependence, and local politics on fuel taxes. Section five concludes.

Modeling Gasoline Taxes

To measure net taxes and subsidies for gasoline, we collected data on local retail gas prices from January 2003 to June 2015 for 157 countries, representing 97.1% of the world's population and accounting for 98.2% of all greenhouse gas emissions. The countries included all sovereign states with populations over one million in 2012, except for four countries where we failed to obtain reliable data (Cuba, Eritrea, North Korea, and Turkmenistan).[5] Data are missing for 1,067 (4.5 percent) of the 23,550 country-months. Appendix Section 1 shows the full list of countries and months (Table S1), describes our data sources (Table S2), and explains our method for deriving taxes and subsidies.[6]

There are several ways to define and measure net fossil fuel taxes and subsidies. We use a conservative definition and employ the "price gap" method.[7] Since refined petroleum products are traded internationally, it is possible to calculate the international supply cost—that is, the cost of bringing a liter of gasoline or diesel to consumers. Since they are sold on retail markets in virtually all countries, their in-country prices are observable. The difference between the international supply cost and the local retail price is the price gap and constitutes the net fuel tax or subsidy, representing the aggregate impact of all

[5]Over a three-year period, our research team gathered data from a large number of primary and secondary sources, working in ten languages. In 17 countries, we employed local researchers to obtain primary data that were not otherwise accessible.

[6]For separate analysis of diesel taxes and subsidies, we use biannual observations from Wagner (2013).

[7]The IMF identifies two classes of petroleum subsidies: "pre-tax subsidies," which represent the difference between the retail price and the international supply cost, and "post-tax subsidies" which are defined as the difference between the retail price and the sum of the supply cost, a basic consumption tax, and a Pigouvian tax that offsets the costs of local pollution, congestion, and carbon emissions (Coady et al., 2017). Post-tax subsidies are, by construction, larger than pre-tax subsidies. We only examine pre-tax subsidies.

government policies that affect the retail prices of gasoline and diesel fuel (Koplow, 2009).

Our measure of fossil fuel taxes and subsidies has three valuable properties. First, it tells us about a policy that is politically costly to adopt. When climate policies are uncontroversial, their adoption tells us relatively little about the depth of the government's policy commitments. But the price of fuel affects many citizens on a daily level, and policies that raise it can be politically risky and lead to protest. This makes it a useful way to gauge a government's capacity to sustain carbon-reducing policies that raise consumer costs.

Second, it reveals the taxes and subsidies that were implemented, not merely ones that were publicly announced. Many governments declare ambitious climate policies that they fail to implement, or whose impact they nullify with countervailing policies. Others adopt costly reforms without announcing them. We only measure policies that affect prices at the pump.

Finally, our measure captures the size of the *net* tax or subsidy. A wide range of government policies can affect fossil fuels at different points in the supply chain—taxing or subsidizing the extraction, import, refining, or transportation of fuel—in ways that ultimately affect the retail price. Governments can also change the retail price directly, even without making formal changes to the tax code: state-owned oil companies, for example, can raise or lower gasoline prices by fiat. Our indicator measures the aggregated effects of these policies, producing a more complete picture of the consumption incentives or disincentives maintained by governments. Since some of these price-altering policies cannot be formally classified as taxes or subsidies, we refer to our measure as *net* taxes and subsidies.

Potential explanatory variables

Our analysis is exploratory and we do not make strong claims about causal inference; our aim is to determine whether any of the arguments about fuel taxes are consistent with our data.

We begin with a baseline model derived from our fiscal politics theory. It includes three economic variables that, according to the tax policy literature, strongly affect taxation levels: *GNI Per Capita*, drawn from the World Development Indicators (The World Bank, 2019); *Central Government Debt*, drawn from the International Finance Statistics database (International Monetary Fund, 2019); and fossil fuel wealth.

Since fossil fuel wealth has not previously been well-measured we give this variable special attention. Previous studies of fuel taxes have used OPEC membership as a proxy for oil wealth, yet OPEC members produce less than 40 percent of the world's oil and gas (Cheon, Urpelainen and Lackner, 2013; Cheon, Lackner and Urpelainen, 2015). A country's fossil fuel production may also be endogenous to its fossil fuel taxes, possibly leading to biased estimations.

We use three more fine-grained measures. Our preferred measure is *Fossil Fuel Dependence*, which is the fraction of a country's GDP that comes from oil and gas production and may be the most intuitive way to make comparisons across countries. As alternatives we use *Fossil Fuel Exports Dependence*, which expresses oil and gas exports as a fraction of total exports, and *Oil and Gas Exports per capita*, which expresses these exports in per capita terms. We take our data on oil and gas production and exports from Ross and Mahdavi (2015) and The World Bank (2019). To evaluate the impact of oil and gas wealth at the monthly level, we use data on giant oil field discoveries from Arezki, Ramey and Sheng (2017).

Since oil wealth measures may be endogenous to other variables in our model (such as income and net fuel taxes), we instrument for fossil fuel wealth using a country's 1960 oil endowment per capita (Tsui, 2011). For robustness, we also employ an alternative instrument based on the spatial distribution of oil-yielding sedimentary basins (Cassidy, 2018). We assume that, conditional on the revenues generated from oil production, the historical geological endowment of a country's oil is plausibly exogenous from present-day net taxes on gasoline. To protect against violations of the exclusion restriction using this instrument, we follow Cassidy (2018) by controlling for potential geographical correlates of geological endowments and fuel price policies, which in our case include latitude, coastal access, and regional indicators.

We then add variables to evaluate the democratic institutions argument. Our main measure of democracy is from Polity IV (Marshall, Jaggers and Gurr, 2011); we convert the continuous measure to a categorical one, *Autocracy*, to simplify the interpretation of interaction terms.[8] For robustness, we use the continuous Polity IV score, the continuous *Electoral Democracy* score from the V-DEM database (Coppedge et al., 2019) and a binary democracy measure from Boix, Miller and Rosato (2013). Our *Government Effectiveness* variable comes from the Worldwide Governance Indicators, measuring expert and public perceptions of the quality of public services, the civil service, and policy formulation and implementation (The World Bank, 2019). To measure the incidence of elections and leadership changes, we use data from the Archigos dataset (Goemans, Gleditsch and Chiozza, 2009) and the NELDA project (Hyde and Marinov, 2015).

In all models we correct for the effects of general sales taxes, such as value-added taxes (VAT), that are imposed on all goods and services. Because they do not affect the price of gas or diesel relative to other goods, general sales taxes cannot cause consumers to switch toward cheaper transportation alternatives. We therefore control for the effects of VAT and other broadly-applied sales taxes with a novel data set created by the International Monetary Fund.[9]

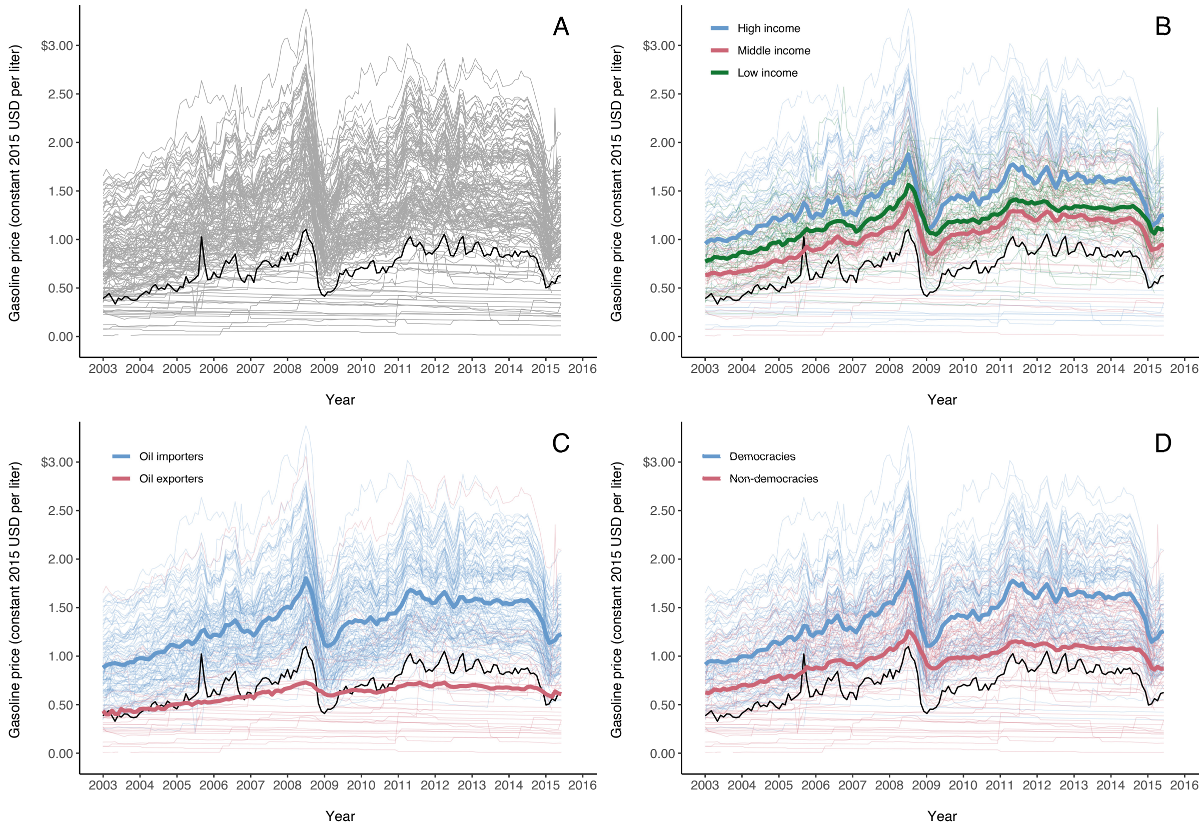
To capture market-wide shocks, such as economic crises and OPEC announcements, we add year fixed effects to all panel models. In Appendix Section 2 we test additional arguments about the role of national oil companies and car ownership.

It is more difficult to evaluate the local politics hypothesis: by definition, the idiosyncratic, time-varying factors that may shape national outcomes cannot be measured

[8]Specifically, we converted the Polity IV into a binary variable denominated *Autocracy* that takes the value of 1 when the Polity IV score is equal to or lower than -6, and zero otherwise.

[9]While the VAT correction makes our estimates more precise, our results are substantively unchanged when the VAT correction is dropped.

Figure 1: **Gasoline prices by country, 2003-15.** Individual country price trends (A) and categorical averages (B, C, D). The global benchmark price is plotted in bold black in all four.



directly or entered into the model. Instead we pay close attention to the fraction of within-country intertemporal variation we cannot account for in our models, to see if it is consistent with claims made about the salience of context-specific factors. We summarize these theoretical expectations and their corresponding measures in Appendix section 1.4.

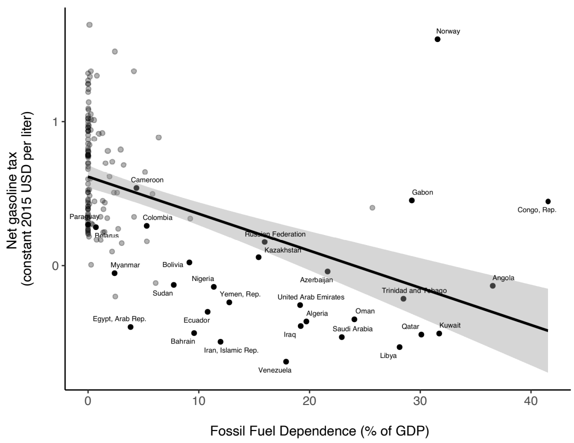
Analysis: cross-national descriptions and panel regressions

We begin with a cross-national analysis to evaluate explanations for net gasoline tax *levels*, then analyze panel data to evaluate explanations for policy *changes*. We also use biannual data on diesel prices from 2004 to 2014 from Wagner (2013) and ask similar questions about diesel taxes and subsidies.

Panel A in Figure 1 shows net gasoline taxes and subsidies for 155 countries over the

2003-15 period.[10] Each gray line represents the retail price in a single country, while the heavy black line displays the "benchmark price," representing the supply cost of a liter of gasoline.[11] States fall into two groups: those above the benchmark line, whose gasoline prices are greater than the supply cost (indicating they are taxing gas sales), and those below the benchmark line, whose prices are less than the supply cost (indicating they are subsidizing gasoline). Of the 155 countries in our data, 133 (85.8 percent) were net taxers for most of this period, while 22 (14.2 percent) were net subsidizers.[12]

Figure 2: **Fuel dependence and net gasoline taxes by country.** Cross-sectional relationship between *net gasoline taxes* and *fossil fuel dependence*, averaged across 2003-2015. Countries above 30% *fossil fuel exports dependence* are labeled to illustrate the high correlation ($\rho = 0.84$) between fuel dependence indicators.



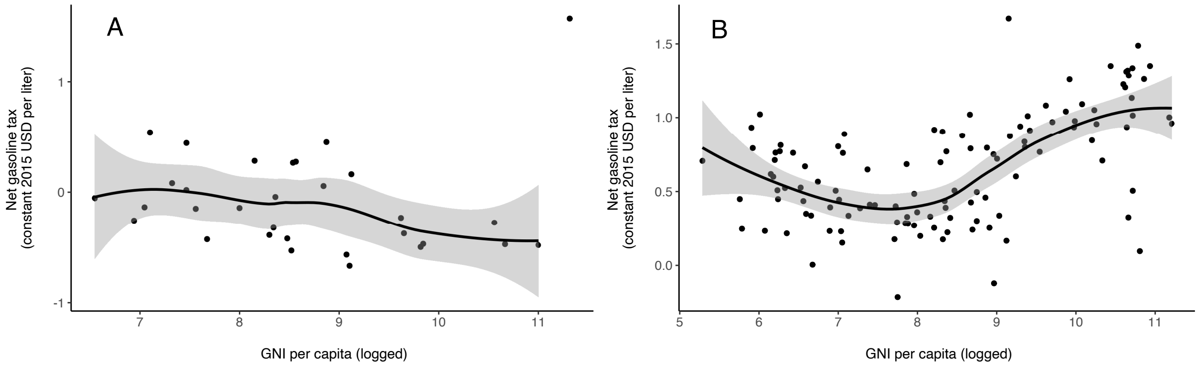
Fossil fuel endowments appear to have a strong association with net fuel taxes: there is a sizeable gap in tax levels between the oil-importing and oil-exporting countries (Figure 1, panel C), and the gap grew during the 2003-15 period (See Appendix Figure S1). All

[10] We have local price data for Myanmar and Somalia, but could not include them in the figure because they lacked market exchange rates during this period.

[11] For the benchmark price we use the spot price for conventional refined gasoline at the New York Harbor, adjusted to account for distribution costs.

[12] We define countries as net taxers or subsidizers comparing their median monthly price for the 2003-15 period to the median monthly benchmark price. If it was above the median benchmark price, we classify it as a "net taxer" and if it was below as a "net subsidizer."

Figure 3: **Income per capita and net gasoline taxes by country**. Cross-sectional relationship between *net gasoline taxes* and *GNI per capita*, averaged across 2003-2015, in oil-exporting countries (left panel) and oil-importing countries (right panel). A local smoother illustrates the approximately linear relationship in oil-exporters (excluding Norway, the outlier in the upper right) versus the U-shaped relationship in oil-importers. Model-based results plotted in Appendix Figure S2.



of the 22 net subsidizers were oil exporters.[13] Among all countries, fossil fuel dependence is negatively correlated with fuel tax levels (Figure 2).

Income per capita also appears to be linked with net fuel taxes (Figure 1, panel B), although the relationship is conditional on a country's oil endowment: among oil importers there is a U-shaped relationship such that middle-income countries have the lowest taxes, while among oil exporters we find a linear relationship (Figure 3).[14]

Our cross-national statistical analysis begins with a baseline model regressing net fuel taxes on the log of income per capita and the square of logged income, fossil fuel dependence, and government debt. We also include VAT as a control (Table 1). The estimates are consistent with the scatterplots: there is a quadratic relationship between *GNI per capita* and net fuel taxes, (Table 1, column 1; see also Appendix Figure S2), a negative relationship between *Fossil Fuel Dependence* and net fuel taxes (Table 1, column

[13]This group comprises Algeria, Angola, Azerbaijan, Bahrain, Ecuador, Egypt, Indonesia, Iran, Iraq, Kuwait, Libya, Myanmar, Malaysia, Nigeria, Oman, Qatar, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, and Yemen.

[14]In Appendix Figure S3, we demonstrate that the quadratic relationship between income and net fuel taxes remains constant over the 2003-15 period.

Table 1: Cross-Section / Basic Specification

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	−1.032***	−0.939***	−0.873***	−0.745***
	(0.193)	(0.181)	(0.181)	(0.182)
log(GNI Per Capita Sq)	0.066***	0.061***	0.057***	0.050***
	(0.011)	(0.011)	(0.011)	(0.011)
Fossil Fuel Dependence		−0.016***		
		(0.004)		
log(Oil and Gas Exports PC)			−0.024***	
			(0.005)	
Fossil Fuel Export Dependence				−0.007***
				(0.001)
Central Government Debt	0.003***	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Value-Added Tax Rate	0.049***	0.042***	0.041***	0.035***
	(0.005)	(0.005)	(0.005)	(0.005)
Constant	3.543***	3.328***	2.986***	2.695***
	(0.817)	(0.750)	(0.750)	(0.747)
Observations	140	139	139	136
R^2	0.598	0.673	0.672	0.737
Adjusted R^2	0.586	0.660	0.660	0.727
Note: Robust SE		*p<0.1; **p<0.05; ***p<0.01		

2), as well as a positive relationship between *Central Government Debt* and net fuel taxes. When we measure fossil fuel endowments in alternative ways (Table 1, columns 3 and 4), the R-squared term is similar or larger. The R-squared terms in columns 2-4 suggest these variables account for between 67% and 74% of the variation in net fuel taxes.[15]

We then evaluate two political factors suggested by the "democratic institutions" approach: *Autocracy* and *Government Effectiveness.* We also include an interaction term for *Fossil Fuel Dependence* and the *Autocracy* dummy, to investigate the claim that oil-rich autocracies are unusually reliant on fossil fuel subsidies, which they use to maintain popular support (Ross, 2012; Fails, 2019). We show in Appendix Table S4 that there is an unconditional, bivariate correlation between each of the "democracy" measures and net

[15]Without the VAT-adjustment, *GNI per capita* and *Fossil Fuel Dependence* account for between 42% and 57% of the variation; the F-statistic for models with and without VAT is 97.4, indicative of the need for VAT-adjustment.

fuel taxes (see also Figure 1, panel D). But when we place each of the measures in the full model, shown in Appendix Table S5, none are statistically correlated with net fuel taxes and their inclusion has little effect on the baseline results.[16] Adding a series of regional controls to the model, plus measures of geography (latitude and coastal access), raises the R-squared and reduces the size of the *GNI per capita* and *GNI per capita squared* coefficients but otherwise does not change these results.

