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## Economics of climate attitudes in oil-rich regions

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# Economics of climate attitudes in oil-rich regions



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## Economics of climate attitudes in oil-rich regions

### Abstract

The study aims to identify economic measures that enhance support for climate change mitigation, particularly in oil-rich communities. Using US county-level data, the research shows that the presence of oil reserves is negatively associated with the attribution of human influence to climate change and policies regulating CO<sub>2</sub> emissions. Interestingly, a high current dependence on mineral extraction is associated with greater support for climate policies, while a decline in the mining-income share in oil-rich regions does not correlate with increased support for climate action, underpinning our hypothesis of persistence of climate attitudes. This suggests that a region's current economic dependence on mining is not necessarily an obstacle to greater action to mitigate human impacts on climate. While evidence on the impact of extreme weather events on climate attitudes is mixed, we also present evidence that regional economic losses from natural disasters and rising home insurance costs may help convince people of the need for climate policy measures.

Keywords: Climate Attitudes, Oil Wealth, Panel Data, United States

JEL: Q35, Q54, C33

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# Non-technical summary

## Focus

This study explores what economic factors increase support for climate change policies in oil-rich regions, where skepticism about human-caused climate change is common. Using data from US counties, it examines how the presence of oil reserves, economic dependence on mining, and experiences with natural disasters or rising insurance costs influence people's attitudes toward climate action.

## Contribution

The research bridges a gap in understanding how both historical oil wealth and current economic conditions shape climate attitudes. It uniquely distinguishes between the effects of simply having oil reserves and actually relying on mining income. The study also introduces the idea that rising home insurance costs and local economic losses from natural disasters can act as economic signals that may shift public opinion toward supporting climate policies.

## Findings

The study finds that people in oil-rich counties are less likely to believe in human-caused climate change and less likely to support climate policies. Surprisingly, a higher current dependence on mining is linked to greater support for climate action, while a decline in mining income does not increase support. Additionally, higher average incomes and increased costs from natural disasters or insurance premiums are associated with more favorable attitudes toward climate policies, suggesting that economic experiences can influence climate beliefs even in traditionally skeptical regions.

# 1. Introduction

Climate change poses one of the most urgent and complex challenges of our time. It has far-reaching consequences for economies, societies, and ecosystems worldwide. Despite mounting scientific evidence and increasingly visible impacts, governments continue to struggle at implementing decarbonization policies such as CO<sub>2</sub> emissions pricing. Meaningful progress must couple sound policy design with broad public support as voter attitudes can make or break climate initiatives. Olson-Hazboun (2018) notes, that while it is known that individuals in fossil fuel dependent communities often perceive fossil fuel development positively, little is known about how these individuals might be convinced of the need for climate action such as renewable energy development. This study aims at filling that gap in knowledge by identifying economic measures that could enhance support for climate change mitigation in oil-rich regions.

Values and attitudes persist across generations. Using longitudinal survey data, Inglehart & Baker (2000), for example, show that modernization in different societies, despite exposure to the same economic development forces and pervasive cultural changes, follows distinct development paths (path dependent) due to situation-specific conditions such as cultural heritage. Moreover, the history of many religious traditions demonstrates that distinctive value systems remain in place even with economic development. Similarly, Sears & Funk (1999) present evidence with longitudinal survey data from the United States that partisan political attitudes remain highly stable over time.

Bell & York (2010) point out that beliefs, norms, and culture can also be built up locally around an industry, creating a community economic identity. They specifically examine the deep bonds within the Appalachian communities created around coal mining. These bonds have remained strong in recent decades despite declining employment in the coal industry. Proximity to oil and gas development or export facility is also known to be associated with higher support for the industry (Boudet, Zanocco, Howe, & Clarke (2018), Olson-Hazboun (2019)).

Fossil fuel reserves may also affect local development in a variety of ways. Examining 19th century data from the southern parts of the US, Michaels (2011)

argues that counties with oil reserves were not significantly different from counties without oil in terms of schooling, manufacturing employment, or population prior to their major oil discoveries. Their economic development paths diverge in the decades following the discovery of significant oil or gas deposits, suggesting that dominant industries can modify regional development. Mitchener & McLean (2003) show that productivity growth in the 20th century was more robust in US states with large mineral endowments than elsewhere. When a region's economic well-being historically stems from hydrocarbon extraction and the local identity is built around a fossil fuel industry, it may be difficult to find economic means to motivate support for climate action. Building on this, we present the following hypothesis: in counties with oil reserves people are less likely to accept the notion of anthropogenic climate change and less likely to support climate policies aimed at climate change mitigation. We expect these attitudes to persist, i.e. support for climate-friendly policies in oil-rich regions should not rise even as economic dependence on extractive industries declines.

We study this hypothesis using US county-level data. We use counties' climate attitudes from Yale Program on Climate Change Communication as dependent variables (Howe et al., 2015; Marlon et al., 2022). To define counties with oil reserves, we use the US Energy Information Administration's Oil and Gas Field Code Master List 2004, which lists all US oil, gas, and shale plays, as well as the counties in which they are located. To describe counties' current dependence on mineral extraction, we use the share of mining income of total labor income as our explanatory variable. We estimate the relationship using a county fixed effects estimator to control for unobserved county heterogeneity.