Results are unchanged when we use alternative measures for democracy (Tables S6–S8) and regional categories (Table S9); when we control for the presence of national oil companies (Table S10), a factor highlighted by Cheon, Lackner and Urpelainen (2015); and when we control for the number of cars per capita (Table S11), which plausibly represents the size of the constituency benefiting directly from fuel subsidies.

These results could be biased by the endogeneity of *Fossil Fuel Dependence* to both our outcome and several of the other right-hand side variables (*GNI per capita*, *Autocracy*, and *Government Effectiveness*).[17] In Appendix Tables S12–S14, we show results from two-stage least squares models in which we use a country's 1960 oil endowment per capita to instrument for *Fossil Fuel Dependence*.

The instrument produces no change in the statistical significance of *Fossil Fuel Dependence* or other variables, although it causes the instrumented *Fossil Fuel Dependence* coefficients to roughly double in size, implying an attenuation bias in the naïve model using the endogenous regressor. Our alternative instrument is based on the spatial distribution of oil-yielding sedimentary basins and taken from Cassidy (2018) (Table S13). While the instrument is less efficient—the first stage F statistic is 17 compared to an F of 283 for the endowment instrument (Table S14)—the results are substantively similar.

We interpret these results as consistent with the fiscal politics hypothesis, but not the democratic institutions hypothesis.

Figure 4 shows how net fuel taxes changed for the 141 countries with relatively com-

---

[16]The failure to find heterogeneous effects is illustrated in Appendix Figure S4.

[17]On the problem of endogeneity in the political effects of oil wealth, see Haber and Menaldo (2011).

plete data for both 2003 and 2015. The x-axis shows the net tax or subsidy in the first six months of 2003, while the y-axis shows the net tax or subsidy for the first half of 2015. Over these 13 years, taxes rose modestly in 73 countries (51.8 percent), fell modestly in 63 countries (44.7 percent), and were unchanged in five (3.5 percent). Countries were almost as likely to reduce taxes as to raise them.[18]

If we weight all countries equally, the median net gasoline tax rose from \$0.29 per liter to \$0.37 per liter between 2003 and 2015; this is equivalent to an annual increase of 2.05 percent, adjusted for inflation. We can alternatively weight each country's price by its gasoline consumption in the same year, giving high-consuming countries more weight than low-consuming countries. The median consumption-weighted tax fell from \$0.12 to \$0.06 per liter—a drop of 48.8 percent, equivalent to an annual decline of 5.43 percent. The downward trend in the consumption-weighted price reflects a global shift: while consumption fell among the high-tax countries (which were generally high-income, oil-importing states), it rose among low-tax countries (which were predominantly middle-income and oil-exporting states).

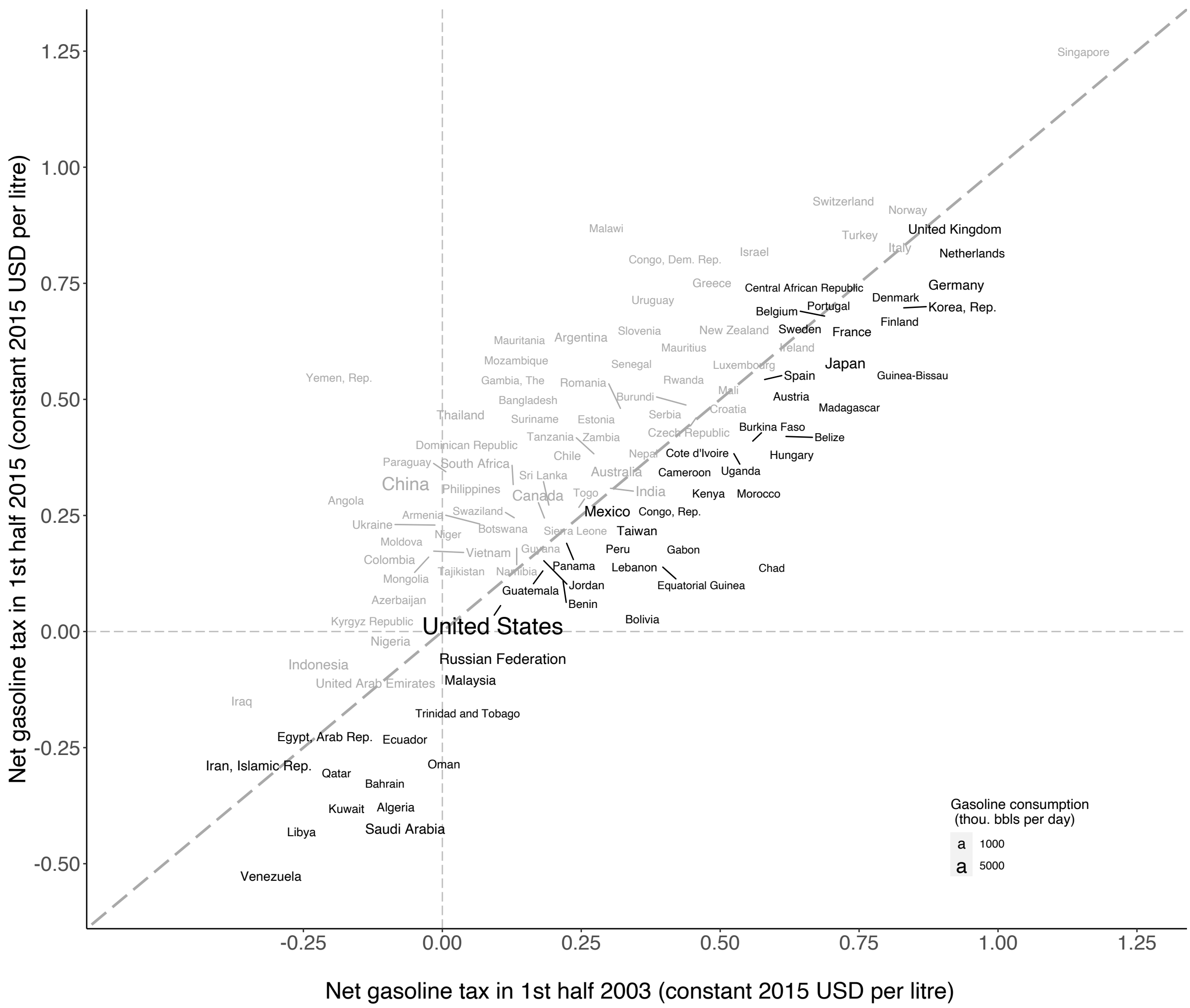
The pattern for diesel fuel was similar: from 2004 to 2014, the unweighted median diesel tax rose from \$0.22 per liter to \$0.25 per liter, an annual increase of just 0.95 percent.[19] Diesel taxes rose in 62 countries and fell in 66 countries.

For many issues, the absence of global policy change might be unremarkable. But the absence of change in fossil fuel taxes and subsidies from 2003 to 2015 is striking, since this was a period of rapidly-growing attention to both the hazards of climate change and the benefits of taxing carbon emissions. While many governments took other measures to address the climate emergency, this suggests that in general these measures did not make gas or diesel fuel more expensive.

[18]These trends are not sensitive to the choice of beginning and end dates: when we use the second half of 2003 and the second half of 2014 as alternative beginning and end periods, the trends are similar.

[19]We are unable to perform a consumption-weighted calculation for diesel given the lack of time-series data on country-level diesel consumption.

Figure 4: **Gasoline taxes by country in 2003 and 2015.** This figure compares the average per-liter tax or subsidy for countries in the first six months of 2003 to the first six months of 2015. Taxes or subsidies are net of each country's value-added tax rate; this is calculated as $Price_{it} * (1 - VAT_{it}) - Benchmark_t$. Countries with the same level of taxes or subsidies in both periods will fall along the 45-degree dashed line. Countries with higher taxes (or lower subsidies) in 2015 than in 2003 are colored in gray; those with lower taxes (or higher subsidies) are colored in black. See also Appendix Figures S5–S6.



Appendix Table S15 displays the results from a fixed-effects model with our monthly fuel tax data aggregated into annual observations.[20] As with the cross-country results, *Fossil Fuel Dependence* is negatively associated with net fuel taxes, even after accounting for country and year fixed effects. Both *Central Government Debt* and *VAT* remain statistically correlated with net fuel taxes, but *GNI per capita* does not. *Government*

[20]Note we choose the fixed-effects specification as we are interested in within-country changes over time. In Appendix Tables S16–S20, we also show the results from a pooled model without fixed effects.

Effectiveness continues to be uncorrelated with net fuel taxes. *Autocracy* is statistically associated with net fuel taxes at the 10% level, but the sign on the coefficient is reversed from the model in Table S5. Further, there remains no evidence of a differential effect of fuel dependence on taxes between autocracies and democracies.

A model with *only* country-fixed effects and no other covariates gives an adjusted R^2 of 0.915, indicating that the overwhelming majority of the variation in our data is cross-sectional, not intertemporal (See Appendix Figure S7).[21] The variables representing our fiscal politics argument—including income, fossil fuel dependence, debt, along with the control for VAT—account for about 20% of the remaining intertemporal variation (0.017/0.085 in the annual panel regressions and 0.025/0.126 in the monthly panel regressions), while the remaining 80% is accounted for by unobserved, time-varying, country-specific factors.

We interpret these results as consistent with the fiscal politics hypothesis and the local politics hypothesis, but not the democratic institutions view.

Our monthly data allows us to estimate the role of three types of infra-annual events: the discovery of giant oil fields, whose significance would be consistent with the fiscal politics claim; and elections and leadership turnover, whose significance would be consistent with the democratic institutions claim. In Table 2 we enter each measure with leads and lags by quarters. There appears to be no statistical relationship between net fuel taxes and the timing of elections or changes in political leadership. The month of an oil discovery and the following two quarters are associated with *higher* net fuel taxes at the p=*.05* and p=*.10* levels, albeit with a small substantive effect; this is not consistent with the notion that fossil fuel wealth leads to reduced net fuel taxes. Still, we are reluctant to draw inferences from this result: oil discoveries only generate government revenues with a significant lag—often five to ten years, but sometimes more.

For each variable we tried a range of other specifications, including leads and lags to

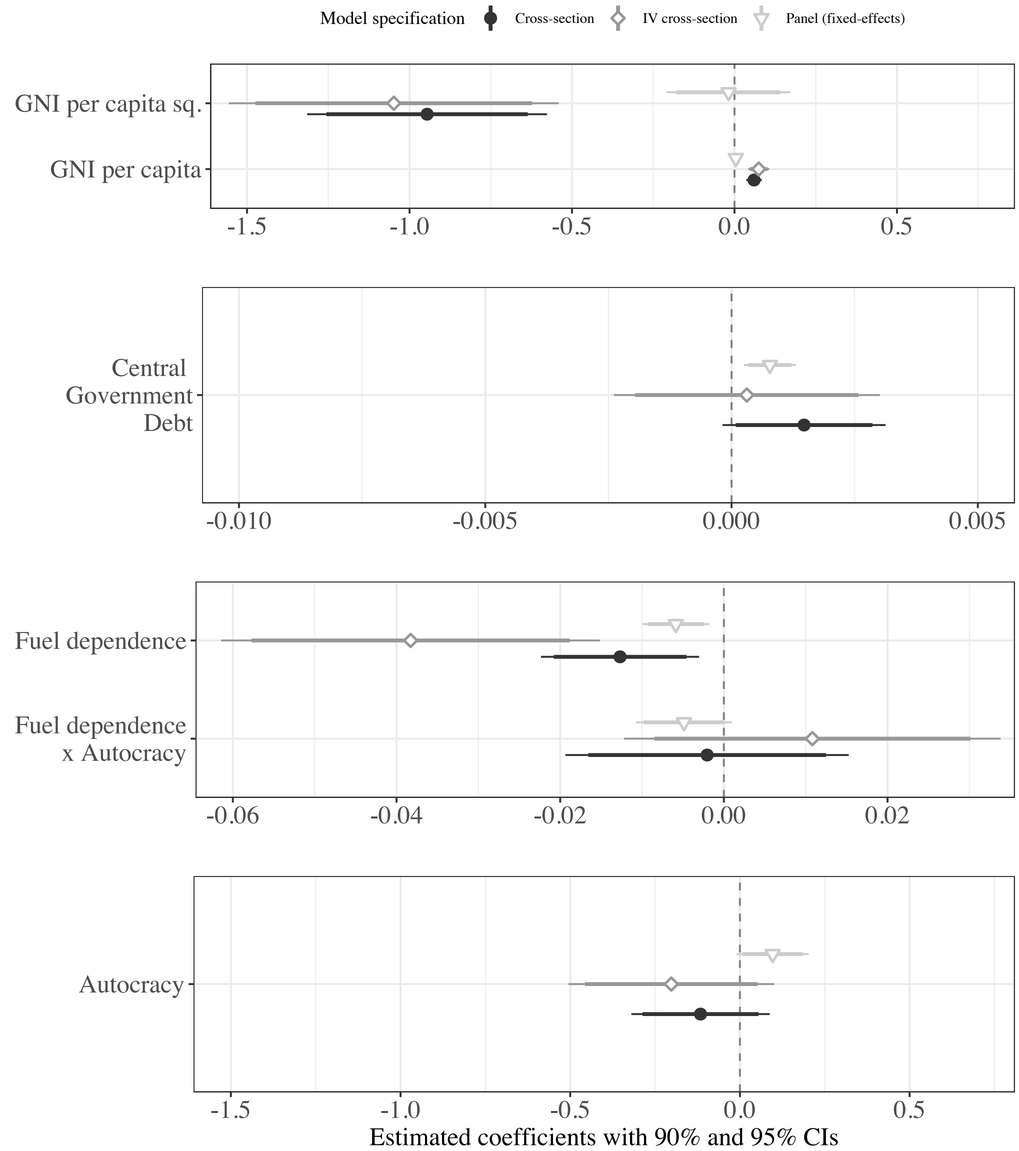
[21]Adding year-fixed effects only marginally improves the fit of the model: an adjusted R-squared increase to 0.922, and an F-statistic of only 13.2 ($p < 0.0001$).

cover events one to twelve months before, and one to twelve months following, each type of event, as well as a pooled model with monthly data (Table S21). The results were substantively unchanged.

Table 2: Cross-section Time-series: Monthly Panel

	Dependent variable:
	Net Gasoline Tax
1 Qr Before Elections	0.001
	(0.009)
2 Qr Before Elections	0.004
	(0.010)
3 Qr Before Elections	0.001
	(0.009)
4 Qr Before Elections	0.001
	(0.010)
1 Qr After Elections	0.002
	(0.009)
2 Qr After Elections	−0.003
	(0.009)
3 Qr After Elections	−0.007
	(0.010)
4 Qr After Elections	−0.011
	(0.009)
1 Qr After Leader Turnover	0.010
	(0.015)
2 Qr After Leader Turnover	0.013
	(0.014)
3 Qr After Leader Turnover	0.017
	(0.014)
4 Qr After Leader Turnover	0.008
	(0.014)
Oil Discovery Month	0.041**
	(0.017)
1 Qr After Discovery Month	0.033**
	(0.016)
2 Qr After Discovery Month	0.026*
	(0.015)
3 Qr After Discovery Month	0.016
	(0.015)
4 Qr After Discovery Month	0.023
	(0.016)
Constant	0.218***
	(0.015)
Observations	22,124
Country FE	Y
Adjusted R^2	0.898
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01

Figure 5: **Model results across three specifications for income, fuel dependence, autocracy, and government debt.** Note the differing scales of the estimated coefficients across all covariates. See Appendix Figure S4 for fuel-autocracy interaction marginal effects plot.



Discussion

The results across these three model specifications—cross-sectional, instrumental variables analysis, and fixed-effects panel—are plotted in Figure 5 for four of our variables of interest: *GNI per capita*, *Fossil Fuel Dependence*, *Central Government Debt*, and *Autocracy*.

Three patterns stand out in our overall analysis: the powerful role of core economic factors, particularly income per capita and fossil fuel wealth; the lack of any consistent effect from political factors, including democracy, elections, leadership, and government effectiveness; and the importance of unobserved, country-specific factors in explaining policy changes. These patterns are robust to multiple specifications and the use of instruments for the endogenous *Fossil Fuel Dependence* variable. In the Appendix, we show that the same three patterns apply to taxes on diesel fuel (Tables S22–S25).

Fiscal politics. Net gasoline taxes appear to be largely a function of three macro-level economic factors that previous studies have linked to fiscal policies: income, fossil fuel wealth, and government debt. Depending on how we measure fossil fuel wealth, together they account for between 42% and 57% of the country-to-country variation in fuel tax levels.[22]

The substantive effect of income appears to be large, though it is difficult to estimate with much precision—partly because the effects of income and fossil fuel wealth are confounded, partly because the effects of income vary by a country's natural resource endowment, and partly because among oil-importing countries, the impact of income on net fuel taxes is U-shaped: the highest net fuel taxes are in both very rich countries (like Singapore and Switzerland) and very poor ones (like Burundi and Malawi), while middle-income countries (like China and Sri Lanka) have lower taxes. (Figure 3 and Appendix Figures S2–S3). We discuss the U-shaped pattern in our model below.

The substantive effect of fossil fuel wealth is more straightforward and unambiguously large. In our baseline estimation (Table 1, column 2), a one standard deviation increase in *Fossil Fuel Dependence* is associated with a 16 cent decrease in the net fuel tax. For example, as a country's fuel dependence increases from the levels in Malaysia (6.1%) to Qatar (30.1%), the net fuel tax decreases by 43 cents, or 20% of the total range of the variable. Our results are similar when we use alternative measures of oil wealth (Table 1, columns 3 and 4), and roughly doubles in size when we use petroleum endowment in

[22] This is based on running the models in Table 1 without controlling for VAT.