In addition to economic structure, we consider whether other factors shift climate attitudes. While extreme weather events could, in theory, make people more receptive to climate change mitigation policies, the evidence is mixed. Borick & Rabe (2017) show that individuals skeptical of climate change are less likely to report past weather events accurately than people who accept the existence of climate change. Zanocco et al. (2018) argue that the increase in perceptions that climate change is happening after an extreme weather event comes from communities where acceptance in climate change was high to start with. Rising home insurance costs

might provide a clearer economic signal for wider group of people and is thus more difficult to ignore even when extreme weather events do not cause direct personal economic losses. During the past decade, rising levels of extreme weather and climate-related risks have played a part in driving up property insurance costs in the United States (Waters, 2024).

Taken together, these considerations highlight the challenge of convincing communities with low initial belief in anthropogenic climate change, especially in oil-rich regions, to acknowledge human influence on climate and to support mitigation policies. This study therefore focuses on identifying economic factors that might help, or fail to help, shift attitudes in these reluctant communities.

This study contributes to the existing literature by bridging a critical gap between economic dependence on fossil fuels and persistent climate skepticism in oil-rich regions. While prior research has documented the role of political ideology, economic identity, and proximity to extractive industries in shaping climate attitudes, few studies have sought to disentangle the effects of historical resource endowment from current economic activity. More precisely, this paper makes four key contributions to the existing literature. First, we show that belief in anthropogenic climate change and support for CO<sub>2</sub> regulation is lower in oil-rich regions than elsewhere. We use oil reserves as the indicator of oil region rather than production-related indicators, since the existence of oil underground can be considered exogenously determined. Second, we show that a decline in mining income share is not associated with climate attitudes more supportive of climate action in oil-rich regions. On the contrary, support for climate action is higher in oil-rich counties when the income or employment share of mining is higher. Thus, a reduction in economic dependence on mining is unlikely to enhance support for climate-friendly policies. Third, we show that an increase in average income of a county is associated with higher support for climate action. Finally, we show that high home insurance premiums and high economic costs from weather related natural disasters may enhance support for funding of renewables research in oil-rich regions.

The remainder of this paper is organized as follows. Section 2 reviews the literature on determinants of climate policy support. Section 3 describes the data



sources and estimation methodology. Section 4 presents the main empirical results. Section 5 reports robustness checks using alternative specifications and variables. Section 6 discusses the findings and their implications for climate policy in oil-rich regions. Additional details and supplementary analyses are provided in the appendices

## 2. Literature

### 2.1. Individual, regional and political determinants of climate policy support

Political views are associated with views on climate change. Based on their meta-analysis, Drews & Van den Bergh (2016) argue that, even though Democratic party affiliation and left-wing political orientation are associated with higher policy support for climate action policies, the relationship may be spurious as both originate from alternative values and worldviews. Egalitarian worldviews predict support for climate policies, while individualistic and hierarchical values are associated with opposition to climate policy (Leiserowitz, 2006). Interestingly, Couttenier & Sangnier (2015) show that large mineral resource endowments are associated with opposition to redistribution in a region, revealing individualistic attitudes in such regions. Democrat support for renewable energy is driven more by concerns about global warming, while Republican support is driven more by considerations of economic cost-benefit-analysis (Gustafson et al., 2020). The climate change denial advocated by some Republican politicians may also influence climate policy support among Republican voters to some extent (McCright, Dunlap, & Xiao, 2014).

Climate policy measures are supported when they are considered fair and effective. Dechezleprêtre et al. (2025) find three major predictors of whether people support a given climate policy: perceived effectiveness of the policy in reducing emissions, related inequality concerns and the effect on respondents' household. Bergquist, Thiel, Goldberg, & van der Linden (2023) find only weak or close to zero effects from demographic variables, such as age, gender or education, on climate

policy support, whereas perceived fairness and effectiveness were the most important determinants. McCright & Dunlap (2011b) find, that educational attainment is positively associated with support for scientific view on climate for liberals and Democrats, but not for conservatives or Republicans. One group stands out clearly: conservative white males are more likely than other Americans to endorse climate change denial even when they self-report high knowledge of climate change (McCright & Dunlap, 2011a).

Experience of extreme weather may not appreciably increase support for climate action. Based on survey data from the United States, Ray et al. (2017) find a positive relationship with a recent extreme weather event and support for climate adaptation policies, but the effect is small and fades quickly over time. Zanolto et al. (2018) show that people's views of extreme weather events are colored by "motivated reasoning." Thus, they find higher acceptance of anthropogenic climate change after an extreme weather event in communities where the confidence that human-induced climate change was already high.

## 2.2. Economic determinants of climate policy support

Economic downturn may lower public support on climate policy. Stoutenborough, Liu, & Vedlitz (2014), for example, suggest that the global financial crisis led to a drop in support for climate action from its 2007 peak, although they fail to present any clear causation.

Using individual-level data of climate attitudes in the United States, Olson-Hazboun, Howe, & Leiserowitz (2018) show that higher economic dependence of mining sector in a region correlates with lower public support for renewable energy policies. As a measure of mining sector dependence, they use data from US Department of Agriculture Economic Research Service, which classifies a county as "mining dependent" if at least 15% of total county earnings during 1998–2000 on average came from mining. We delve deeper into this effect in order to tease out the effect of a county's subterranean wealth from current economic dependence on mining.

Schimpf et al. (2022) argue that some individuals are less likely to support climate policy measures as they expect the existing fossil fuel industries to deliver

wealth in the foreseeable future. Notably, there is empirical evidence that even economic benefits brought by “green transition” projects are insufficient to convince communities of the importance of the agenda. Olson-Hazboun (2018) gives evidence that communities traditionally involved with production of fossil fuels may reject renewable energy projects even when they would bring economic boost to the area. On the other hand, little is yet known about how green energy projects may affect climate attitudes of local communities over the longer term.

Using US data, Boudet et al.(2018) show that proximity to unconventional oil and gas development is associated with support for hydraulic fracturing. This indicates that familiarity with oil production may increase support for it. A similar result is found by Olson-Hazboun (2019) with regard to support for fossil fuel exports, i.e. living near an export facility is related to higher support for exports. Caretta, Rothrock, & Zegre (2022) argue that the economic identity of many rural communities is still tied to extractive industries. Bell & York (2010) suggest that extractive-industry companies may encourage community economic identity in order to secure political influence, even when technological advances are reducing the industry’s significance as a regional employer.

Mayer & Malin (2019) find that perceived economic benefits for the community, not individual economic gains, bolster support for oil and gas development. Regarding coal industry, Blaacker, Woods, & Oliver (2012) argue that support for the industry remains strong in a region despite its decline as an employer. Based on cross-country analysis, Hao & Shao (2021) note that countries become more supportive of renewable energy if their economies are less intertwined with fossil fuels.

Roddis, Carver, Dallimer, & Ziv (2019), examining UK data, find that high regional employment in the oil & gas sector is associated with decreased support for fracking. They conclude that economic dependence on the fossil fuel sector does not necessarily coincide with greater support for further exploration – at least when the alternative involves unconventional oil production.

By using the presence of underground oil reserves as an exogenous indicator of oil-rich counties, this paper isolates the long-term economic imprint of fossil fuel wealth on climate beliefs from the short-term economic gains. Furthermore, it

challenges the intuitive assumption that the declining importance of mining income naturally leads to greater climate policy support, finding instead that economic disengagement from mining may not shift attitudes in communities with deep-rooted extractive identities. Finally, the paper introduces high home insurance premiums as a novel economic signal that may transcend ideological divides and foster broader support for climate mitigation, offering a fresh perspective on how economic levers can influence public opinion in regions traditionally resistant to climate-friendly policies.

### 3. Data and methodology

Data for climate attitudes are taken from the Yale Program on Climate Change Communication (Howe et al. 2015), which covers county-level data on climate attitudes in the United States from 2014 to 2021 with gap years for 2015 and 2017. County-level data are based on several individual-level surveys representative at the national level.<sup>1</sup>

The variables in the Yale Program on Climate Change Communication data which we use as the dependent variables in our regression are:

Human: Estimated percentage who think that global warming is caused mostly by human activities. We use this variable to describe the belief in anthropogenic climate change.

Regulate: Estimated percentage who somewhat/strongly support regulating CO<sub>2</sub> as a pollutant. This variable is used to describe support for regulation as a mean to mitigate climate change.

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<sup>1</sup> In Howe et al. (2015), multilevel modeling with post-stratification was used to estimate the county-level distribution of climate opinions. First, individual survey responses are predicted using demographic and geography-level covariates. (The demographic variables are gender, race, education, and a three-way interaction term among these variables. The geography-level covariates are percent of people who drive alone to work, percent of same-sex households, percent of CO<sub>2</sub> emissions per capita, and percent of people who voted for Democratic candidates in the most recent election.) Second, the spatial weighting is performed based on population distribution within each county. For county-level analysis, the modeling allows for about 100,000 unique population types (e.g. Hispanic man with bachelor's degree living in Maricopa county, Arizona in 2014).

Fund renewables: Estimated percentage who somewhat/strongly support funding research into renewable energy sources. This variable is used to describe support for public expenditure in research as a mean to mitigate climate change.

We chose the variables on support for climate action based on their availability, as not all variables in the Yale data are available for all the years in our sample nor at the county level. The variable human was chosen to describe climate attitudes in general, as the belief in anthropogenic climate change has been shown to be a divisive factor in climate attitudes. Assuming climate change is happening, less than half of Americans believe that it is mostly human caused and more than one third believe that it is caused mostly by natural changes in the environment (Leiserowitz et al. 2010).

Data on US counties that have oil reserves is from U.S. Energy Information Administration Oil and Gas Field Code Master List 2004, which lists all identified oil and gas fields in the United States. All the counties that are located above an oil or oil and gas discovery, are classified as oil counties. Off-shore fields were excluded. Most of the fields have been discovered decades ago. From 1102 individual counties that had proven oil reserves in the 2004 listing, 87% had known reserves already in 1960. We use this measure of underground oil reserves rather than mining or oil extraction activities to define oil counties, as it can be considered exogenous. For oil production the causality could run the other way: counties less worried about climate change might increase oil extraction.

Variables on climate attitudes we are using in our analysis are presented grouped by oil counties and non-oil counties with group means and their 95% confidence intervals in Table 1. In oil-rich counties, respondents believe less in that climate change is mostly caused by human activities and they also express less support for both measure of climate action than their counterparts in non-oil counties and all differences are statistically significant.

Table 1. Group means and their 95% confidence intervals for climate attitudes.