1960 as an instrument (Table S12). We observe a similar relationship in the panel data: increases in *Fossil Fuel Dependence* are associated with declines in net fuel taxes, even after accounting for two-way fixed effects (Table S15). This matches our observations of countries like Chad, Bolivia, and Equatorial Guinea, which had fast-growing fossil fuel exports and some of the biggest drops in net fuel taxes.

Central Government Debt has a statistical effect that is smaller: a one standard deviation increase in debt (31 percentage points) is correlated with a 6 cent increase in the net fuel tax (Table 1, columns 2-4; Table S15, columns 1-3). A dramatic shift in debt, for example, from Luxembourg in 2005 (0.8% of GDP) to Greece in 2005 (108% of GDP) would be associated with a $0.19 per liter increase in net fuel taxes, akin to a change of 8% of the total range of the dependent variable. This seems to match the experience of countries like Yemen and Sudan, where sudden changes in fiscal pressures between 2003 and 2015 led to the removal of large fuel subsidies.[23]

Democratic institutions. We find no consistent association between net fuel taxes and the variables implied by the democratic institutions hypothesis: democratic rule, elections, leadership changes, or government effectiveness. Although net fuel taxes tend to be higher in democracies than autocracies, this is because regime type is confounded with *GNI per capita*, *Central Government Debt*, and *Fossil Fuel Dependence*. The same holds true for *Government Effectiveness*: its naïve correlation with net fuel taxes appears to be spurious.

If democratic rule led to higher net fuel taxes, then countries that democratized between 2003 and 2015 period should have raised their net gasoline tax, while countries that grew less democratic should have reduced it. We find no such pattern in the data: the countries that moved farthest towards democracy over the period had on average the same net gasoline taxes at the end as they did at the beginning. The same is true for countries that moved the farthest toward autocracy (see Appendix Figure S6).

[23]For an in-depth look at the impact of fiscal pressures on net fuel taxes, see Vagliasindi (2012) and Inchauste and Victor (2017).

These results are not consistent with studies that suggest democratic accountability and bureaucratic effectiveness tend to promote higher fuel taxes (Cheon, Urpelainen and Lackner, 2013; Cheon, Lackner and Urpelainen, 2015; Kyle, 2018). Our results are consistent, however, with Bernauer and Böhmelt's conclusion that "Most studies are not able to identify a robust significant effect" of national-level political factors on fossil-fuel taxation (Bernauer and Böhmelt, 2013, 434-435).

The absence of any effect from elections or leadership change might at first look surprising, since several case studies imply that these events can create "windows of opportunity" for reform. For example, Egypt's experience in 2014-15 seems to suggest that elections matter: after General El-Sisi won the 2014 presidential election in a landslide (following an earlier coup), he began the first of two rounds of politically-unpopular fiscal reforms, removing long-standing subsidies for gasoline, diesel, kerosene, and liquified natural gas. Moerenhout's careful case study describes Egypt as "a good example of opportunistic reform" (Moerenhout, 2018, 268). Yet the durability of these post-election reforms are unclear: by 2017, the real price of Egyptian gasoline had dropped well below the 2014 pre-reform price.

The 2018 Presidential election in Mexico was also surprisingly inconsequential. In December 2017, the Mexican government unveiled large gasoline price increases, which led to riots across the country (Grunstein, 2017). During the 2018 presidential campaign, the candidate who eventually won—Andrés Manuel López Obrador—harshly criticized the fuel price increases and said he would roll them back. Yet after taking office in December 2018, his administration has left the gasoline price policy mostly unchanged.

Local politics. We cannot directly measure the effects of idiosyncratic, time-varying, national-level factors. Still, our analysis implies that they are important: even though variations in net fuel taxes over time are relatively small, 80% of these intertemporal changes are *not* associated with any of the variables in our models. Unobserved factors at the country level may be the most important drivers of changes in (but not levels of) fuel prices.

While this result may look perplexing, it is consistent with the case study literature on fuel taxes, which emphasizes the impact of distinctive juxtapositions of actors and events, idiosyncratic changes in the domestic political economy, and fleeting opportunities for reform (Clements et al., 2013; Skovgaard and van Asselt, 2018; Rabe, 2018; Inchauste and Victor, 2017). The impact and complexity of fluctuating local conditions may help explain why, after a decade of research, there is no straightforward formula for subsidy reform. Our analysis echos the conclusion in Inchauste and Victor (2017, 3) that, "local details matter enormously and vary by country, by market, by fuel type, and by the political organization of the relevant interest groups. The factors relevant in political economy are highly complex and difficult to study without detailed case study analysis." It is also consistent with influential theories of public policy, including the concepts of "multiple streams" (Kingdon, 1984) and "punctuated equilibrium"(Baumgartner and Jones, 1993), which see policy changes as slow and incremental, and arising from the interaction of many context-specific elements, including multiple actors, ideas, and windows of opportunity.

These heterogeneous, time-varying factors are by definition hard to summarize: in each country, and at each point in time, there is a unique configuration of influential actors, whose roles, interests, strategies, and relationships can shift over time.

For example, Ghana's 2004 and 2015 fuel price reforms were spurred by a surprising convergence of interests among three unlikely groups: the rural poor, who did not directly benefit from low gasoline prices; and bulk distribution companies and oil-financing commercial banks, both of which were effectively carrying debts incurred from subsidies (Addo, Bazilian and Oguah, 2017). Jordan's 2012-13 reforms also emerged from an unpredictable confluence of events: a reduction in energy imports, due to the turmoil in Egypt triggered by the Arab Spring; a shortage of foreign exchange, which spurred the government to action; and a new, precision-targeted cash transfer mechanism that enabled the government to compensate key urban constituencies who were affected by the price increases (Inchauste, Mansur and Serajuddin, 2017).

By contrast, reforms in Indonesia were repeatedly blocked by a coalition of labor unions and student groups, thanks to a strategy they had developed during the upheaval around the 1998-99 democratic transition: they hired large numbers of lower-income citizens to stage protests, even though the latter would probably have benefited from the government's reforms. Moreover, legal reforms in 2004 made it easier for opposition parties to launch constitutional challenges to subsidy reforms (Beaton, Lontoh and Wai-Poi, 2017).

In each of these cases, a government's fiscal needs mattered, as our fiscal politics argument suggests. But these needs only provide a rough bounds on fuel price policies. To gain a more complete explanation of changes in fuel tax policies, a close understanding of local political conditions is essential.

A Model of the Supply and Demand of Fossil Fuel Taxes

How do these four factors—income per capita, fossil fuel dependence, government debt, and local politics—jointly determine net fuel taxes? Here we develop a simple model to illustrate how they could produce some of the patterns we observe in the data.

Our fiscal politics approach suggests that fuel taxes can be best understood as *taxes*, not instruments of environmental policy. We hence assume they are influenced by the same broad factors that affect all tax policies, including a government's demand for revenues and the population's willingness to supply them. These factors include a country's income level, natural resource wealth, and debt burden.

Our model incorporates longstanding ideas about the determinants of tax policies: that higher incomes lead to more government spending as a fraction of the economy, and hence higher taxes (Ortiz-Ospina and Roser, 2020; Akitoby et al., 2006; Drazen, 2004); that the governments of low-income countries are dependent on easy-to-collect taxes, including trade taxes and taxes on commodities for which demand is inelastic (Slemrod, 1990; Besley and Persson, 2014); and that as incomes rise, governments become less reliant on trade and commodity taxes and more reliant on taxes on income, profits, and capital gains (Joshi, Prichard and Heady, 2014; Besley and Persson, 2014). These suggest that among low-income countries, taxes on fossil fuels should be relatively high, since transportation fuels are both commodities and (in our baseline example) imported. They also imply that as incomes rise, the government's demand for fossil fuel tax revenues should *decline*, as it increasingly relies on taxes on income, profits, and capital gains.

At the same time, rising incomes should also affect the population's willingness to pay fuel taxes: more wealth creates both more disposable income and a greater demand for public goods (Luttmer and Singhal, 2011; Greenstone and Jack, 2015). This implies that rising incomes should be associated with an increased willingness to pay net fuel taxes.

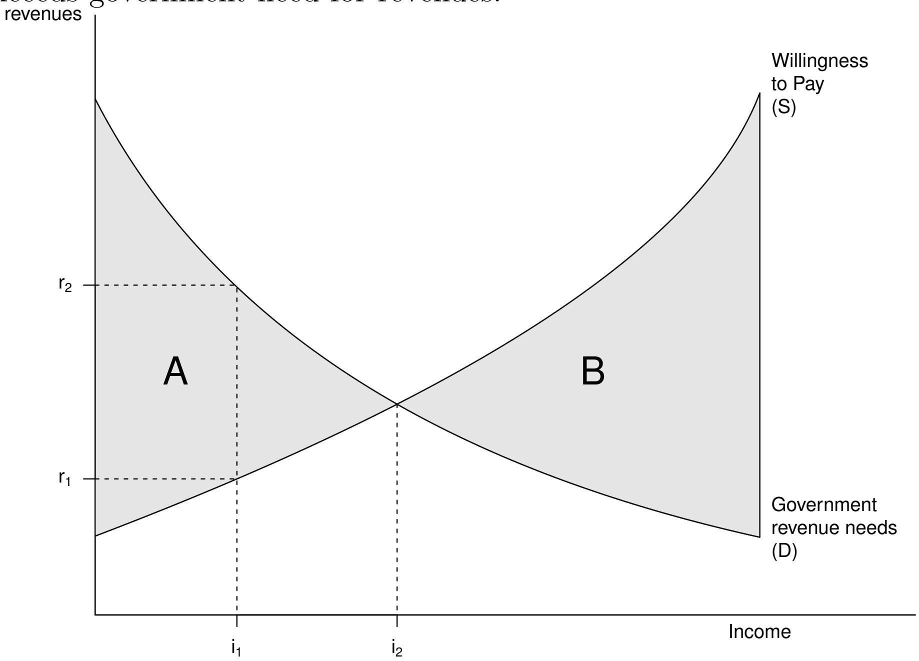
In our model, net fuel taxes are jointly determined by governments that demand tax revenues and citizens who must supply them. Countries are divided into fossil fuel importers and exporters.

Consider first the oil importers (Figure 6). When country incomes are low, governments are highly dependent on taxes on imported fuel and wish to keep these rates high. As countries become wealthier, governments grow more reliant on other, more broadly-based tax instruments, causing the government's demand for fuel tax revenue to slope downward. At the same time, when incomes rise citizens grow more willing to pay high fuel taxes, producing an upward-sloping supply curve.

When country income is low (i_1), the government will attempt to set the gasoline tax at r_2 even though the median citizen is only willing to pay r_1 in taxes. The larger the gap between r_1 and r_2, the greater the dissatisfaction of citizens and the higher the likelihood that the government's preferred tax level will spark protests. Since the preferences of governments and citizens diverge in Area A, there is no equilibrium fuel tax. The tax will hence be determined by local politics—that is, the country-specific political factors that reflect the relative bargaining power of the two parties, such as the capacity of citizens to organize protests, and the capacity of the government to deter them.

Once incomes pass a certain threshold (i_2), the public's willingness to pay exceeds the

Figure 6: **Supply and Demand of Revenue from Fossil Fuel Taxes.** Consumer willingness to pay fuel taxes (supply, S) and government demand for fuel tax revenues (demand, D), plotted by national income (x-axis) and fuel tax revenues (y-axis). Shaded regions (A and B) represent the divergence between government and citizen preferences. Points r_1 and r_2 represent the potential range of gasoline tax revenues when country income is relatively low at i_1. Point i_2 marks the income threshold after which willingness to pay exceeds government need for revenues.



government's need for fuel taxes, making the government's revenue needs less salient.[24] Further increases in income will lead to more disposable income and a greater willingness to fund public goods, and hence pay fuel taxes; since the government's demand function is no longer relevant, this should cause the price to rise. If we allow for heterogeneity in the willingness of citizens to pay for public goods, we may still observe conflicts in Area B over the tax. Once again, local politics will determine which groups are more influential and hence what the tax will be.

Now consider a country with significant hydrocarbon wealth. Hydrocarbon wealth typically produces large government revenues, even in low-income countries; this tends to reduce the government's need for revenues from other sources, including taxes on transportation fuels (Ross, 2012). In an oil-exporting country, the demand curve should

[24]That is, the government finds it easier to raise revenues with other types of taxes, making net fuel taxes a relatively unimportant source of revenue.

hence be relatively flat and closer to zero.

The supply curve should also become flatter. In most oil-exporting countries, citizens believe oil wealth belongs to the nation and confers on them a right to purchase fuel without paying more than the marginal supply cost, even when their disposable incomes rise (Beblawi and Luciani, 1990; Springborg, 2013; El-Katiri, 2014; Krane, 2018). Hence in oil-exporting countries, the net fuel tax should be relatively low, since both curves are closer to zero. It should also remain constant as incomes rise.[25]

The model suggests a way to account for some of the key features of the data: why oil-importing and oil-exporting states have different tax patterns; the U-shaped relationship between incomes and net fuel taxes; the salience of local conditions; and the conflicts that break out over fuel prices, particularly in low and middle income countries.

Conclusion

We believe this is the most comprehensive and accurate analysis to date of an important climate-related policy across a large number of countries and years. Our findings are worrisome. From 2003 to 2015, taxes and subsidies for transportation fuels showed little change at a global level: increases in 73 countries were offset by declines in 63 others, and the consumption-weighted median gasoline price fell at a rate of 5.43 percent per year. This trend paradoxically coincided with growing recognition of the climate emergency.

Our statistical analysis suggests that this trend reflects a discouraging pattern: fuel taxes appear to reflect a government's fiscal needs, not its environmental aspirations. Our analysis also fails to support prior claims about the beneficial effects of democratic institutions: fuel taxes were not associated with democratic accountability, elections, leadership turnover, or bureaucratic effectiveness (Cheon, Urpelainen and Lackner, 2013; Cheon, Lackner and Urpelainen, 2015; Kyle, 2018).

Despite little change at the global level, we find variation at the country level concen-

[25]When the retail price is below the international supply cost—e.g., the price of imported fuel—the difference is defined as a subsidy.

trated at isolated moments of fuel tax reform. Yet these reforms are exceedingly difficult to predict. We find suggestive evidence that they are largely driven by idiosyncratic, evanescent, country-specific factors. This is consistent with several qualitative studies that underscore the critical role of contextual factors in the reform of fossil fuel taxes and subsidies (Inchauste and Victor, 2017; Clements et al., 2013; Vagliasindi, 2012; Skovgaard and van Asselt, 2018).

Our findings may cast light on a broader class of politically-costly climate policies, particularly ones that entail carbon pricing. Although carbon taxes are championed by many economists and policy analysts for their efficiency, it is unclear whether governments are adopting them. Several reports suggest their use is spreading and note the rising number of jurisdictions that have implemented them or are considering doing so (Klenert et al., 2018); yet progress has been slow, reflecting the "breadth and ferocity of political opposition" to carbon-pricing proposals (Rabe, 2018, xvi). Our findings on taxes and subsidies for transportation fuels (which are little-affected by carbon taxes) come to a broadly similar conclusion: they are exceedingly difficult to change.

Still, our analysis suggests there are opportunities to raise fossil fuel taxes in countries where the fundamental determinants of tax policies—income levels, debt, and fossil fuel dependence—are changing in the right directions. In China, quickly-rising incomes probably made it possible for the government to hike fuel taxes; in both Norway and Indonesia, a decline in economic dependence on oil and gas exports created political conditions that ultimately opened the door to higher net fuel taxes. Over the next decade, incomes in quickly-growing countries like India and Vietnam may move them past the inflection point on the U-curve when countries typically raise their net fuel taxes. If our model is correct, this makes them good candidates for significant increases in fuel taxes, despite the expected gains in car ownership.

Fortunately, there are many ways governments can discourage fossil fuel consumption without imposing new taxes on consumer products: instead of making gasoline and diesel more expensive, they can make green alternatives cheaper, for example, by investing in mass transit and subsidizing electric vehicles. They can also use regulations instead of prices by raising fuel efficiency standards, and in the electricity sector, adopting renewable portfolio standards and shutting down coal plants. Fossil fuel taxes are not a lost cause, but they are much harder to advance than many recognize. Other carbon-reducing policies may ultimately be politically easier to implement.

Finally, our data on monthly gasoline prices across countries may also open new avenues of research. Climate politics are hard to study, in part, because accurate data on government policies is scarce. We hope our data allow other scholars to study, with better resolution, the links between fuel prices and key political, economic, and health outcomes—including political protests, political stability, gasoline consumption, automobile and mass transit use, traffic accidents, and respiratory illness—and how they can be addressed.

Acknowledgements

The authors are grateful to Chad Hazlett, Khobaib Osailan, and the anonymous reviewers, for their valuable advice on earlier drafts. Previous incarnations of this paper were presented at the University of Virginia, the University of Wisconsin, the University of Toronto, the World Bank, the Center for Global Development, the 2018 annual meeting of the American Political Science Association, the Balzan Workshop on Climate Change Politics, the Bren School at the University of California, Santa Barbara, and the Burkle Center at the University of California, Los Angeles. An earlier version of this paper was published by the Center for Global Development as Working Paper 541.

References

Addo, Sheila, Morgan Bazilian and Samuel Oguah. 2017. Ghana: Lessons Learned, New Strategies. In *The Political Economy of Energy Subsidy Reform*, ed. Gabriela Inchauste and David G Victor. The World Bank.

Aghion, Philippe, Antoine Dechezleprêtre, David Hemous, Ralf Martin and John Van Reenen. 2016. "Carbon taxes, path dependency, and directed technical change: Evidence from the auto industry." *Journal of Political Economy* 124(1):1–51.

Akitoby, Bernardin, Benedict Clements, Sanjeev Gupta and Gabriela Inchauste. 2006. "Public spending, voracity, and Wagner's law in developing countries." *European Journal of Political Economy* 22(4):908–924.

Aklin, Michaël and Johannes Urpelainen. 2013. "Political competition, path dependence, and the strategy of sustainable energy transitions." *American Journal of Political Science* 57(3):643–658.

Aldy, Joseph, William Pizer et al. 2016. "Economic tools to promote transparency and comparability in the Paris Agreement." *Nature Climate Change* 6(11):1000.

Ansolabehere, Stephen and David M Konisky. 2014. *Cheap and Clean: How Americans think about energy in the age of global warming*. Mit Press.

Arezki, Rabah, Valerie A. Ramey and Liugang Sheng. 2017. "News Shocks in Open Economies: Evidence from Giant Oil Discoveries." *The Quarterly Journal of Economics* 132(1):103–155.