Oil County	Human (Mean $\pm$ CI)	Regulate (Mean $\pm$ CI)	Fund Renewables (Mean $\pm$ CI)
Non-Oil County	49.1 $\pm$ 0.06	71.47 $\pm$ 0.05	79.89 $\pm$ 0.05
Oil County	47.24 $\pm$ 0.08	69.34 $\pm$ 0.06	78.07 $\pm$ 0.07

County-level economic indicators on income and employment are from Bureau of Economic Analysis. We use the share of mining (mining, quarrying, and oil & gas extraction) income of total labor income and mining employment share of total employment as independent variables to depict the economic importance of mining in a county. We include both measures as independent variables but analyze their influence in separate models to avoid overfitting due to multicollinearity.<sup>2</sup> The mining income share is used as an independent variable in main regressions and employment to test the robustness of the results. We also use the annual change in mining income and labor shares to estimate whether changes in regional economic dependence on mining are in addition to the level associated with changes in support for climate action. Also, we include changes in the annual county average income level to detect for the effect of income on climate attitudes. Our third economic indicator is the average home insurance premium for homeowners as reported by the National Association of Insurance Commissioners (NAIC). This variable is used to describe the rising prices of home insurance prices, which is partly due to the increased frequency and costs of extreme weather events (Waters, 2024). Unfortunately, only state-level data are available. For county level, we use the database on losses from natural disasters compiled by the Federal Reserve Bank of New York (Crosignani & Hiti, 2025) to indicate local losses from natural disasters. Specifically, we use the sum of inflation-adjusted property damage and inflation adjusted crop damage per capita. This, together with the state-level indicator for insurance costs, could indicate how costs from natural disasters are felt in households.

In addition to economic explanatory variables, we also control for political sentiment by using county-level change in Republican vote share since the previous

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<sup>2</sup> Testing for multicollinearity using a variance inflation factor, we find that there is a moderate multicollinearity between mining income share and mining employment share.

presidential election. Variable descriptions and their descriptive statistics are presented in Appendices 1–3.

The mining sector boomed after the global financial crisis, but the share of mining income and jobs peaked already in 2014 (Figure 1). This variation allows us to detect whether mining income share dynamics are associated with shifting attitudes to climate policy measures, or, as we hypothesize, attitudes remain sticky. Notably, about one percent of labor income is from mining even in counties without oil reserves. Table 2 presents more detailed statistics of mining income share of labor income by these two groups, oil counties and non-oil counties. There are counties with oil reserves, where no labor income comes from mining. Likewise, there are counties without oil reserves, where up to 75% of labor income comes from mining.

Figure 1. Share of mining income of total labor income in US counties 2000–2022.

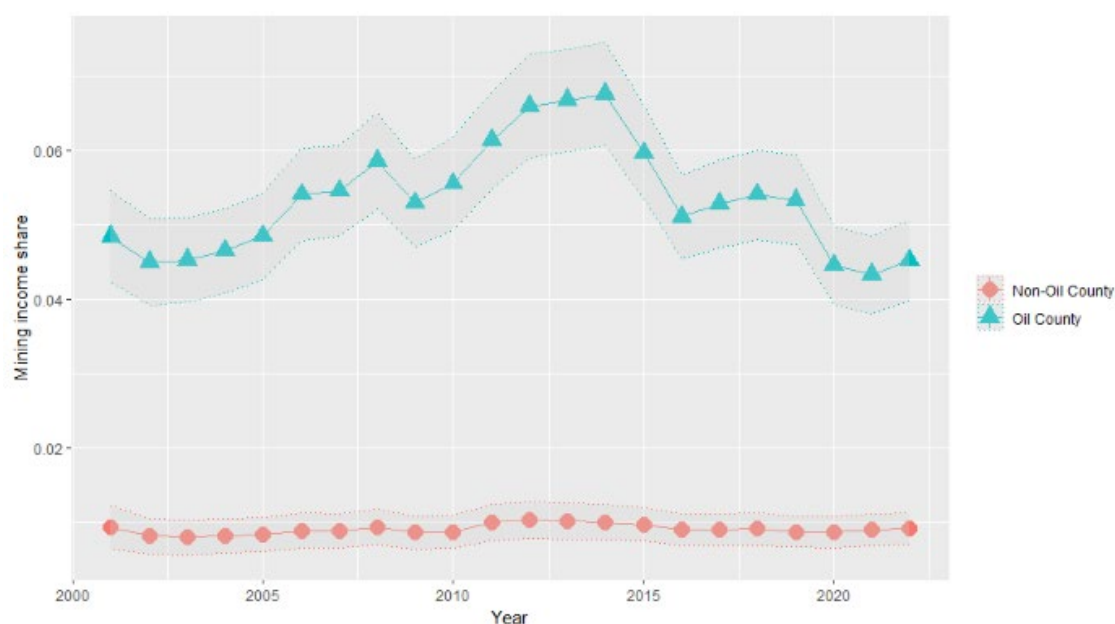


Table 2. Summary statistics of mining income of total labor income grouped by oil county and non-oil county.

oilcounty	Mean	sd	min	max	N
0	0.01	0.05	0.00	0.75	1996
1	0.06	0.10	0.00	0.93	1093

Our model for estimation is the following:

$$Y_{it} = \beta_1 \text{oilcounty}_i + \beta_2 X_{it-1} + \gamma_i + \delta_t + \varepsilon_{it} , \quad (1)$$

where  $i$  and  $t$  are the indexes of county and year, respectively.  $Y_{it}$  is the dependent variable describing climate attitude in county  $i$  and year  $t$ . Oil county is a binary variable receiving a value of 1 if the county has oil reserves, and 0 otherwise.  $X_{it-1}$  presents the county-specific one-period lagged explanatory variables of economic indicators. Variables  $\gamma_i$  and  $\delta_t$  stand for the county and time dummies, respectively and  $\varepsilon_{it}$  is the random disturbance.