Bättig, Michèle B and Thomas Bernauer. 2009. "National institutions and global public goods: are democracies more cooperative in climate change policy?" *International organization* 63(2):281–308.

Baumgartner, Frank R and Bryan D Jones. 1993. *Agendas and Instability in American Politics*. University of Chicago Press.

Bayer, Patrick and Johannes Urpelainen. 2016. "It is all about political incentives: Democracy and the renewable feed-in tariff." *The Journal of Politics* 78(2):603–619.

Beaton, Christopher, Lucky Lontoh and Matthew Wai-Poi. 2017. Indonesia: Pricing Reforms, Social Assistance, and the Importance of Perceptions. In *The Political Economy of Energy Subsidy Reform*, ed. Gabriela Inchauste and David G Victor. The World Bank.

Beblawi, Hazem and Giacomo Luciani. 1990. *The Rentier State*. Routledge.

Bernauer, Thomas. 2013. "Climate change politics." *Annual Review of Political Science* 16:421–448.

Bernauer, Thomas and Tobias Böhmelt. 2013. "National climate policies in international comparison: the climate change cooperation index." *Environmental Science & Policy* 25:196–206.

Besley, Timothy and Torsten Persson. 2014. "Why do developing countries tax so little?" *Journal of Economic Perspectives* 28(4):99–120.

Boix, Carles, Michael Miller and Sebastian Rosato. 2013. "A complete data set of political regimes, 1800–2007." *Comparative Political Studies* 46(12):1523–1554.

Brautigam, Deborah, Odd-Helge Fjeldstad and Mick Moore. 2008. *Taxation and State-building in Developing Countries: Capacity and Consent*. Cambridge University Press.

Cassidy, Traviss. 2018. "The Long-Run Effects of Oil Wealth on Development: Evidence from Petroleum Geology." *The Economic Journal* 129(623):2745–2778.

Charap, Mr Joshua, Mr Arthur Ribeiro da Silva and Mr Pedro C Rodriguez. 2013. *Energy Subsidies and Energy Consumption: A Cross-Country Analysis*. Number 13-112 International Monetary Fund.

Cheon, Andrew, Johannes Urpelainen and Maureen Lackner. 2013. "Why do governments subsidize gasoline consumption? An empirical analysis of global gasoline prices, 2002–2009." *Energy Policy* 56:382–390.

Cheon, Andrew, Maureen Lackner and Johannes Urpelainen. 2015. "Instruments of political control: National oil companies, oil prices, and petroleum subsidies." *Comparative Political Studies* 48(3):370–402.

Christoff, Peter and Robyn Eckersley. 2011. "Comparing state responses." *The Oxford handbook of climate change and society* pp. 431–448.

Clarke, Leon E and Kejun Jiang. 2015. Assessing Transformation Pathways. In *Climate Change 2014: Mitigation of Climate Change. Contribution of WGIII to the IPCC Fifth Assessment Report*, ed. Ottmar Edenhofer. Cambridge University Press.

Clements, Benedict J, David Coady, Stefania Fabrizio, Sanjeev Gupta, Trevor Serge Coleridge Alleyne and Carlo A Sdralevich. 2013. *Energy Subsidy Reform: Lessons and Implications*. International Monetary Fund.

Coady, David, Ian Parry, Louis Sears and Baoping Shang. 2017. "How large are global fossil fuel subsidies?" *World development* 91:11–27.

Coady, Mr David, Ian Parry, Nghia-Piotr Le and Baoping Shang. 2019. *Global fossil fuel subsidies remain large: An update based on country-level estimates*. International Monetary Fund.

Coppedge, Michael, John Gerring, Staffan I Lindberg, Jan Teorell, David Altman, Michael Bernhard, M Steven Fish, Adam Glynn, Allen Hicken, Carl H Knutsen et al. 2019. "Varieties of Democracy." *VDEM Codebook v10* .

Del Granado, Francisco Javier Arze, David Coady and Robert Gillingham. 2012. "The unequal benefits of fuel subsidies: A review of evidence for developing countries." *World development* 40(11):2234–2248.

Drazen, Allan. 2004. *Political Economy in Macro Economics*. Orient Blackswan.

El-Katiri, Laura. 2014. "The guardian state and its economic development model." *Journal of Development Studies* 50(1):22–34.

Erickson, Peter, Harro van Asselt, Doug Koplow, Michael Lazarus, Peter Newell, Naomi Oreskes and Geoffrey Supran. 2020. "Why fossil fuel producer subsidies matter." *Nature* 578(7793):E1–E4.

Fails, Matthew D. 2019. "Fuel subsidies limit democratization: Evidence from a global sample, 1990–2014." *International Studies Quarterly* 63(2):354–363.

Fattouh, Bassam and Laura El-Katiri. 2013. "Energy subsidies in the Middle East and North Africa." *Energy Strategy Reviews* 2(1):108–115.

Finnegan, Jared. 2019. "Institutions, climate change, and the foundations of long-term policymaking." *APSA Preprints* doi: 10.33774/apsa-2019-6ft75.

Goemans, Henk E, Kristian Skrede Gleditsch and Giacomo Chiozza. 2009. "Introducing Archigos: A dataset of political leaders." *Journal of Peace research* 46(2):269–283.

Greenstone, Michael and B Kelsey Jack. 2015. "Envirodevonomics: A research agenda for an emerging field." *Journal of Economic Literature* 53(1):5–42.

Grunstein, Miriam. 2017. "The Winter of Our Discontent: The Implications of Mexico's Hefty Gasoline Price Hikes." *Issue Brief* 6.

Haber, Stephen and Victor Menaldo. 2011. "Do natural resources fuel authoritarianism? A reappraisal of the resource curse." *American Political Science Review* 105(1):1–26.

Hughes, Llewelyn and Phillip Y Lipscy. 2013. "The Politics of Energy." *Annual Review of Political Science* 16:449–469.

Hyde, Susan D and Nikolay Marinov. 2015. "NELDA 4.0: National Elections across Democracy and Autocracy dataset codebook for version 4.". https://nelda.co/ (accessed September 2 2016).

Inchauste, Gabriela and David G Victor. 2017. *The Political Economy of Energy Subsidy Reform*. The World Bank.

Inchauste, Gabriela, Yusuf Mansur and Umar Serajuddin. 2017. Jordan: Reform amid Turmoil. In *The Political Economy of Energy Subsidy Reform*, ed. Gabriela Inchauste and David G Victor. The World Bank.

International Monetary Fund. 2019. "Government Finance Statistics.". http://data.imf.org (accessed June 1, 2019).

Javeline, Debra. 2014. "The most important topic political scientists are not studying: Adapting to climate change." *Perspectives on Politics* 12(2):420–434.

Joshi, Anuradha, Wilson Prichard and Christopher Heady. 2014. "Taxing the informal economy: The current state of knowledge and agendas for future research." *The Journal of Development Studies* 50(10):1325–1347.

Kingdon, John W. 1984. *Agendas, Alternatives, and Public Policies*. Harper Collins.

Klenert, David, Linus Mattauch, Emmanuel Combet, Ottmar Edenhofer, Cameron Hepburn, Ryan Rafaty and Nicholas Stern. 2018. "Making carbon pricing work for citizens." *Nature Climate Change* 8(8):669–677.

Kojima, Masami and Doug Koplow. 2015. Fossil Fuel Subsidies: Approaches and Valuation. Policy Research Working Paper 7220 World Bank.

Koplow, Doug. 2009. "Measuring energy subsidies using the price-gap approach: What does it leave out?" *IISD Trade, Investment and Climate Change Series* .

Krane, Jim. 2018. "Political enablers of energy subsidy reform in Middle Eastern oil exporters." *Nature Energy* 3(7):547–552.

Kyle, Jordan. 2018. "Local Corruption and Popular Support for Fuel Subsidy Reform in Indonesia." *Comparative Political Studies* 51(11):1472–1503.

Luttmer, Erzo FP and Monica Singhal. 2011. "Culture, context, and the taste for redistribution." *American Economic Journal: Economic Policy* 3(1):157–79.

Marshall, Monty G, Keith Jaggers and Ted Robert Gurr. 2011. "Polity IV Project: Political Regime Characteristics and Transitions 1800-2010 Dataset Users Manual." *Center for Systemic Peace* 11. https://www.systemicpeace.org/polity/polity4.htm (accessed September 2, 2016).

Matsumura, Wataru and Adam Zakia. 2019. "Fossil fuel consumption subsidies bounced back strongly in 2018." *International Energy Agency, Paris* 7.

McFarland, William and Shelagh Whitley. 2014. "Fossil fuel subsidies in developing countries." *A review of support to reform processes. Overseas Development Institute* .

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

Moerenhout, Tomsh. 2018. "Reforming Egypt's Fossil Fuel Subsidies in the Context of a Changing Social Contract." *The Politics of Fossil Fuel Subsidies and Their Reform* p. 265.

O'Neill, Kate, Erika Weinthal, Kimberly R Marion Suiseeya, Steven Bernstein, Avery Cohn, Michael W Stone and Benjamin Cashore. 2013. "Methods and global environmental governance." *Annual Review of Environment and Resources* 38:441–471.

Organization for Economic Cooperation and Development. 2021. *Tax Policy and Climate Change*. Paris: Organization for Economic Cooperation and Development.

Ortiz-Ospina, Esteban and Max Roser. 2020. "Government spending.". http://ourworldindata.org (accessed October 1, 2020).

Prichard, Wilson, Paola Salardi and Paul Segal. 2018. "Taxation, non-tax revenue and democracy: New evidence using new cross-country data." *World Development* 109:295–312.

Purdon, Mark et al. 2015. "Advancing Comparative Climate Change Politics: Theory and Method." *Global Environmental Politics* 15(3):1–26.

Rabe, Barry G. 2018. *Can we price carbon?* MIT Press.

Ross, Michael L. 2012. *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* 2.

Schneider, Ben Ross and Blanca Heredia. 2003. *Reinventing Leviathan: the politics of administrative reform in developing countries*. North-South Center Press, University of Miami Miami.

Sims, Ralph et al. 2014. Transport. In *Climate Change 2014: Mitigation of Climate Change. Contribution of WGIII to the IPCC Fifth Assessment Report*, ed. Ottmar Edenhofer. Cambridge University Press.

Skovgaard, Jakob and Harro van Asselt. 2018. *The Politics of Fossil Fuel Subsidies and Their Reform*. Cambridge University Press.

Slemrod, Joel. 1990. "Optimal taxation and optimal tax systems." *Journal of Economic Perspectives* 4(1):157–178.

Springborg, Robert. 2013. "GCC Countries as 'Rentier States' Revisited." *The Middle East Journal* 67(2):301–309.

The World Bank. 2019. "World Development Indicators.". http://wdi.worldbank.org (accessed June 1, 2019).

Tsui, Kevin K. 2011. "More oil, less democracy: Evidence from worldwide crude oil discoveries." *The Economic Journal* 121(551):89–115.

Vagliasindi, Maria. 2012. "Implementing Energy Subsidy Reforms." *Washington, DC: World Bank* .

Victor, David G. 2009. "The Politics of Fossil-fuel Subsidies.". SSRN 1520984.

Wagner, Armin. 2013. "International fuel prices 2012/2013." *Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH* .

Ward, Hugh and Xun Cao. 2012. "Domestic and international influences on green taxation." *Comparative Political Studies* 45(9):1075–1103.

Author biographies

Paasha Mahdavi is an assistant professor of political science and environmental science and management at the University of California, Santa Barbara. Cesar B. Martinez-Alvarez is a Ph.D. candidate in political science at the University of California, Los Angeles. Michael L. Ross is a professor of political science at the University of California, Los Angeles.

Supporting Information

Why Do Governments Tax or Subsidize Fossil Fuels?

To be published as Online Appendix

Contents

1 Supplementary Data Description

1.1 Data collection methods

1.1.1 Selection of dates and grades

For countries with data reported more frequently than monthly intervals (daily, weekly or bi-weekly), we used the price from the first day or week of the month as the monthly price. When data on multiple gasoline grades were available we use regular-graded gasoline (typically between 87 and 90 octane) to reflect the type most likely to be purchased by the average consumer. In countries where the availability of grades changes over time we selected the grade with the longest coverage. When data were available for different parts of a country we selected the region that includes the capital city.

1.1.2 Converting local currencies

To convert local currencies to US dollars we use monthly exchange rates from the IMF International Financial Statistics. For converting from nominal to real 2015 US dollars we use monthly inflation rates from the US Federal Reserve Economic Database (FRED) Consumer Price Index for All Urban Consumers: All Items Less Food and Energy (CPILFESL) series. In countries that experienced currency changes or revaluations—for example, Romania (July 2005), Turkey (January 2005), Ghana (August 2007)—all prices have been back-converted to the more recent currency price. For example, the Turkish lira was revalued in January 2005 by dividing by 1,000,000 to usher in the 'Second Turkish lira'. All pre-2005 prices are thus divided by 1,000,000 to be in Second Turkish lira per litre.

1.1.3 Benchmark prices

To estimate net fuel taxes and subsidies we compute the gap between the local price and the international benchmark price, less a small adjustment to account for distribution costs. To simplify our analysis we assume local distribution costs are fixed for all countries and years at 10 US cents per litre in constant 2015 US dollars; this estimate is drawn from ref. 19, which uses a similar figure for the cost of bringing refined gasoline to retailers. Though distribution and other local costs may vary by location, we expect those unobserved differences to change slowly, and thus may affect cross-country comparisons but not within-country comparisons over time.

For our benchmark we use the spot price for conventional refined gasoline at the New York Harbor as reported by the US Energy Information Administration. For oil-importing countries, the benchmark price represents the marginal cost of supplying gasoline to consumers. For oil-producing countries, who in many cases can supply gasoline to their citizens at a lower cost, the difference between the retail price and the benchmark represents the opportunity cost to the government: if it sets a retail price below the international benchmark, it is forgoing revenue it would otherwise accrue by selling its gasoline at a market price. In both cases we treat the difference between the retail price and the benchmark as the net tax or subsidy.

1.1.4 Start and end dates

Six-month averages for 2003 ('first half 2003') and 2015 ('first half 2015') are computed using prices for January through June, where available. In countries where one or several of these months are missing, we instead use the average price for the non-missing months.

1.1.5 Consumption weighting

We weight net gasoline taxes and subsidies by consumption using data on annual motor gasoline consumption from the US Energy Information Agency International Energy Statistics. A weight wit is given by a country's consumption share, calculated as the total consumption by each country i divided by total global consumption in month t (assuming constant consumption share across all 12 months in a given year). A global consumption-weighted mean net tax is then given by

$$tax_t = (\sum_{i=1}^{N} w_{it} price_{it}) - benchmark_t$$

at each month t. The most recent Energy Information Administration data on motor gasoline consumption are from 2012; we extrapolate consumption shares up to 2015 by assuming that shares (but not consumption) remain fixed across the 2012–2015 period.

1.1.6 Implemented versus announced prices

We measure only gasoline taxes and subsidies that are implemented at the pump rather than those that are announced or decreed by governments. This choice reflects our focus on fuel costs that are directly incurred by consumers. As such, our measures are based on posted prices; we do not rely on prices that are announced by government in media outlets or press releases but never posted in practice.

1.2 Comparison of Different Data Sources to Measure Climate Policy

One of the main challenges of the literature on climate change politics is the conceptualization and measurement of progress on the enactment of policies to mitigate greenhouse gas (Mildenberger, 2020, 8-13). There are multiple ways to approximate this concept, including the ratification of international environmental treaties, changes in the carbon intensity of the economy, and the number of climate change laws enacted by a particular government. Although no single measure fully captures the extent to which governments have effectively addressed the climate crisis, we argue that the main outcome variable of this paper—the net implicit tax on gasoline—offers some key advantages over similar measures on three criteria: (a) comparability across countries, (b) geographic and temporal coverage, and (c) government intent.

First, cross-country comparability refers to the extent to which the policy output / outcome reflects a similar underlying phenomenon in different jurisdictions. Even policies that are nominally identical can have quite different consequences in terms of carbon emissions abatement depending on their design or implementation. For example, carbon taxes across the world vary in terms of the price and sectors covered. Whereas some are more than USD100, many others are equivalent to only a few dollars (The World Bank, 2021). Moreover, even taxes set at the same price can have heterogeneous effects if some crucial sectors are excluded from them (as it occurs in many countries with powerful industrial lobbies). Hence, more appropriate comparisons would require to clearly specify the effective carbon tax imposed on a specific sector, which becomes much more demanding in terms of data requirements. National climate plans and strategies represent another example of a nominally identical policy that may not be comparable across countries. These documents vary considerably in terms of their content, the specificity of their policies, emissions targets, and institutional framework to enforce them (Grantham Research Institute on Climate Change and the Environment, 2021).

Some of the existing variables fare relatively well regarding this criteria. For example, feed-in tariffs are usually quite standard in terms of their design and implementation; therefore, as they tend to be more homogeneous, they are also more suitable for cross-country comparisons. However, measures like these tend to be binary (a country either has the policy or it does not), which complicates making more nuanced inferences. In contrast, our outcome variable measures a very specific quantity (the tax or subsidy) on a good that is essentially identical across countries. Although there are some variations in the refining process and the transportation costs, the life cycle of gasoline, its primary uses, its macroeconomic and household-level relevance, and its effects on the global climate are homogeneous across countries, which improves the comparability of this variable with respect to other options to measure climate policy.

The second criteria we can employ to compare different measures of climate policy is coverage, in both geographic and temporal terms. Geographically, some fine-grained variables are only available for a handful of countries. For example, the OECD compiles data on the average explicit carbon taxation for different fuels, ranging from coal to biofuels, natural gas, and gasoline; although this is a direct measure of the extent to which governments are willing to impose costs on some key sources of carbon emissions, the data is not available for most non-OECD countries (Organization for Economic Cooperation and Development, 2019). Temporarily, some variables that have full geographic coverage are only available for a few years—for example the prices of diesel (The World Bank, 2019). This makes more difficult to test fine-grained hypotheses about the role of political variables, such as the timing of elections. In contrast, our measure is available for 156 countries from 2003 to 2015 at the country-month level, which provides full geographic and temporal coverage.