## 4. Results

First, using pooled panel regression, we start by estimating whether counties with oil reserves differ in average “belief in anthropogenic climate change” from non-oil counties (Table 3, column 1). Next, we analyze how oil reserves and other explanatory variables are linked to two variables describing county-level support for climate change mitigation, i.e. “support for funding renewables research” and “support for regulation of CO<sub>2</sub> as a pollutant” (Table 3, columns 2 and 3 respectively). Even when we separately control income dependence on mining, the existence of oil reserves in a county is negatively associated with belief in anthropogenic climate change and support for regulating CO<sub>2</sub> as pollutant. The magnitude of the effect is of relevant size in both cases. For oil-rich counties, the belief in anthropogenic climate change is about half of its standard deviation lower than in non-oil counties, while support for regulating CO<sub>2</sub> is more than a standard deviation lower. However, support for funding renewables is not related to existing oil reserves in the county.

Interestingly, after controlling for the existence of oil reserves, a higher level of mining income share is positively associated with belief in anthropogenic climate change and support for climate action, and the effect is non-negligible. High insurance premiums also seems to be correlated with support for funding renewables research, and the effect is of relevant magnitude. For the other covariates, the significant coefficients are not economically relevant in their effect (descriptive statistics



are presented in Appendix 2). In line with e.g. Bergquist et al.(2022), an increase in county average income positively correlates with support for renewable energy funding. An increase in home insurance premiums is positively associated with higher level of belief in anthropogenic climate change and negatively associated with support for CO2 regulation. Economic damage from natural disasters in a county seems to be related to greater belief in anthropogenic climate change and greater support for climate action. Somewhat surprisingly, an increase in Republican vote share is positively associated with support for funding renewables research and regulating CO2, but both effects are small.

Table 3. Regression results with pooled OLS.

	<i>Dependent variable:</i>		
	Belief in anthropogenic climate change (1)	Support for funding renewables (2)	Support for CO2 regulation (3)
Oil county	-2.601*** (1.003)	0.604 (0.699)	-4.613*** (0.827)
Change in mining income share	0.143 (0.275)	0.249 (0.191)	0.166 (0.227)
Mining income share	8.766*** (1.173)	3.885*** (0.817)	6.749*** (0.967)
Change in average income	2.668*** (0.680)	3.310*** (0.474)	2.984*** (0.561)
Average income	0.162 (0.676)	-0.514 (0.471)	-2.391*** (0.557)
Change in insurance premium	1.083* (0.602)	0.329 (0.420)	-1.373*** (0.497)
Insurance premium	-0.131 (0.429)	2.237*** (0.299)	0.293 (0.353)
Damages from natural disasters	0.006* (0.003)	0.006*** (0.002)	0.005** (0.003)
Change in republican support	0.062 (0.130)	0.319*** (0.090)	0.189* (0.107)
Constant	39.290*** (7.690)	61.501*** (5.356)	93.002*** (6.340)
Observations	12,547	12,547	12,547
R <sup>2</sup>	0.929	0.948	0.926
Adjusted R <sup>2</sup>	0.915	0.938	0.912
F Statistic (df = 2092; 10454)	65.464***	91.645***	62.807***

Note:

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01

One period lagged values used for time-variant regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

All the regressions include control for year and county.

High R-squared is driven by county fixed effects, which alone seems to explain about three-quarters of the variation. Time fixed effects alone explain about 15% of the variation.

Next, we divide our sample into oil-rich counties and non-oil counties to see if the relationship between economic variables and climate attitudes differs between oil-rich and non-oil counties. This should also allow us to use a fixed effects estimator to reduce possible bias from unobserved county time-invariant heterogeneity. The fixed effects estimator does not assume that the omitted variables are uncorrelated with the regressors. We use support for funding research on renewable energy sources as our dependent variable in Table 4.

Interestingly, the results differ significantly for oil-rich (Table 4, column 2) and non-oil (column 3) counties. For non-oil counties, the coefficient for change in mining income share is quite intuitive: when a county becomes more economically dependent on mining income, support for funding of renewable energy development declines. For oil-rich counties, however, the coefficient is positive. This indicates that an increase in economic dependence on mining leads to higher support for renewable energy funding. In other words, a decrease in income dependence on mining reduces support for funding renewable energy sources. Although the effect is quite small, it seems to be the case that the current economic dependence on mining does not appear to be the cause behind the reluctance for climate action in oil-rich counties supporting our hypothesis of persistence in climate attitudes.

Table 4. Fixed effects regression results for support funding for renewable energy sources as the dependent variable.

	<i>Dependent variable:</i>		
	Support funding research into renewable energy sources		
	all counties (1)	oil counties (2)	non-oil counties (3)
Change in mining income share	0.249 (0.247)	0.515* (0.299)	-1.203*** (0.415)
Mining income share	3.885** (1.600)	2.071 (1.786)	0.533 (3.112)
Change in average income	3.310*** (0.745)	1.887* (0.985)	4.210*** (1.084)
Average income	-0.514 (0.876)	0.637 (1.213)	-2.349* (1.306)
Change in insurance premium	0.329 (0.515)	1.342 (0.935)	-0.616 (0.591)
Insurance premium	2.237*** (0.511)	3.235*** (0.917)	1.091* (0.611)
Damages from natural disasters	0.006** (0.002)	0.008** (0.004)	0.004 (0.003)
Change in republican support	0.319** (0.153)	1.296*** (0.330)	0.226 (0.175)
Observations	12,547	5,420	7,127
R <sup>2</sup>	0.913	0.912	0.917
Adjusted R <sup>2</sup>	0.896	0.896	0.899
F Statistic	7,313.747*** (df = 15; 10454)	3,158.760*** (df = 15; 4546)	4,328.146*** (df = 15; 5893)

Note:

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Robust standard errors clustered by county.

One period lagged values used for regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

Regressions include control for year and county fixed effects.

Looking at other economic factors that may affect support for climate action, we find that higher home insurance premiums and damage from natural disasters do seem to be associated with higher support for renewable energy funding in oil-rich counties in particular, confirming the results from the pooled regression.

Next, we use fixed effects estimator in similar way to detect the relationship between our economic variables and county-level support for regulating CO<sub>2</sub> as a pollutant in Table 5. Again, non-oil counties (column 3) face declining support for CO<sub>2</sub> regulation when the income share of mining increases, but this is not the case for oil-rich counties (column 2). In oil-rich counties, a higher level of mining income share is associated with greater support for CO<sub>2</sub> regulation. The model does not seem to be as good in explaining the variation in support for CO<sub>2</sub> regulation as the

model was with respect to support for renewables funding. The explanatory power of the model may be related to the confidence interval of the dependent variable, since it is wider for regulating CO<sub>2</sub> than for funding of renewables research (and wider still for the additional climate policy indicators used for robustness tests).

Table 5. Fixed effects regression results for support regulating CO<sub>2</sub> as pollutant as the dependent variable

	<i>Dependent variable:</i>		
	Support regulating CO <sub>2</sub> as pollutant		
	all counties (1)	oil counties (2)	non-oil counties (3)
Change in mining income share	0.166 (0.310)	0.457 (0.384)	-1.444*** (0.501)
Mining income share	6.749*** (1.798)	5.721*** (2.032)	3.796 (4.275)
Change in average income	2.984*** (0.870)	1.853 (1.221)	3.809*** (1.176)
Average income	-2.391** (1.068)	-1.351 (1.562)	-3.545** (1.509)
Change in insurance premium	-1.373** (0.650)	0.848 (1.192)	-3.107*** (0.764)
Insurance premium	0.293 (0.684)	0.877 (1.229)	-0.230 (0.822)
Damages from natural disasters	0.005* (0.003)	0.009* (0.005)	0.002 (0.004)
Change in republican support	0.189 (0.142)	0.195 (0.339)	0.213 (0.161)
Observations	12,547	5,420	7,127
R <sup>2</sup>	0.728	0.727	0.735
Adjusted R <sup>2</sup>	0.674	0.674	0.679
F Statistic	1,868.617*** (df = 15; 10454)	805.661*** (df = 15; 4546)	1,088.939*** (df = 15; 5893)

Note:

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Robust standard errors clustered by county.

One period lagged values used for regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

Regressions include control for year and county fixed effects.

We also have data on shale plays. Their potential value has emerged much later than that of conventional oil. Most of shale oil exploration has occurred only in recent decades, and the actual boom only in the 2010s. We find no effect from the existence of shale plays for support for climate action as we did from conventional oil reserves (Appendix 4 replicates regression results in Table 3 for counties with shale plays instead of traditional oil reserves). In fact, counties with shale oil seem to be more supportive for funding renewables research than counties without oil or

shale reserves. That is in line with the findings of Bell and York 2010, who note that skepticism of climate policies might reflect a community's economic identity formed during decades of received economic benefits, and thus not by a recent income boom in shale oil production.

## 5. Robustness tests

We start testing the robustness of the results by using the share of mining employment of total employment as the explanatory variable. People employed in the mining sector may have different attachment to the industry, and thus declining mining employment may lead to more people being supportive of climate action. The results in Tables 6 and 7 are quite similar to Tables 4 and 5, respectively, although we do not find significant coefficients for the change in mining employment share.

Table 6. Fixed effects regressions with mining employment as a regressor and support for funding renewables research as the dependent variable

	<i>Dependent variable:</i>		
	Support funding research into renewable energy sources		
	all counties (1)	oil counties (2)	non-oil counties (3)
Change in mining employment share	-0.348 (0.325)	-0.281 (0.325)	-0.491 (0.434)
Mining employment share	12.258*** (2.856)	9.225*** (2.856)	4.040 (6.418)
Change in average income	3.744*** (0.928)	2.623*** (0.928)	4.116*** (1.082)
Average income	-1.070 (1.114)	-0.142 (1.114)	-2.430* (1.304)
Change in insurance premium	0.328 (0.945)	1.402 (0.945)	-0.656 (0.588)
Insurance premium	1.978** (0.915)	2.927*** (0.915)	1.106* (0.612)
Damages from natural disasters	0.006 (0.004)	0.008** (0.004)	0.004 (0.003)
Change in republican support	0.321 (0.332)	1.273*** (0.332)	0.232 (0.175)
Observations	12,547	5,420	7,127
R <sup>2</sup>	0.913	0.913	0.917
Adjusted R <sup>2</sup>	0.896	0.896	0.899
F Statistic	7,356.245*** (df = 15; 10454)	3,173.948*** (df = 15; 4546)	4,323.822*** (df = 15; 5893)

Note:

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Robust standard errors clustered by county.