Finally, the third criteria to evaluate different measures of climate policy is government intent, or the extent to which the variable addresses an explicit action by a state actor. Variables like the share of renewable energy sources in the electricity mix, the carbon intensity of the economy, and the amount of greenhouse gas emissions per capita do measure progress in carbon pollution mitigation; however, they measure phenomena other than direct government action, such as changes in the cost of technology, macroeconomic structural conditions, among many others. Although it is clear that governments incentivize reductions in greenhouse gas emissions per capita through a wide array of policies, the causal process is confounded by many other variables that also affect the outcome. In contrast, our main variable of interest directly measures a specific action implemented by government—the gap between the benchmark and the retail price of fuel—on gasoline—the consumption of which is one of the leading drivers of carbon dioxide emissions.

Finally, it is important to mention that, despite the previous advantages, our outcome has some limitations. In particular, it addresses only one source of carbon pollution: emissions from the consumption of fossil fuels for transportation. The other key sources are the electricity sector, industry, residential, and land use, which we do not capture with the net implicit tax on gasoline.

In summary, measuring progress in greenhouse gas emissions mitigation is crucial in the literature on climate change politics. Although no variable will perfectly capture the extent to which governments are committed to address the climate crisis, we argue that our main outcome variable offers a balanced assessment of this concept. First, this measure is directly comparable across countries. Second, the data has full geographic and temporal coverage at the country-month level, for the period 2003-2015. Third, it addresses directly an action undertaken by governments on an issue that is meaningful to reduce emissions. In the end, the net implicit tax on gasoline reveals how much governments are willing to impose costs on goods (gasoline) and activities (driving) that are directly responsible for carbon pollution.

1.3 Sample, variable descriptions, and protest data

Table S1: **List of countries and monthly observations used in the analysis.**

Country	Start Date	End Date	Monthly Obs.
Afghanistan	Mar 2004	Jun 2015	126
Albania	Jul 2008	Jun 2015	79
Algeria	Jan 2003	Jun 2015	150
Angola	Jan 2003	Jun 2015	150
Argentina	Jan 2003	Jun 2015	150
Armenia	Jan 2003	Mar 2015	138
Australia	Jan 2003	Jun 2015	150
Austria	Jan 2003	Jun 2015	150
Azerbaijan	Jan 2003	Jun 2015	150
Bahrain	Jan 2003	Jun 2015	150
Bangladesh	Jan 2003	Jun 2015	150
Belarus	Sep 2006	Jun 2015	106
Belgium	Jan 2003	Jun 2015	150
Belize	Jan 2003	Feb 2015	146
Benin	Jan 2003	Jun 2015	138
Bolivia	Jan 2003	Jun 2015	150
Bosnia and Herzegovina	Jan 2003	Jun 2015	150
Botswana	Jan 2003	Jun 2015	150
Brazil	Jan 2003	Jun 2015	150
Bulgaria	Jan 2003	Jun 2015	150
Burkina Faso	Jan 2003	Jun 2015	150
Burundi	Jan 2003	Jun 2015	140
Cambodia	Jan 2003	Mar 2015	146
Cameroon	Jan 2003	Jun 2015	132
Canada	Jan 2003	Jun 2015	150
Central African Republic	Jan 2003	Jun 2015	130
Chad	Jan 2003	Jun 2015	150
Chile	Jan 2003	Jun 2015	150
China	Jan 2003	Jun 2015	150
Colombia	Jan 2003	Jun 2015	150
Congo	Jan 2003	Jun 2015	146
Congo, Dem Rep	Jan 2003	Jun 2015	150
Costa Rica	Jan 2003	Jun 2015	150
Cote d'Ivoire	Jan 2003	Jun 2015	137
Croatia	Jan 2003	Jun 2015	150
Cyprus	May 2004	Jun 2015	134
Czech Republic	Jan 2003	Jun 2015	150
Denmark	Jan 2003	Jun 2015	150

Country	**Start Date**	**End Date**	**Monthly Obs.**
Dominican Republic	Jan 2003	Jun 2015	143
Ecuador	Jan 2003	Jun 2015	150
Egypt	Jan 2003	Jun 2015	150
El Salvador	Jan 2004	Jun 2015	138
Equatorial Guinea	Jan 2003	Jun 2015	150
Estonia	Jan 2003	Jun 2015	150
Ethiopia	Jan 2003	Jun 2015	150
Finland	Jan 2003	Jun 2015	150
France	Jan 2003	Jun 2015	150
Gabon	Jan 2003	Jun 2015	150
Gambia	Jan 2003	Jun 2015	144
Georgia	Jul 2008	Jun 2015	84
Germany	Jan 2003	Jun 2015	150
Ghana	Jan 2003	Jun 2015	149
Greece	Jan 2003	Jun 2015	150
Guatemala	Jan 2003	Jun 2015	150
Guinea	Jan 2005	Jun 2015	126
Guinea-Bissau	Jan 2003	Apr 2015	86
Guyana	Jan 2003	Jun 2015	150
Haiti	Jan 2003	Jun 2015	150
Honduras	Jan 2003	Jun 2015	150
Hungary	Jan 2003	Jun 2015	146
India	Jan 2003	Jun 2015	150
Indonesia	Jan 2003	Jun 2015	150
Iran	Jan 2003	Jun 2015	150
Iraq	Jan 2003	Jun 2015	150
Ireland	Jan 2003	Jun 2015	150
Israel	Jan 2003	Jun 2015	150
Italy	Jan 2003	Jun 2015	150
Jamaica	Feb 2004	Jun 2015	134
Japan	Jan 2003	Jun 2015	150
Jordan	Jan 2003	Jun 2015	150
Kazakhstan	Jul 2009	Jun 2015	72
Kenya	Jan 2003	Jun 2015	150
Kuwait	Jan 2003	Jun 2015	150
Kyrgyzstan	Jan 2003	Jun 2015	150
Laos	Jan 2003	Jun 2015	150
Latvia	Jan 2003	Jun 2015	150
Lebanon	Jan 2003	Jun 2015	150
Lesotho	Jan 2004	Jun 2015	136
Liberia	Jul 2008	Mar 2015	74
Libya	Jan 2003	Jun 2015	150
Lithuania	Jan 2003	Jun 2015	150

Country	Start Date	End Date	Monthly Obs.
Luxembourg	Jan 2003	Jun 2015	150
Macedonia	Apr 2006	Jun 2015	111
Madagascar	Jan 2003	Jun 2015	150
Malawi	Jan 2003	Jun 2015	150
Malaysia	Jan 2003	Jun 2015	150
Mali	Jan 2003	Jun 2015	149
Malta	Jun 2004	Jun 2015	133
Mauritania	Jan 2003	Jun 2015	142
Mauritius	Jan 2003	Jun 2015	150
Mexico	Jan 2003	Jun 2015	150
Moldova	Jan 2003	Jun 2015	150
Mongolia	Jan 2003	Jun 2015	150
Montenegro	Jul 2006	Jun 2015	108
Morocco	Jan 2003	Jun 2015	150
Mozambique	Feb 2003	Jun 2015	149
Myanmar	Jan 2003	Jul 2014	139
Namibia	Jan 2003	Jun 2015	146
Nepal	Jan 2003	Jun 2015	150
Netherlands	Jan 2003	Jun 2015	150
New Zealand	Jan 2003	Jun 2015	150
Nicaragua	Jan 2003	Jun 2015	150
Niger	Jan 2003	Jun 2015	150
Nigeria	Jan 2003	Jun 2015	150
Norway	Jan 2003	Jun 2015	150
Oman	Jan 2003	Jun 2015	150
Pakistan	May 2006	Jun 2015	109
Panama	Jan 2003	Jun 2015	150
Papua New Guinea	Jan 2003	Apr 2015	112
Paraguay	Jan 2003	Jun 2015	150
Peru	Jan 2003	Jun 2015	150
Philippines	Jan 2003	Jun 2015	150
Poland	May 2004	Jun 2015	134
Portugal	Jan 2003	Jun 2015	150
Qatar	Jan 2003	Jun 2015	150
Romania	Jan 2003	Jun 2015	150
Russia	Jan 2003	Jun 2015	150
Rwanda	Jan 2003	Jun 2015	150
Saudi Arabia	Jan 2003	Jun 2015	150
Senegal	Jan 2003	Jun 2015	144
Serbia	Jan 2003	Jun 2015	150
Sierra Leone	Jan 2003	Jun 2015	144
Singapore	Jan 2003	Jun 2015	150
Slovakia	Jun 2004	Jun 2015	133

Country	Start Date	End Date	Monthly Obs.
Slovenia	Jan 2003	Jun 2015	150
Somalia	Jan 2003	Jun 2015	146
South Africa	Jan 2003	Jun 2015	150
South Korea	Jan 2003	Jun 2015	150
Spain	Jan 2003	Jun 2015	150
Sri Lanka	Jan 2003	Jun 2015	150
Sudan	Jan 2003	Jun 2015	150
Suriname	Jan 2003	Jun 2015	150
Swaziland	Jan 2003	Jun 2015	150
Sweden	Jan 2003	Jun 2015	150
Switzerland	Jan 2003	Jun 2015	150
Syria	Jan 2003	Jun 2015	150
Taiwan	Jan 2003	Jun 2015	150
Tajikistan	Jan 2003	Jun 2015	150
Tanzania	Jan 2003	Jun 2015	150
Thailand	Jan 2003	Jun 2015	150
Timor-Leste	Jan 2003	Jun 2015	150
Togo	Jan 2003	Jun 2015	150
Trinidad & Tobago	Jan 2003	Jun 2015	150
Tunisia	Jul 2005	Jun 2015	112
Turkey	Jan 2003	Jun 2015	150
UAE	Jan 2003	Jun 2015	150
Uganda	Jan 2003	Jun 2015	141
Ukraine	Mar 2003	Jun 2015	148
United Kingdom	Jan 2003	Jun 2015	150
United States	Jan 2003	Jun 2015	150
Uruguay	Jan 2003	Jun 2015	150
Uzbekistan	Oct 2008	Jun 2015	81
Venezuela	Jan 2003	Jun 2015	150
Viet Nam	Jan 2003	Jun 2015	150
Yemen	Jan 2003	Jun 2015	150
Zambia	Jan 2003	Jun 2015	150
Zimbabwe	Feb 2009	Jun 2015	76

Table S2: **Variable list, descriptions, and data sources.**

Variable	Description	Source
Net Gasoline Tax	Net tax estimated using the "gap" approach, which is the difference between the local price and the benchmark	Ross, Hazlett and Mahdavi (2017)
Fuel Exports Dependence	Exports of mineral fuels as percentage of total merchandise	The World Bank (2019)
Oil and Gas Income Dependence	Total oil and gas income as percentage of GDP	Ross (2013), The World Bank (2019)
GNI Per Capita (Atlas)	Gross national income per capita converted to U.S. dollars using the Atlas method	The World Bank (2019)
GDP Per Capita PPP	Gross domestic product per capita based on purchashing power parity	The World Bank (2019)
Electoral Democracy	Index including information on freedom of association, clean elections, freedom of expression, elected officials, and suffrage	Coppedge et al. (2019)
Polity IV	Polity IV Score from a -10 to 10 range	Marshall, Jaggers and Gurr (2011)
Democracy	Dichotomous measure of democracy based on Robert Dahl's elements of contestation and participation	Boix, Miller and Rosato (2013)
NOC	Presence of an upstream national oil company	Mahdavi (2020)
Influential NOC	Presence of an upstream national oil company completely owned by the state and with production capacity	Mahdavi (2020)
Central Gov Debt	Total stock of debt liabilities issued by a country's central government as a percent of gross national product	International Monetary Fund (2019*a*)
Car Ownership	Number of motor vehicles per capita	The World Bank (2019)
VAT	Value-added Tax Rate	International Monetary Fund (2019*b*)
Region World Bank	Regional categories as defined by the World Bank	The World Bank (2019)
Fuel Exports Per Capita	Value of total oil and gas exports per capita in USD	Ross (2013)
Oil Endowment	Natural log of the total endowment of oil in millions of barrels divided by the population in 1960	Tsui (2011) cited by Cassidy (2018)
Convergent C-C mechanical area	Natural log of the total sovereign area covered by convergent C-C mechanical basin	Cassidy (2018)
Time Before/After Elections	1-4 quarters before and after executive-level elections	Hyde and Marinov (2015)
Time Before/After Leader Turnover	1-4 quarters before and after the regular turnover of executive leaders (excludes any irregular mechanisms such as coups)	Goemans, Gleditsch and Chiozza (2009)
Time Before/After Oil Discoveries	1-4 quarters before and after the discovery of major oil fields	Arezki, Ramey and Sheng (2017)
Diesel Prices	Pump price for diesel fuel in USD per liter	The World Bank (2019)
Diesel Benchmark Price	Spot price for Ultra Low Sulfur CARB Diesel at the Los Angeles port in USD per liter	Energy Information Administration (2019*c*)
Global Oil Price	Cushing OK WTI Spot Price FOB Annual in USD per barrel	Energy Information Administration (2019*a*)
Gasoline Benchmark Price	Spot price for conventional refined gasoline at the New York City port (Brent crude blend) in USD per liter	Energy Information Administration (2019*b*)

Table S3: **Country list of states experiencing protests over fuel prices, 2007–2019.**

Country	Date	Source.
Bolivia	Dec 2010	Ortiz et al. (2013)
Brazil	May 2018	Cowie and Phillips (2019)
Burkina Faso	Feb 2008	Ortiz et al. (2013)
Burkina Faso	Nov 2018	(2018)
Cameroon	Feb 2008	Ortiz et al. (2013)
Cameroon	Dec 2008	(2008)
China	Apr 2011	Ortiz et al. (2013)
Cote d'Ivoire	Apr 2008	Ortiz et al. (2013)
Chile	Dec 2010	Ortiz et al. (2013)
Chile	Aug 2011	Ortiz et al. (2013)
Ecuador	Oct 2019	Cabrera and Krauss (2019)
France	Nov 2018	Rubin (2018)
India	Jun 2010	Ortiz et al. (2013)
India	May 2012	Ortiz et al. (2013)
India	Sep 2012	Ortiz et al. (2013)
India	Jun 2013	Ortiz et al. (2013)
Indonesia	May 2008	Ortiz et al. (2013)
Indonesia	Apr 2012	Ortiz et al. (2013)
Iran	Nov 2019	Fassihi and Gladstone (2019)
Jordan	Nov 2012	Ortiz et al. (2013)
Jordan	March 2013	(2013*a*)
Mexico	Jan 2017	Agren (2017)
Mozambique	Feb 2008	Ortiz et al. (2013)
Mozambique	Sep 2010	Ortiz et al. (2013)
Myanmar	Aug 2007	(2007)
Nigeria	Jan 2012	Ortiz et al. (2013)
Sudan	Sep 2013	(2013*b*)
Uganda	Apr 2011	Ortiz et al. (2013)
Yemen	Aug 2014	(2014)

1.4 Theoretical expectations and measures

Theory	**Measures**	**Results**
Fiscal politics:		
Fuel tax policy dictated by macroeconomic factors that affect government revenues	• Fossil fuel dependence • Income per capita • Central government debt	• Fuel dependence is associated with lower net fuel tax levels and declines in net fuel taxes • Income per capita has expected U-shaped correlation with fuel taxes; little relation between income and net tax changes • Higher debt relates to higher net taxes, but findings not robust
Democratic institutions:		
Democratic accountability and bureaucratic effectiveness promote higher fuel taxes	• Democracy • Government effectiveness • Elections and leadership changes	• No statistical relationship between fuel taxes and democracy, government effectiveness, or elections and other leadership changes after controlling for macroeconomic factors.
Domestic political economy:		
Fuel tax reforms driven by interactions between windows of opportunity, constraints, and organization of political interests	• Residuals from fully-specified models with country fixed effects • Identifying interests, coalitions, circumstantial conditions with case studies	• 80% of intertemporal variation in tax changes is not associated with modeled factors • Consistent with prior findings that reforms are driven by unique configurations of actors whose interests and strategies shift over time

2 Supplementary Tables: Gasoline models

2.1 Cross-Sectional models

Table S4: **Bivariate relationships between Regime Type and Fossil Fuel Taxes.**

	Dependent variable:				
	Net Gasoline Tax				
	(1)	(2)	(3)	(4)	(5)
Polity IV (continuous)	0.044^{***}				
	(0.005)				
Autocracy (Polity IV)		-0.537^{***}			
		(0.097)			
Democracy (Polity IV)			0.449^{***}		
			(0.070)		
Electoral Democracy (V-DEM)				1.116^{***}	
				(0.122)	
Democracy (Boix et al.)					0.488^{***}
					(0.074)
Constant	0.312^{***}	0.547^{***}	0.238^{***}	-0.121	0.205^{***}
	(0.039)	(0.040)	(0.052)	(0.074)	(0.056)
Observations	153	153	153	154	156
R^2	0.294	0.123	0.214	0.342	0.232
Adjusted R^2	0.290	0.117	0.209	0.337	0.227
Note: Robust SE			*p<0.1; **p<0.05; ***p<0.01		

Table S5: **Cross-sectional models: Additional controls.** Here we add political and economic controls to the baseline model in main text Table 1. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	−0.939***	−0.946***	−0.946***	−0.540**
	(0.181)	(0.188)	(0.188)	(0.206)
log(GNI Per Capita Sq)	0.061***	0.060***	0.060***	0.037***
	(0.011)	(0.012)	(0.012)	(0.013)
Fossil Fuel Dependence	−0.016***	−0.013**	−0.013**	−0.013***
	(0.004)	(0.005)	(0.005)	(0.005)
Central Government Debt	0.002**	0.001*	0.001*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		−0.116	−0.116	−0.036
		(0.104)	(0.104)	(0.108)
Fossil Fuel Dependence * Autocracy		−0.002	−0.002	−0.00005
		(0.009)	(0.009)	(0.006)
Government Effectiveness		0.044	0.044	0.010
		(0.079)	(0.079)	(0.079)
European Union				−0.050
				(0.116)
Latitude				0.0003
				(0.002)
Landlocked				−0.005
				(0.052)
Asia + Pacific				−0.005
				(0.112)
Europe + North America				0.105
				(0.173)
Former USSR				−0.272*
				(0.147)
Latin America + Caribbean				−0.233***
				(0.089)
Middle East				−0.347***
				(0.124)
Value-Added Tax Rate	0.042***	0.040***	0.040***	0.036***
	(0.005)	(0.005)	(0.005)	(0.008)
Constant	3.328***	3.490***	3.490***	1.921**
	(0.750)	(0.746)	(0.746)	(0.827)
Observations	139	136	136	136
R^2	0.673	0.684	0.684	0.750
Adjusted R^2	0.660	0.664	0.664	0.716
Note: Robust SE				*p<0.1; **p<0.05; ***p<0.01

Table S6: **Cross-sectional models: Alternative measures of regime type.** Here we use the Boix-Miller-Rosato measure of democracy instead of the Polity IV measure used in the main text. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.939^{***}	-0.920^{***}	-0.920^{***}	-0.476^{***}
	(0.181)	(0.191)	(0.191)	(0.194)
log(GNI Per Capita Sq)	0.061^{***}	0.058^{***}	0.058^{***}	0.033^{***}
	(0.011)	(0.012)	(0.012)	(0.012)
Fossil Fuel Dependence	-0.016^{***}	-0.014^{**}	-0.014^{**}	-0.015^{***}
	(0.004)	(0.005)	(0.005)	(0.005)
Central Government Debt	0.002^{**}	0.002^{**}	0.002^{**}	0.001^{*}
	(0.001)	(0.001)	(0.001)	(0.001)
BMR Democracy		0.100	0.100	0.042
		(0.074)	(0.074)	(0.090)
Fossil Fuel Dependence		0.005	0.005	0.007
* BMR Democracy		(0.011)	(0.011)	(0.010)
Government Effectiveness		0.031	0.031	−0.005
		(0.078)	(0.078)	(0.078)
European Union				−0.030
				(0.113)
Latitude				0.001
				(0.002)
Landlocked				0.001
				(0.051)
Asia + Pacific				−0.040
				(0.103)
Europe + North America				0.053
				(0.163)
Former USSR				-0.300^{***}
				(0.138)
Latin America + Caribbean				-0.266^{**}
				(0.108)
Middle East				-0.354^{***}
				(0.124)
Value-Added Tax Rate	0.042^{***}	0.040^{***}	0.040^{***}	0.035^{***}
	(0.005)	(0.005)	(0.005)	(0.007)
Observations	139	139	139	139
Adjusted R^2	0.660	0.664	0.664	0.717

Note: Robust SE *p<0.1; **p<0.05; ***p<0.01

Table S7: **Cross-sectional models: Alternative measures of regime type.** Here we use the V-DEM measure of electoral democracy instead of the Polity IV measure used in the main text. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.939^{***}	-0.936^{***}	-0.936^{***}	-0.541^{***}
	(0.181)	(0.189)	(0.189)	(0.194)
log(GNI Per Capita Sq)	0.061^{***}	0.059^{***}	0.059^{***}	0.037^{***}
	(0.011)	(0.012)	(0.012)	(0.012)
Fossil Fuel Dependence	-0.016^{***}	-0.014^{*}	-0.014^{*}	-0.014^{**}
	(0.004)	(0.008)	(0.008)	(0.007)
Central Government Debt	0.002^{**}	0.002^{**}	0.002^{**}	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Electoral Democracy		0.228	0.228	0.146
		(0.199)	(0.199)	(0.254)
Fossil Fuel Dependence		0.003	0.003	0.003
* Electoral Democracy		(0.016)	(0.016)	(0.015)
Government Effectiveness		0.028	0.028	−0.007
		(0.080)	(0.080)	(0.080)
European Union				−0.061
				(0.120)
Latitude				0.0003
				(0.002)
Landlocked				−0.004
				(0.050)
Asia + Pacific				−0.001
				(0.109)
Europe + North America				0.108
				(0.165)
Former USSR				-0.264^{*}
				(0.145)
Latin America + Caribbean				-0.257^{***}
				(0.091)
Middle East				-0.316^{**}
				(0.140)
Value-Added Tax Rate	0.042^{***}	0.039^{***}	0.039^{***}	0.035^{***}
	(0.005)	(0.006)	(0.006)	(0.008)
Observations	139	137	137	137
Adjusted R^2	0.660	0.663	0.663	0.719

Note: Robust SE *p<0.1; **p<0.05; ***p<0.01

Table S8: **Cross-sectional models: Alternative measures of regime type.** Here we use the continuous version of the Polity IV score instead of the binary variable used in the main text. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.939^{***}	-0.977^{***}	-0.977^{***}	-0.551^{***}
	(0.181)	(0.194)	(0.194)	(0.198)
log(GNI Per Capita Sq)	0.061^{***}	0.061^{***}	0.061^{***}	0.037^{***}
	(0.011)	(0.012)	(0.012)	(0.013)
Fossil Fuel Dependence	-0.016^{***}	-0.011^{**}	-0.011^{**}	-0.013^{**}
	(0.004)	(0.005)	(0.005)	(0.005)
Central Government Debt	0.002^{**}	0.002^{**}	0.002^{**}	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Polity IV		0.010	0.010	0.004
		(0.007)	(0.007)	(0.008)
Fossil Fuel Dependence		−0.00001	−0.00001	−0.00002
* Polity IV		(0.001)	(0.001)	(0.001)
Government Effectiveness		0.043	0.043	0.006
		(0.081)	(0.081)	(0.080)
European Union				−0.051
				(0.119)
Latitude				0.0004
				(0.002)
Landlocked				−0.005
				(0.052)
Asia + Pacific				−0.006
				(0.106)
Europe + North America				0.092
				(0.173)
Former USSR				-0.280^{*}
				(0.143)
Latin America + Caribbean				-0.243^{***}
				(0.090)
Middle East				-0.339^{***}
				(0.129)
Value-Added Tax Rate	0.042^{***}	0.039^{***}	0.039^{***}	0.036^{***}
	(0.005)	(0.005)	(0.005)	(0.008)
Observations	139	136	136	136
Adjusted R^2	0.660	0.666	0.666	0.717
Note: Robust SE		*p<0.1; **p<0.05; ***p<0.01		

Table S9: **Cross-sectional models: Alternative measure of region.** Here we use the World Bank measure of regional categories instead of the measure used in the main text. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.939^{***}	-0.946^{***}	-0.946^{***}	-0.724^{***}
	(0.181)	(0.188)	(0.188)	(0.216)
log(GNI Per Capita Sq)	0.061^{***}	0.060^{***}	0.060^{***}	0.049^{***}
	(0.011)	(0.012)	(0.012)	(0.014)
Fossil Fuel Dependence	-0.016^{***}	-0.013^{**}	-0.013^{**}	-0.013^{***}
	(0.004)	(0.005)	(0.005)	(0.005)
Central Government Debt	0.002^{**}	0.001^{*}	0.001^{*}	0.001^{*}
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		−0.116	−0.116	−0.096
		(0.104)	(0.104)	(0.154)
Fossil Fuel Dependence		−0.002	−0.002	−0.002
* Autocracy (Polity IV)		(0.009)	(0.009)	(0.009)
Government Effectiveness		0.044	0.044	0.030
		(0.079)	(0.079)	(0.087)
European Union				−0.045
				(0.123)
Latitude				0.0003
				(0.002)
Landlocked				−0.027
				(0.060)
Europe + Central Asia				0.019
				(0.181)
Latin America + Caribbean				−0.207
				(0.139)
Middle East + North Africa				-0.345^{**}
				(0.127)
North America				-0.452^{***}
				(0.152)
South Asia				−0.071
				(0.132)
Sub-Saharan Africa				0.035
				(0.151)
Value-Added Tax Rate	0.042^{***}	0.040^{***}	0.040^{***}	0.031^{***}
	(0.005)	(0.005)	(0.005)	(0.008)
Observations	139	136	136	136
Adjusted R^2	0.660	0.664	0.664	0.697
Note: Robust SE		*p<0.1; **p<0.05; ***p<0.01		

Table S10: **Cross-sectional models: National oil companies.** Here we add measures to control for the presence of national oil companies (NOCs). See Table S2 for variable descriptions; compare to results in Table S5. Note that while the political institutions variables remain statistically indistinguishable from zero, the fossil fuel dependence coefficients are now attenuated and no longer statistically significant. This is likely the result of post-treatment bias when including NOCs alongside a measure of oil wealth, which prior work identifies as central to government decisions to nationalize the sector (Jones Luong and Weinthal, 2006; Guriev, Kolotilin and Sonin, 2011; Mahdavi, 2020).

	Dependent variable:		
	Net Gasoline Tax		
	(1)	(2)	(3)
log(GNI Per Capita)	-0.834^{***}	-0.808^{***}	-0.841^{***}
	(0.198)	(0.171)	(0.195)
log(GNI Per Capita Sq)	0.052^{***}	0.052^{***}	0.053^{***}
	(0.013)	(0.011)	(0.013)
Fossil Fuel Dependence	-0.008	-0.007	-0.009^{*}
	(0.005)	(0.005)	(0.005)
Central Government Debt	0.002^{**}	0.001	0.002^{*}
	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)	-0.053	-0.018	-0.050
	(0.095)	(0.085)	(0.099)
Fossil Fuel Dependence * Autocracy	-0.004	-0.006	-0.004
	(0.008)	(0.008)	(0.008)
Government Effectiveness	0.071	0.053	0.054
	(0.078)	(0.069)	(0.078)
National Oil Company (Mahdavi)	-0.139^{**}		
	(0.064)		
Influential National Oil Company (Mahdavi)		-0.293^{***}	
		(0.094)	
National Oil Company (Cheon et al.)			-0.146^{**}
			(0.073)
Value-Added Tax Rate	0.039^{***}	0.037^{***}	0.040^{***}
	(0.005)	(0.005)	(0.005)
Observations	134	134	136
Adjusted R^2	0.678	0.706	0.677
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01		

Table S11: **Cross-sectional models: Motorization rate.** Here we add a measure to control for the number of cars per capita, which plausibly represents the size of the constituency benefiting directly from fuel subsidies. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-1.046^{***}	-1.061^{***}	-1.061^{***}	-0.746^{***}
	(0.204)	(0.218)	(0.218)	(0.249)
log(GNI Per Capita Sq)	0.071^{***}	0.070^{***}	0.070^{***}	0.054^{***}
	(0.013)	(0.015)	(0.015)	(0.017)
Fossil Fuel Dependence	-0.026^{***}	-0.022^{***}	-0.022^{***}	-0.022^{***}
	(0.005)	(0.007)	(0.007)	(0.006)
Central Government Debt	0.001^{*}	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		−0.108	−0.108	−0.069
		(0.094)	(0.094)	(0.116)
Fossil Fuel Dependence * Autocracy		−0.001	−0.001	0.001
		(0.008)	(0.008)	(0.007)
Government Effectiveness		0.052	0.052	0.018
		(0.080)	(0.080)	(0.091)
Motorization Rate	−0.315	−0.376	−0.376	−0.595
	(0.292)	(0.310)	(0.310)	(0.414)
European Union				−0.059
				(0.117)
Latitude				0.001
				(0.002)
Landlocked				−0.002
				(0.059)
Asia + Pacific				−0.056
				(0.108)
Europe + North America				0.078
				(0.194)
Former USSR				−0.201
				(0.185)
Latin America + Caribbean				-0.219^{**}
				(0.100)
Middle East				-0.266^{**}
				(0.128)
Value-Added Tax Rate	0.042^{***}	0.041^{***}	0.041^{***}	0.037^{***}
	(0.005)	(0.005)	(0.005)	(0.007)
Observations	117	114	114	114
Adjusted R^2	0.762	0.769	0.769	0.791

Note: Robust SE $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

2.2 Instrumental Variables models

Table S12: **Instrumental Variables models: Baseline model**. Here we use oil endowment per capita as an instrument for fossil fuel dependence. See Table S2 for variable descriptions and Table S14 for first-stage results.

	Dependent variable:			
	Net Gasoline Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	−0.869***	−1.048***	−1.048***	−0.552**
	(0.205)	(0.234)	(0.234)	(0.258)
log(GNI Per Capita Sq)	0.058***	0.075***	0.075***	0.049***
	(0.012)	(0.015)	(0.015)	(0.016)
Fossil Fuel Dependence	−0.032***	−0.038***	−0.038***	−0.038***
	(0.005)	(0.008)	(0.008)	(0.008)
Central Government Debt	0.001	0.0003	0.0003	−0.0002
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		−0.202	−0.202	−0.109
		(0.163)	(0.163)	(0.160)
Fossil Fuel Dependence * Autocracy		0.011	0.011	0.009
		(0.010)	(0.010)	(0.009)
Government Effectiveness		−0.192*	−0.192*	−0.234**
		(0.099)	(0.099)	(0.103)
European Union				−0.136
				(0.121)
Latitude				0.001
				(0.002)
Landlocked				−0.051
				(0.075)
Asia + Pacific				−0.080
				(0.111)
Europe + North America				−0.099
				(0.185)
Former USSR				−0.441***
				(0.183)
Latin America + Caribbean				−0.415***
				(0.118)
Middle East				−0.399***
				(0.142)
Value-Added Tax Rate	0.034***	0.036***	0.036***	0.038***
	(0.005)	(0.005)	(0.005)	(0.006)
Constant	3.230***	3.512***	3.512***	1.435
	(0.852)	(0.929)	(0.929)	(1.049)
Observations	137	134	134	134
Adjusted R^2	0.587	0.546	0.546	0.612
Note: Robust SE				*p<0.1; **p<0.05; ***p<0.01

Table S13: **Instrumental Variables models: Alternative instrument.** Here we use the spatial distribution of oil-yielding sedimentary basins, following Cassidy 2018, as an instrument for fossil fuel dependence instead of the oil endowment per capita instrument. Compare to results in Table S12. See Table S2 for variable descriptions and Table S14 for first-stage results.

	Dependent variable:		
	Net Gasoline Tax		
	(1)	(2)	(3)
log(GNI Per Capita))	−0.316	−0.373	−0.974***
	(0.392)	(1.088)	(0.366)
log(GNI Per Capita Sq)	0.030	0.100	0.084*
	(0.021)	(0.104)	(0.043)
Fossil Fuel Dependence	−0.060**	−0.190	−0.083
	(0.025)	(0.318)	(0.101)
Central Government Debt	−0.0001	−0.008	−0.001
	(0.002)	(0.017)	(0.004)
Autocracy (Polity IV)		−0.688	−0.260
		(1.192)	(0.374)
Fossil Fuel Dependence * Autocracy		0.061	0.023
		(0.124)	(0.048)
Government Effectiveness		−1.605	−0.530
		(3.006)	(0.864)
log(Land Area PC)	0.045	0.085	0.074
	(0.055)	(0.215)	(0.123)
log(Coastline PC)	0.008	0.055	0.011
	(0.016)	(0.116)	(0.032)
log(Mountainous Area PC)	0.007	0.033	−0.001
	(0.015)	(0.070)	(0.018)
log(Good Soil PC)	−0.053*	−0.150	−0.074
	(0.030)	(0.250)	(0.088)
log(Tropical Area PC)	0.016	0.052	0.023
	(0.016)	(0.079)	(0.029)
Europe/Northern America/Oceania	−0.250	−1.190	
	(0.243)	(2.272)	
Asia	−0.223	−0.512	
	(0.171)	(0.932)	
Latin America/Caribbean	−0.364**	−1.362	
	(0.183)	(2.221)	
Value-Added Tax Rate	0.033***	0.064	0.044***
	(0.009)	(0.051)	(0.011)
Observations	135	132	132
Adjusted R^2	0.357	−3.217	0.024
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01		

Table S14: **Instrumental Variables models: First-stage results.** Results from the first stage of two-stage least squares models, using the oil endowment per capita and oil-yielding sedimentary basins instruments. See Table S2 for variable descriptions.

	Dependent variable:	
	Fossil Fuel Dependence	
	(1)	(2)
Oil Endowment PC 1960	2.357***	
	(0.214)	
Basin Type Area PC 1960		0.660**
		(0.277)
Constant	28.289***	10.110***
	(2.422)	(2.412)
Observations	152	152
R^2	0.558	0.049
Adjusted R^2	0.555	0.043
F Statistic (df = 1; 150)	189.210***	7.725***
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

2.3 Cross-Sectional Time Series models

Table S15: **Cross-section Time-series: Annual Panel**. See Table S2 for variable descriptions.

	Dependent variable:
	Net Gasoline Tax
log(GNI Per Capita)	−0.018
	(0.097)
log(GNI Per Capita Sq)	0.004
	(0.006)
Fossil Fuel Dependence	−0.006***
	(0.002)
Central Government Debt	0.001***
	(0.0003)
Autocracy (Polity IV)	0.096*
	(0.054)
Fossil Fuel Dependence * Autocracy	−0.005
	(0.003)
Government Effectiveness	0.027
	(0.031)
Value-Added Tax Rate	0.019***
	(0.004)
Constant	0.129
	(0.401)
Observations	1,535
Country and Year FE	Y
Adjusted R^2	0.930
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01

A Hausman test comparing the pooled OLS model to a country-year fixed effects model gives an F statistic of 34.9 (p-value < 0.0001), which suggests the fixed effects model may be a better choice over the pooled model. (A second Hausman test gives a χ^2 of 99.97 (p-value < 0.0001), indicating that a random effects model should be rejected in favor of a fixed effects model.) In a pooled model, *GNI per capita, GNI per capita sq, Fossil Fuel Dependence*, and *Central Government Debt* have the same relationships to *Net Gasoline Tax* as they do in the cross-section results in the main text (Table 1 and Figure 5). We also find that *Autocracy* is statistically associated with *Net Gasoline Tax* in the direction hypothesized by prior studies, while *Government Effectiveness* is not. The *Fossil Fuel Dependence*Autocracy* interaction term remains not statistically significant, implying that fossil fuel dependence has similar effects in democracies and autocracies. Note that, as discussed in the main text, once country and year fixed effects are added to the model, most of the variables lose statistical significance at the $p = 0.05$ level (although *Autocracy* remains significant at the $p = 0.10$ level). The exceptions are *Fossil Fuel Dependence*, *VAT*, and *Central Government Debt*, which remain significant in both specifications.