One period lagged values used for regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

Regressions include control for year and county fixed effects.

Table 7. Fixed effects regressions with mining employment as regressor and support for CO2 regulation as the dependent variable

	<i>Dependent variable:</i>		
	Support regulating CO2 as pollutant		
	all counties (1)	oil counties (2)	non-oil counties (3)
Change in mining employment share	0.155 (0.281)	0.178 (0.415)	-0.518 (0.548)
Mining employment share	13.733*** (1.584)	13.263*** (3.096)	6.699 (7.609)
Change in average income	3.172*** (0.550)	2.303** (1.136)	3.650*** (1.165)
Average income	-2.515*** (0.545)	-1.666 (1.439)	-3.490** (1.500)
Change in insurance premium	-1.346*** (0.495)	0.902 (1.201)	-3.135*** (0.763)
Insurance premium	0.009 (0.355)	0.463 (1.227)	-0.222 (0.821)
Damages from natural disasters	0.005* (0.003)	0.008* (0.005)	0.002 (0.004)
Change in republican support	0.196* (0.107)	0.177 (0.345)	0.223 (0.162)
Observations	12,547	5,420	7,127
R <sup>2</sup>	0.729	0.728	0.735
Adjusted R <sup>2</sup>	0.675	0.676	0.679
F Statistic	1,876.334*** (df = 15; 10454)	810.606*** (df = 15; 4546)	1,087.711*** (df = 15; 5893)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Robust standard errors clustered by county.

One period lagged values used for regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

Regressions include control for year and county fixed effects.

Next, we use alternative measures of support for climate action to get a more concise picture of the relationship between climate attitudes and economic dependence on mining. There are two more variables available for the same time periods at the county level:

“CO2 limits for coal” – estimated percentage of persons who somewhat/strongly support setting strict limits on existing coal-fired power plants.

“Support renewable quota” – estimated percentage of persons who somewhat/strongly support requiring utilities to produce 20% of their electricity from renewable sources.

The results in Table 8 are similar to previous results considering mining income share: the coefficient is positive, very significant and non-negligible in effect for oil-

rich counties but not for non-oil counties. Again, an increase in average income is positively associated with support for climate action, while the coefficient on change in insurance premiums is negative when significant. It is worth noting that the explanatory power of our model is clearly lower here than in the main regressions. This may reflect perhaps the greater uncertainty related to the actual value of the dependent variables. The sample size for “Support renewable quota” is smaller due to missing counties.

Table 8. Robustness tests with fixed effects estimator on alternative dependent variables.

	<i>Dependent variable:</i>			
	CO2limits for coal		support renewable quota	
	oil counties (1)	non-oil counties (2)	oil counties (3)	non-oil counties (4)
Change in mining income share	0.028 (0.661)	-1.067 (0.992)	0.310 (0.530)	-2.477*** (0.709)
Mining income share	8.664** (3.557)	-6.608 (8.118)	7.917*** (2.672)	5.316 (5.215)
Change in average income	5.621*** (2.135)	7.942*** (2.336)	3.718** (1.788)	4.147** (1.805)
Average income	-3.680 (2.606)	-8.766*** (3.058)	-2.003 (2.040)	-5.643*** (2.075)
Change in insurance premium	-3.506* (2.066)	-1.804 (1.258)	1.340 (1.468)	-2.576*** (0.914)
Insurance premium	-1.906 (1.894)	-2.855* (1.458)	-3.013** (1.416)	-1.836* (1.052)
Damages from natural disasters	0.019** (0.008)	0.009 (0.007)	0.012* (0.007)	0.008 (0.006)
Change in republican support	-1.002* (0.604)	-0.740*** (0.285)	-0.327 (0.378)	-0.079 (0.168)
Observations	5,420	7,127	4,051	5,334
R <sup>2</sup>	0.345	0.384	0.403	0.459
Adjusted R <sup>2</sup>	0.220	0.255	0.242	0.299
F Statistic	159.826*** (df = 15; 4546)	244.541*** (df = 15; 5893)	165.727*** (df = 13; 3191)	268.804*** (df = 13; 4116)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Robust standard errors clustered by county.

One period lagged values used for regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

Regressions include control for year and county fixed effects.

## 6. Discussion

We ask two important questions facing governments and international organizations across the globe. First, what economic factors might increase wide-ranging

support for climate change mitigation? Second, how can a “green transition” be rolled out in a manner that is fair and tolerable to all?

Using county-level data from the US, we show that opposition for climate action is to some extent rooted in geography. Counties with known conventional oil reserves are less supportive of climate policy measures than their resource-poor counterparts. However, a current economic dependence on mining does not seem to hamper support for climate action.

We also find evidence that high insurance premiums or local costs from natural disasters may motivate people to support climate policy measures. The analysis presented would benefit from more detailed data on insurance premiums, but these results nevertheless have immediate policy implications. Subsidizing home insurance in areas with more frequent natural disasters such as wildfires or floods comes at a cost. If households are protected from rising insurance costs, they may not be as supportive of climate policies as they would be if they felt the consequences of climate change in their wallets. In this paper we provide the first contribution but nevertheless more data are needed to build a comprehensive picture of how climate attitudes can be influenced in oil-rich communities.