Table S16: **Cross-sectional Time-series: with and without fixed effects**. Compare to Table S15. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
log(GNI Per Capita)	−0.840***	−0.018
	(0.058)	(0.097)
log(GNI Per Capita Sq)	0.055***	0.004
	(0.004)	(0.006)
Oil and Gas Income Dependence	−0.014***	−0.006***
	(0.001)	(0.002)
Central Government Debt	0.001***	0.001***
	(0.0003)	(0.0003)
Autocracy (Polity IV)	−0.151***	0.096*
	(0.040)	(0.054)
Oil and Gas Income Dependence * Autocracy	−0.0004	−0.005
	(0.003)	(0.003)
Government Effectiveness	0.029	0.027
	(0.021)	(0.031)
Value-Added Tax Rate	0.040***	0.019***
	(0.002)	(0.004)
Constant	2.983***	0.129
	(0.235)	(0.401)
Observations	1,535	1,535
Country and Year FE	N	Y
R^2	0.642	0.937
Adjusted R^2	0.640	0.930
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

Table S17: **Cross-sectional time-series models: Alternative measures of regime type.** Here we use the Boix-Miller-Rosato measure of democracy instead of the Polity IV measure used in the main text. Compare to results in Table S15. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
log(GNI Per Capita)	-0.817^{***}	-0.047
	(0.060)	(0.095)
log(GNI Per Capita Sq)	0.053^{***}	0.006
	(0.004)	(0.006)
Fossil Fuel Dependence	-0.014^{***}	-0.010^{***}
	(0.002)	(0.002)
Central Government Debt	0.001^{***}	0.001^{***}
	(0.0003)	(0.0003)
Democracy	0.071^{***}	0.009
	(0.023)	(0.033)
Fossil Fuel Dependence * Democracy	-0.001	0.008^{**}
	(0.003)	(0.004)
Government Effectiveness	0.025	0.043
	(0.021)	(0.030)
Value-Added Tax Rate	0.041^{***}	0.018^{***}
	(0.002)	(0.004)
Constant	2.841^{***}	0.293
	(0.242)	(0.389)
Observations	1,581	1,581
Country and Year FE	N	Y
R^2	0.636	0.938
Adjusted R^2	0.634	0.931
Note: Robust SE	$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$	

Table S18: **Cross-sectional time-series models: Alternative measures of regime type.** Here we use the V-Dem measure of electoral democracy instead of the Polity IV measure used in the main text. Compare to results in Table S15. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
log(GNI Per Capita)	-0.841^{***}	-0.041
	(0.059)	(0.097)
log(GNI Per Capita Sq)	0.054^{***}	0.005
	(0.004)	(0.006)
Fossil Fuel Dependence	-0.014^{***}	-0.011^{***}
	(0.002)	(0.003)
Central Government Debt	0.001^{***}	0.001^{***}
	(0.0003)	(0.0003)
Electoral Democracy	0.173^{***}	0.059
	(0.059)	(0.078)
Fossil Fuel Dependence * Electoral Democracy	-0.0004	0.008
	(0.005)	(0.007)
Government Effectiveness	0.018	0.048
	(0.021)	(0.030)
Value-Added Tax Rate	0.041^{***}	0.018^{***}
	(0.002)	(0.004)
Constant	2.916^{***}	0.259
	(0.237)	(0.394)
Observations	1,561	1,561
Country and Year FE	N	Y
R^2	0.639	0.937
Adjusted R^2	0.637	0.930
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

Table S19: **Cross-sectional time-series models: Alternative measures of regime type.** Here we use the continuous version of the Polity IV index instead of the binary variable used in the main text. Compare to results in Table S15. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
log(GNI Per Capita)	−0.850***	−0.029
	(0.061)	(0.097)
log(GNI Per Capita Sq)	0.055***	0.005
	(0.004)	(0.006)
Fossil Fuel Dependence	−0.014***	−0.007***
	(0.001)	(0.002)
Central Government Debt	0.001***	0.001***
	(0.0003)	(0.0003)
Polity IV (Continuous)	0.008***	−0.003
	(0.002)	(0.003)
Fossil Fuel Dependence * Polity IV (Continuous)	−0.0002	0.0003
	(0.0002)	(0.0002)
Government Effectiveness	0.036*	0.033
	(0.021)	(0.031)
Value-Added Tax Rate	0.041***	0.018***
	(0.002)	(0.004)
Constant	3.009***	0.178
	(0.248)	(0.401)
Observations	1,535	1,535
Country and Year FE	N	Y
R^2	0.639	0.937
Adjusted R^2	0.637	0.930
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

Table S20: **Cross-sectional time-series models: Motorization rate.** Here we add a measure to control for the number of cars per capita, which plausibly represents the size of the constituency benefiting directly from fuel subsidies. Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
log(GNI Per Capita)	-0.962^{***}	-0.230^{*}
	(0.073)	(0.137)
log(GNI Per Capita Sq)	0.062^{***}	0.015^{*}
	(0.005)	(0.008)
Fossil Fuel Dependence	-0.020^{***}	-0.001
	(0.002)	(0.002)
Central Government Debt	0.001^{**}	0.001^{***}
	(0.0003)	(0.0004)
Autocracy (Polity IV)	-0.197^{***}	0.147^{**}
	(0.044)	(0.059)
Fossil Fuel Dependence * Autocracy	0.004	-0.002
	(0.003)	(0.003)
Government Effectiveness	0.082^{***}	-0.004
	(0.025)	(0.036)
Motorization Rate	-0.226^{**}	0.452^{*}
	(0.103)	(0.234)
Value-Added Tax Rate	0.043^{***}	0.015^{***}
	(0.002)	(0.004)
Constant	3.520^{***}	0.983^{*}
	(0.283)	(0.549)
Observations	1,103	1,103
Country and Year FE	N	Y
R^2	0.738	0.961
Adjusted R^2	0.736	0.956
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

Table S21: **Cross-Sectional Time Series (Monthly) with and without fixed effects.** A Hausman test comparing the pooled OLS model to a country-fixed effects model for the monthly panel suggests that the fixed effects model is a better choice ($F = 1,249$). In column 2 we show that included country and year fixed effects causes the R-squared figure to rise from 0.008 to 0.898. We observe a negative relationship between *Oil Discoveries* and *Net Gasoline Tax*, rather than the small positive relationship in the pooled model. The inconsistency of these results leads us to be cautious about drawing inferences about the role of oil discoveries.

	Dependent variable:	
	Net Gasoline Tax	
	(1)	(2)
1 Qr Before Elections	−0.018	0.001
	(0.027)	(0.009)
2 Qr Before Elections	−0.007	0.004
	(0.027)	(0.010)
3 Qr Before Elections	−0.010	0.001
	(0.028)	(0.009)
4 Qr Before Elections	−0.006	0.001
	(0.028)	(0.010)
1 Qr After Elections	−0.005	0.002
	(0.027)	(0.009)
2 Qr After Elections	−0.014	−0.003
	(0.026)	(0.009)
3 Qr After Elections	−0.017	−0.007
	(0.027)	(0.010)
4 Qr After Elections	−0.019	−0.011
	(0.027)	(0.009)
1 Qr After Leader Turnover	0.044	0.010
	(0.047)	(0.015)
2 Qr After Leader Turnover	0.025	0.013
	(0.047)	(0.014)
3 Qr After Leader Turnover	0.032	0.017
	(0.047)	(0.014)
4 Qr After Leader Turnover	0.037	0.008
	(0.048)	(0.014)
Oil Discovery Month	−0.249***	0.041**
	(0.054)	(0.017)
1 Qr After Discovery Month	−0.259***	0.033**
	(0.055)	(0.016)
2 Qr After Discovery Month	−0.293***	0.026*
	(0.054)	(0.015)
3 Qr After Discovery Month	−0.282***	0.016
	(0.055)	(0.015)
4 Qr After Discovery Month	−0.278***	0.023
	(0.057)	(0.016)
Constant	0.503***	0.218***
	(0.004)	(0.015)
Observations	22,124	22,124
Country FE	N	Y
Adjusted R^2	0.008	0.898
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

3 Supplementary Tables: Diesel models

We additionally run all specifications in the main text for models with taxes on diesel fuel instead of gasoline. The same core patterns hold for diesel: a consistent statistical relationship between fuel taxes and income, and between fuel taxes and fossil fuel dependence; the lack of a consistent relationship with political factors; and the importance of unobserved, country-specific factors in the annual panel. Note that we do not run monthly panels here given the lack of infra-annual data on diesel prices.

3.1 Cross-Sectional models

Table S22: **Diesel analysis: cross-sectional base specification.** Compare to results in main text Table 1. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Diesel Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.899^{***}	-0.820^{***}	-0.780^{***}	-0.664^{***}
	(0.163)	(0.150)	(0.145)	(0.146)
log(GNI Per Capita Sq)	0.057^{***}	0.053^{***}	0.050^{***}	0.044^{***}
	(0.010)	(0.009)	(0.009)	(0.009)
Fossil Fuel Dependence		-0.015^{***}		
		(0.003)		
log(Oil and Gas Exports PC)			-0.019^{***}	
			(0.004)	
Fossil Fuel Export Dependence				-0.006^{***}
				(0.001)
Central Government Debt	0.001^{**}	0.001	0.001	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)
Value-Added Tax Rate	0.042^{***}	0.034^{***}	0.035^{***}	0.030^{***}
	(0.004)	(0.004)	(0.004)	(0.004)
Constant	3.101^{***}	2.953^{***}	2.692^{***}	2.433^{***}
	(0.676)	(0.606)	(0.597)	(0.594)
Observations	138	137	137	135
R^2	0.587	0.666	0.656	0.722
Adjusted R^2	0.575	0.653	0.643	0.711

Note: Robust SE *p<0.1; **p<0.05; ***p<0.01

Table S23: **Diesel analysis: cross-sectional full specification.** Compare to results in Table S5. See Table S2 for variable descriptions.

	Dependent variable:			
	Net Diesel Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.820^{***}	-0.891^{***}	-0.891^{***}	-0.439^{***}
	(0.150)	(0.154)	(0.154)	(0.159)
log(GNI Per Capita Sq)	0.053^{***}	0.058^{***}	0.058^{***}	0.031^{***}
	(0.009)	(0.010)	(0.010)	(0.010)
Fossil Fuel Dependence	-0.015^{***}	-0.014^{***}	-0.014^{***}	-0.013^{***}
	(0.003)	(0.004)	(0.004)	(0.004)
Central Government Debt	0.001	0.0002	0.0002	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		-0.155^{**}	-0.155^{**}	−0.122
		(0.078)	(0.078)	(0.077)
Fossil Fuel Dependence * Autocracy		−0.005	−0.005	0.001
		(0.006)	(0.006)	(0.005)
Government Effectiveness		−0.027	−0.027	−0.034
		(0.068)	(0.068)	(0.066)
European Union				0.003
				(0.097)
Latitude				0.001
				(0.001)
Landlocked				0.057
				(0.040)
Asia + Pacific				−0.101
				(0.094)
Europe + North America				0.088
				(0.145)
Former USSR				−0.205
				(0.127)
Latin America + Caribbean				-0.229^{***}
				(0.067)
Middle East				-0.308^{***}
				(0.119)
Value-Added Tax Rate	0.034^{***}	0.032^{***}	0.032^{***}	0.023^{***}
	(0.004)	(0.004)	(0.004)	(0.006)
Constant	2.953^{***}	3.228^{***}	3.228^{***}	1.583^{**}
	(0.606)	(0.600)	(0.600)	(0.624)
Observations	137	134	134	134
R^2	0.666	0.686	0.686	0.762
Adjusted R^2	0.653	0.666	0.666	0.729
Note: Robust SE				*p<0.1; **p<0.05; ***p<0.01

3.2 Instrumental Variables models

Table S24: **Diesel analysis: instrumental variable specification.** Fossil fuel dependence is instrumented using the oil endowment per capita measure from 1960. Compare to results in Table S12.

	Dependent variable:			
	Net Diesel Tax			
	(1)	(2)	(3)	(4)
log(GNI Per Capita)	-0.795^{***}	-0.967^{***}	-0.967^{***}	-0.425^{**}
	(0.166)	(0.186)	(0.186)	(0.209)
log(GNI Per Capita Sq)	0.052^{***}	0.068^{***}	0.068^{***}	0.039^{***}
	(0.010)	(0.012)	(0.012)	(0.013)
Fossil Fuel Dependence	-0.025^{***}	-0.030^{***}	-0.030^{***}	-0.032^{***}
	(0.004)	(0.006)	(0.006)	(0.006)
Central Government Debt	−0.00004	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Autocracy (Polity IV)		−0.214	−0.214	−0.186
		(0.131)	(0.131)	(0.130)
Fossil Fuel Dependence * Autocracy		0.004	0.004	0.008
		(0.008)	(0.008)	(0.008)
Government Effectiveness		-0.181^{**}	-0.181^{**}	-0.224^{***}
		(0.078)	(0.078)	(0.086)
European Union				−0.065
				(0.097)
Latitude				0.001
				(0.002)
Landlocked				0.019
				(0.060)
Asia + Pacific				-0.160^{*}
				(0.091)
Europe + North America				−0.072
				(0.151)
Former USSR				-0.350^{**}
				(0.152)
Latin America + Caribbean				-0.376^{***}
				(0.098)
Middle East				-0.370^{***}
				(0.120)
Value-Added Tax Rate	0.029^{***}	0.029^{***}	0.029^{***}	0.026^{***}
	(0.004)	(0.004)	(0.004)	(0.006)
Constant	2.974^{***}	3.280^{***}	3.280^{***}	1.103
	(0.695)	(0.740)	(0.740)	(0.866)
Observations	135	132	132	132
R^2	0.627	0.620	0.620	0.688
Adjusted R^2	0.612	0.595	0.595	0.645
Note: Robust SE				*p<0.1; **p<0.05; ***p<0.01

3.3 Cross-Sectional Time Series models

Table S25: **Diesel analysis: cross-sectional time-series specification.** Compare to results in Table S15. See Table S2 for variable descriptions.

	Dependent variable:	
	Net Diesel Tax	
	(1)	(2)
log(GNI Per Capita)	-0.790^{***}	-0.208
	(0.069)	(0.132)
log(GNI Per Capita Sq)	0.052^{***}	0.013
	(0.004)	(0.008)
Oil and Gas Income Dependence	-0.015^{***}	-0.005^{*}
	(0.002)	(0.003)
Autocracy (Polity IV)	-0.160^{***}	0.066
	(0.042)	(0.068)
Government Effectiveness	-0.007	0.061
	(0.028)	(0.045)
Central Government Debt	0.0001	0.0004
	(0.0003)	(0.0004)
Oil and Gas Income Dependence * Autocracy	-0.001	0.0003
	(0.003)	(0.005)
Value-Added Tax Rate	0.035^{***}	0.013^{**}
	(0.002)	(0.005)
Constant	2.772^{***}	1.236^{**}
	(0.272)	(0.549)
Observations	740	740
Country and Year FE	N	Y
R^2	0.657	0.930
Adjusted R^2	0.653	0.913
Note: Robust SE	*p<0.1; **p<0.05; ***p<0.01	

4 Supplementary Figures

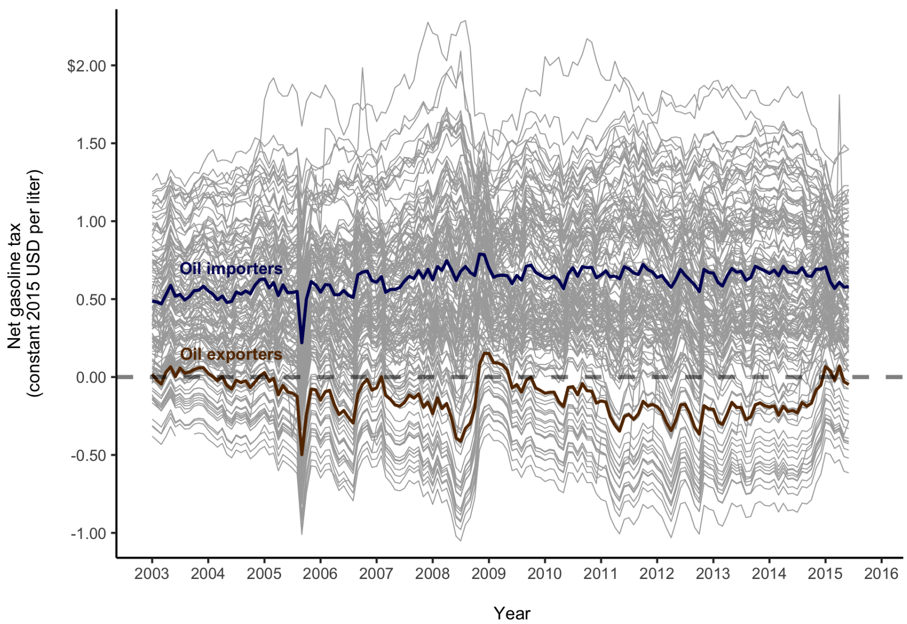


Figure S1: **Gasoline prices 2003-15, oil exporters versus importers.** Oil exporter and importer group averages are computed monthly using unweighted country taxes and subsidies.

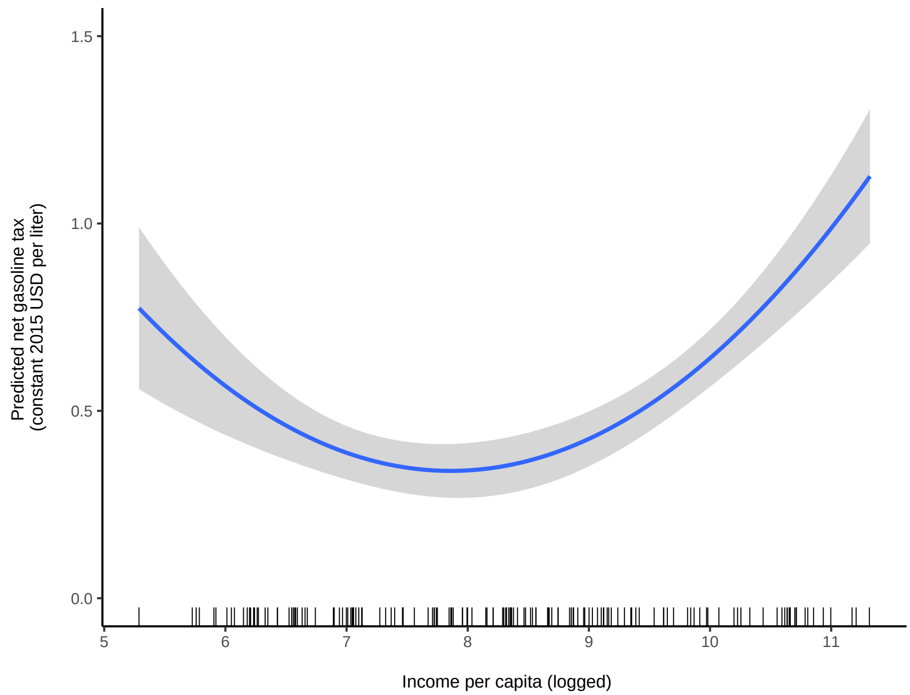


Figure S2: **Income per capita and predicted gasoline taxes by country**. Marginal effects of logged income per capita and logged income per capita squared on net gasoline taxes, based on results from Table 1, column 1. Predicted values for net gasoline taxes are plotted on the y-axis. Distribution of logged income per capita values plotted as a rug above the x-axis.

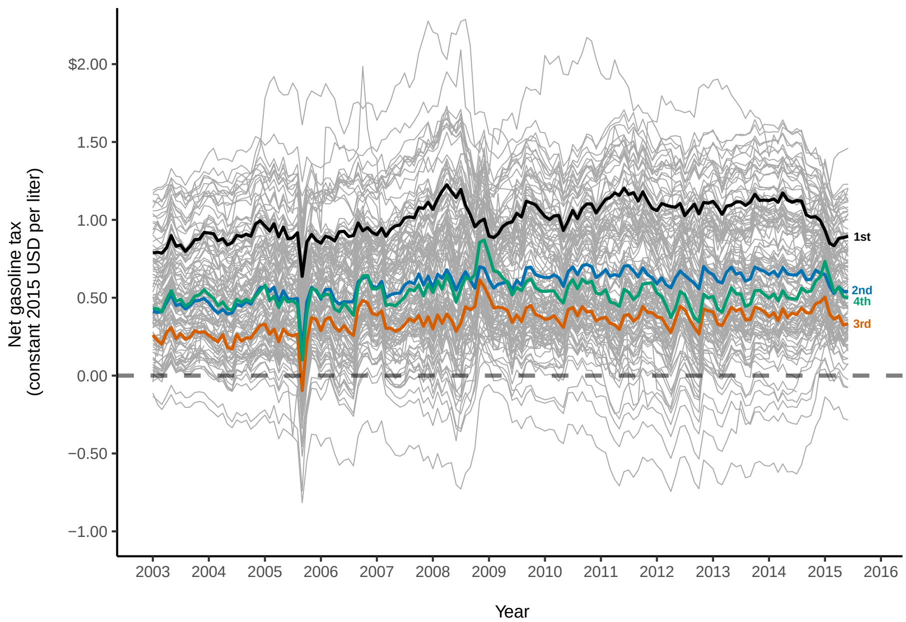


Figure S3: **Net gasoline tax by income group over time.** Income group averages are computed monthly using unweighted country taxes and subsidies. This figure excludes oil-exporting countries. Color-coding is as follows, from top to bottom as of 2015. Black: first income quartile; blue: second income quartile; green: fourth income quartile, orange: third income quartile.

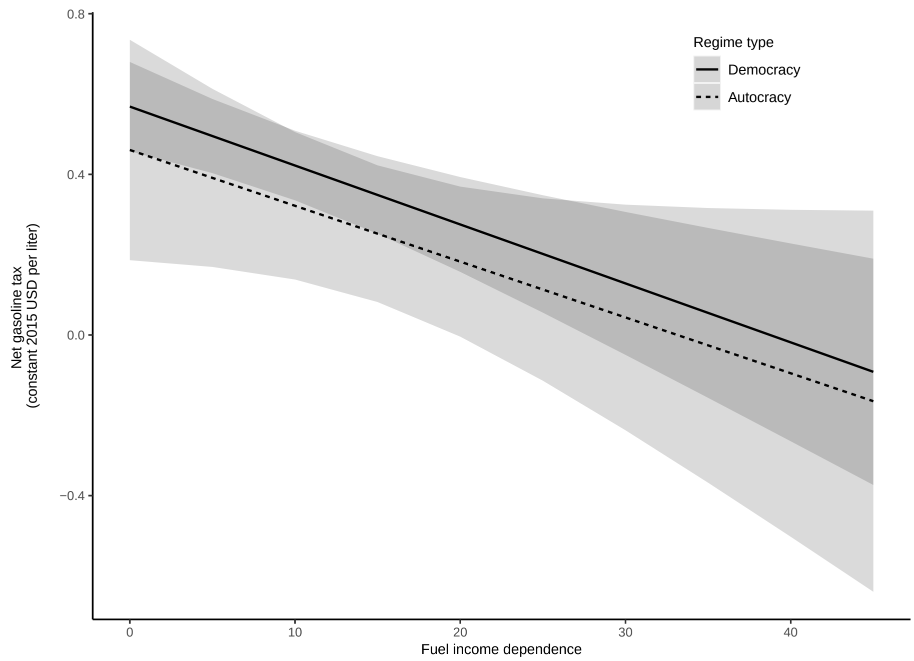


Figure S4: **Predicted values (marginal effects) plot for fossil fuel dependence and autocracy.** Marginal effects of fuel dependence on net gasoline taxes by regime type, based on results from Table S5, column 2. Predicted values for net gasoline taxes are plotted on the y-axis: marginal effects for democracies (autocracies) shown as a solid black line (dashed line) with dark gray (light gray) confidence bands.

Figure S5 illustrates the importance of *Fossil Fuel Dependence*: it is similar to Figure 4 in the main text but highlights countries above the 30% *Fossil Fuel Export Dependence* threshold. Of the 27 oil exporters, 20 had net subsidies in either 2003, 2015, or both. Sixteen of them also fall below the 45 degree line, indicating that their taxes fell (or subsidies grew) during this period.

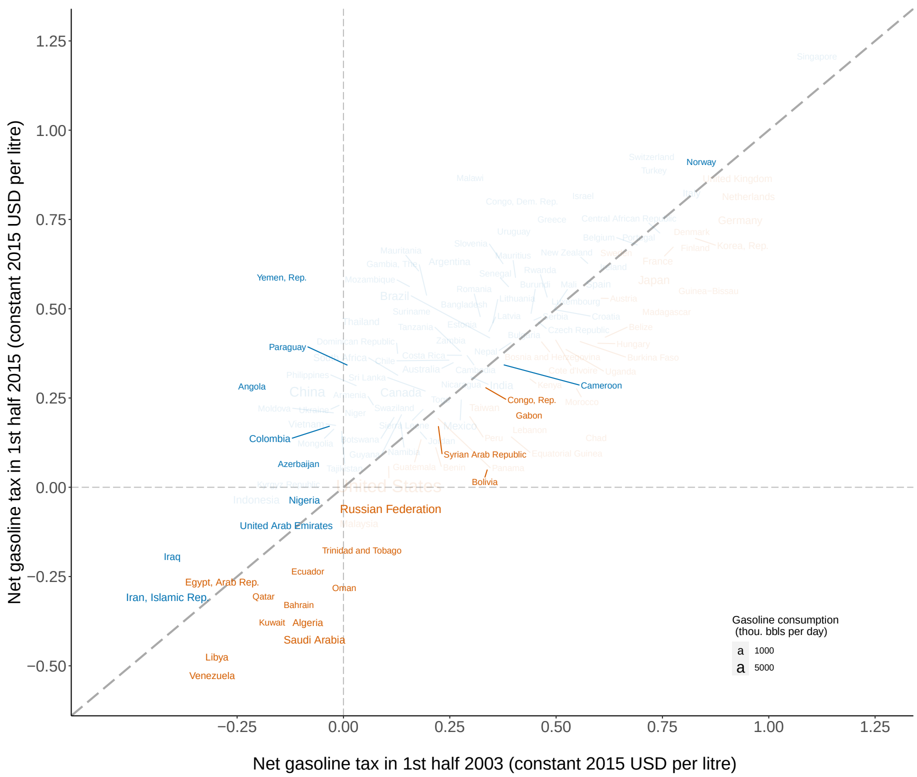


Figure S5: **Net gasoline taxes in 2003 versus 2015 for fuel dependent countries.** The average level of taxes or subsidies per liter for countries in the first six months of 2003 compared to the first six months of 2015, with highlighted labels for the top 30 most fuel dependent countries. Countries with higher taxes (or lower subsidies) in 2015 than in 2003 are colored in blue; those with lower taxes (or higher subsidies) are colored in dark orange. See notes in Figure 4 for further details.

Figure S6 displays the five countries with the greatest gains, and the five countries with the greatest losses, in democratization over these thirteen years. The five that moved farthest toward democracy (in blue) had, on average, almost precisely the same gasoline taxes at the end as they did at the beginning. In fact, their average fuel tax fell by \$0.005 per liter. In the countries that moved the farthest toward autocracy (in red), the average fuel tax actually rose by \$0.06 per liter. Overall, the average effect of both democracy and democratization was not significantly different than zero.

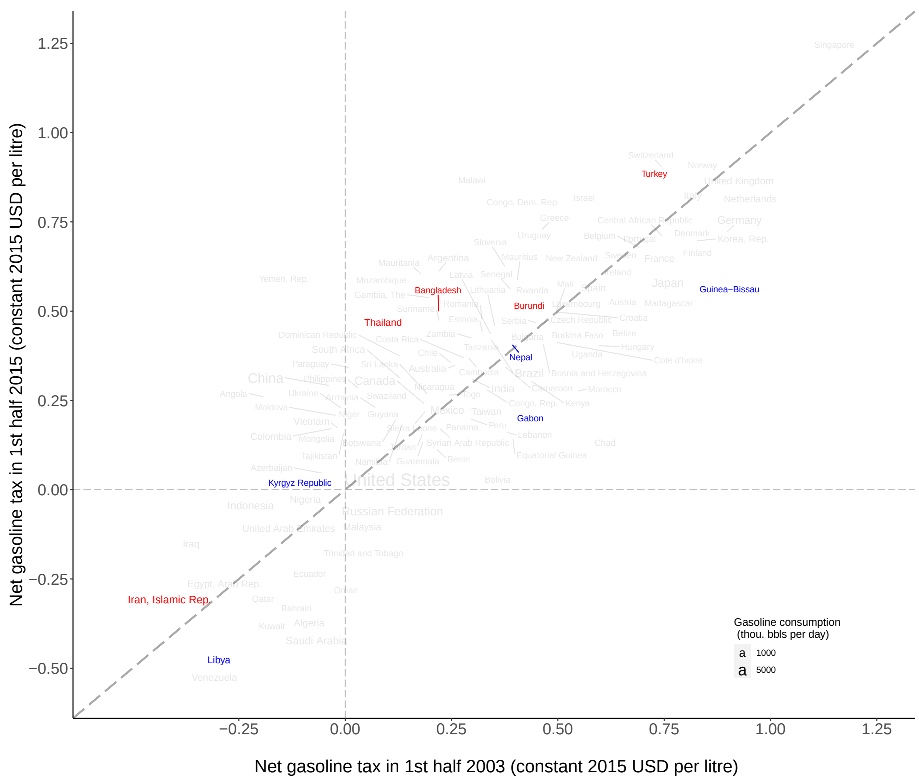


Figure S6: **Net gasoline taxes in 2003 versus 2015 for countries with largest gains or losses in democratization scores.** The average level of taxes or subsidies per liter for countries in the first six months of 2003 compared to the first six months of 2015, with highlighted labels for the top 5 largest gainers (blue) and the top 5 largest decliners (red) on the Polity index from 2003 to 2015. See notes in Figure 4 for further details.

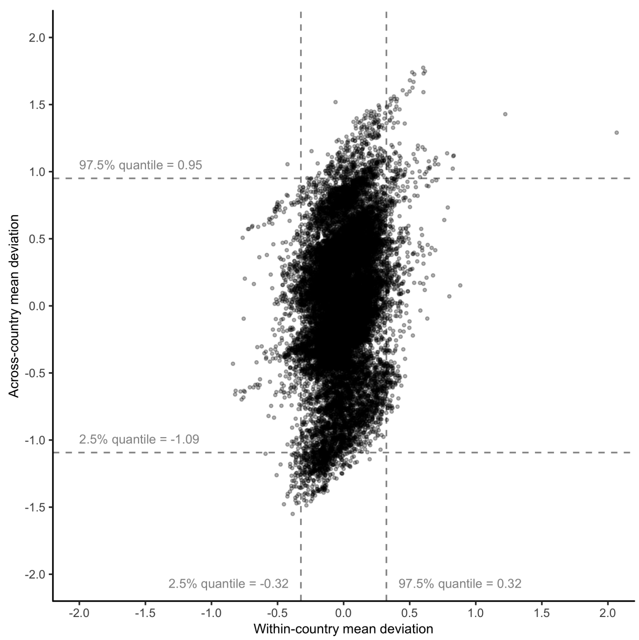


Figure S7: **Deviation from within-country versus across-country average net gasoline tax.** Each point in the graph represents the difference between a country-month-year tax and the overall country mean (x-axis) and the overall monthly mean (y-axis). The 95% quantile range of across-country deviations is roughly 3 times larger than the within-country deviation range; a sample with balanced across-country and within-country variation would have roughly equal ranges.

References

2007. "Fuel price policy explodes in Myanmar." *The Asia Times* . July 24, 2007.

2008. "Anti government rioting spreads in Cameroon." *The New York Times* . December 7, 2008.

2013*a*. "Activists protest against fuel price rise." *The Jordan Times* . March 2, 2013.

2013*b*. "Sudan defends crackdown as protests enter second week." *The Jordan Times* . September 30, 2013.

2014. "Yemen protests erupt after fuel price doubled." *Al-Jazeera* . July 30, 2014.

2018. "Burkina Faso: Protest against fuel price increase." *Africa News* . November 30, 2018.

Agren, David. 2017. "Mexicans are outraged over a big hike in gas prices on Jan 1." *The Washington Post* . January 2, 2017.

Arezki, Rabah, Valerie A. Ramey and Liugang Sheng. 2017. "News Shocks in Open Economies: Evidence from Giant Oil Discoveries." *The Quarterly Journal of Economics* 132(1):103–155.

Boix, Carles, Michael Miller and Sebastian Rosato. 2013. "A complete data set of political regimes, 1800–2007." *Comparative Political Studies* 46(12):1523–1554.

Cabrera, José María León and Clifford Krauss. 2019. "Deal struck in Ecuador to cancel austerity package and end protests." *The New York Times* . October 13, 2019.

Cassidy, Traviss. 2018. "The Long-Run Effects of Oil Wealth on Development: Evidence from Petroleum Geology." *The Economic Journal* 129(623):2745–2778.

Coppedge, Michael, John Gerring, Staffan I Lindberg, Jan Teorell, David Altman, Michael Bernhard, M Steven Fish, Adam Glynn, Allen Hicken, Carl H Knutsen et al. 2019. "Varieties of Democracy." *VDEM Codebook v10* .

Cowie, Sam and Dom Phillips. 2019. "Brazil Faces Call for Return to Military Dictatorship Amid Truckers' Strike." *The Guardian* . May 30, 2019.

Energy Information Administration. 2019*a*. "Cushing OK WTI Spot Price FOB.". https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=M (accessed June 1, 2019).

Energy Information Administration. 2019*b*. "New York Harbor Conventional Gasoline Regular Spot Price FOB.". https://www.eia.gov/dnav/pet/hist/EER_EPMRU_PF4_Y35NY_DPGD.htm (accessed June 1, 2019).

Energy Information Administration. 2019*c*. "Spot price for Ultra Low Sulfur CARB Diesel.". https://www.eia.gov/dnav/pet/hist/eer_epd2dc_pf4_y05la_dpgD.htm (accessed June 1, 2019).

Fassihi, Farnaz and Rick Gladstone. 2019. "Iran abruptly raises fuel prices, and protests erupt." *The New York Times* . November 18, 2019.

Goemans, Henk E, Kristian Skrede Gleditsch and Giacomo Chiozza. 2009. "Introducing Archigos: A dataset of political leaders." *Journal of Peace research* 46(2):269–283.

Grantham Research Institute on Climate Change and the Environment. 2021. "Climate Change Laws of the World Database.". https://climate-laws.org/ (accessed June 1, 2019).

Guriev, Sergei, Anton Kolotilin and Konstantin Sonin. 2011. "Determinants of Nationalization in the Oil Sector: A Theory and Evidence from Panel Data." *Journal of Law, Economics, and Organization* 27(2):301–323.

Hyde, Susan D and Nikolay Marinov. 2015. "NELDA 4.0: National Elections across Democracy and Autocracy dataset codebook for version 4.". https://nelda.co/ (accessed September 2 2016).

International Monetary Fund. 2019*a*. "Government Finance Statistics.". http://data.imf.org (accessed June 1, 2019).

International Monetary Fund. 2019*b*. "Value-added tax rates.". Personal communication with Mario Mansour, IMF Tax Policy Division.

Jones Luong, Pauline and Erika Weinthal. 2006. "Rethinking the resource curse: Ownership structure, institutional capacity, and domestic constraints." *Annual Review of Political Science* 9:241–263.

Mahdavi, Paasha. 2020. *Power Grab: Political Survival Through Extractive Resource Nationalization.* Cambridge: Cambridge University Press.

Marshall, Monty G, Keith Jaggers and Ted Robert Gurr. 2011. "Polity IV Project: Political Regime Characteristics and Transitions 1800-2010 Dataset Users Manual." *Center for Systemic Peace* 11. https://www.systemicpeace.org/polity/polity4.htm (accessed September 2, 2016).

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

Organization for Economic Cooperation and Development. 2019. *Taxing Energy Use: Using Taxes for Climate Action.* Paris: Organization for Economic Cooperation and Development.

Ortiz, Isabel, Sara Burke, Mohamed Berrada and Hernán Cortés. 2013. "World Protests 2006-2013." *Initiative for Policy Dialogue and Friedrich-Ebert-Stiftung New York Working Paper* (2013).

Ross, Michael L. 2013. *The oil curse: How petroleum wealth shapes the development of nations*. Princeton University Press.

Ross, Michael L, Chad Hazlett and Paasha Mahdavi. 2017. "Global progress and backsliding on gasoline taxes and subsidies." *Nature Energy* 2(1):16201.

Rubin, Alissa J. 2018. "Hundreds of thousands in France protest taxes by blocking roads." *The New York Times* . November 17, 2018.

The World Bank. 2019. "World Development Indicators.". http://wdi.worldbank.org (accessed June 1, 2019).

The World Bank. 2021. "Carbon Pricing Dashboard.". https://carbonpricingdashboard.worldbank.org/ (accessed January 30, 2021).

Tsui, Kevin K. 2011. "More oil, less democracy: Evidence from worldwide crude oil discoveries." *The Economic Journal* 121(551):89–115.