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# Appendix

## Appendix 1. Variable descriptions and sources

Variable	Description	Source
Mining income share	Compensation of employees in Mining, quarrying, and oil and gas extraction/ Total Compensation of employees	Bureau of Economic Analysis
Mining employment share	Employment in Mining, quarrying, and oil and gas extraction / Total employment	Bureau of Economic Analysis
Average income	Average compensation per job (dollars)	Bureau of Economic Analysis
Insurance premium	Average premium based on the HO-3 homeowner package policy for owner-occupied dwellings, 1 to 4 family units. Provides “all risks” coverage (except those specifically excluded in the policy) on buildings and broad named-peril coverage on personal property, and is the most common package written.	National Association of Insurance Commissioners (NAIC)
Oil county	Acouny with proven oil reserves in Oil and Gas Field Code Master List 2004	U.S. Energy Information Administration
Shale county	325 counties located in Major US shale plays from County Code Master List	U.S. Energy Information Administration
Regulate*	Estimated percentage who somewhat/strongly support regulating CO2 as a pollutant. How much do you support or oppose the following policies? Regulate carbon dioxide (the primary greenhouse gas) as a pollutant; Strongly support/Somewhat support/Somewhat oppose/Strongly oppose	Yale Climate Opinion Map aggregated dataset, 2008-2021
Fund renewables *	Estimated percentage who somewhat/strongly support funding research into renewable energy sources. Survey question: How much do you support or oppose the following policies? Fund more research into renewable energy sources, such as solar and wind power; Strongly support/Somewhat support/Somewhat oppose/Strongly oppose	Yale Climate Opinion Map aggregated dataset, 2008-2021
Human*	Estimated percentage who think that global warming is caused mostly by human activities. Survey question: Assuming global warming is happening, do you think it is...? Caused mostly by human activities/ Caused mostly by natural changes in the environment/ None of the above because global warming isn't happening/ Other/Don't know	Yale Climate Opinion Map aggregated dataset, 2008-2021
Change in republican vote share	Difference in the vote share of the republican candidate in the two most recent presidential elections/earlier election republican vote share	MIT Election Data and Science Lab
Damages from natural disasters	County-level estimates of inflation-adjusted annual direct property and crop damages from natural disasters/county population in 2010 census	Federal Reserve Bank of New York and Census Bureau

\*The modeling employs data from 31 nationally representative surveys of American adults conducted from November 2008 through December 2024 with a combined sample size of n>35,000. County level estimates are derived from a statistical model using multilevel regression with post-stratification (MRP) on a large national survey dataset, along with demographic and geographic population characteristics. For more detailed introduction of the methodology, Please consult Howe, P., Mildenberger, M., Marlon, J., & Leiserowitz, A (2015). Geographic variation in opinions on climate change at state and local scales in the USA Nature Climate Change

## Appendix 2. Descriptive statistics

	n	mean	sd	median	min	max
Mining income share	25540	0.032	0.079	0.002	0.000	0.927
Mining employment share	25540	0.025	0.051	0.005	0.000	0.830
Average income	45122	49302	11443	47324	26539	209136
Insurance premium	45122	1126	391	1040	387	2437
Change in mining income share	22095	-0.002	0.068	0.000	-0.498	0.468
Change in mining employment share	22095	-0.001	0.056	0.000	-0.304	0.343
Change in average income	42091	0.029	0.031	0.027	-0.274	0.340
Change in insurance premium	42103	0.042	0.048	0.039	-0.175	0.324
Oil county	45122	1.359	0.480	1.000	1.000	2.000
Shale county	45122	1.107	0.309	1.000	1.000	2.000
Support regulating CO2	24033	70.709	4.381	70.713	56.892	88.000
Support funding renewables research	24033	79.237	4.499	79.857	60.485	91.641
Belief in anthropogenic climate change	24033	48.388	5.332	47.665	35.000	74.543
Change in republican vote share	44828	0.006	0.165	0.026	-1.000	0.967
Damages from natural disasters	45122	1157	14353	9	0	897365

## Appendix 3. Correlation matrix (lower triangle) and their respective p-values (upper triangle)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Mining income share		0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.75
2 Mining employment share	0.92		0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
3 Average income	0.18	0.14		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
4 Insurance premium	0.15	0.21	0.20		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 Change in mining income share	0.07	0.03	-0.03	-0.08		0.00	0.00	0.20	0.00	0.02	0.00	0.00	0.00	0.30	0.60
6 Change in mining employment share	0.04	0.05	-0.10	-0.13	0.61		0.00	0.00	0.00	0.19	0.00	0.02	0.00	0.00	0.64
7 Change in average income	0.03	0.02	0.16	0.06	0.28	0.23		0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
8 Change in insurance premium	-0.01	-0.02	-0.10	-0.06	0.01	0.04	-0.08		0.00	0.00	0.03	0.00	0.12	0.00	0.08
9 Oil county	0.34	0.40	0.02	0.26	-0.03	-0.02	-0.01	-0.04		0.00	0.00	0.00	0.00	0.00	0.00
10 Shale county	0.25	0.26	0.03	0.11	0.02	0.01	0.03	-0.03	0.30		0.00	0.00	0.00	0.00	0.00
11 Support regulating CO2	-0.25	-0.30	0.19	-0.33	0.12	0.06	0.02	-0.01	-0.23	-0.11		0.00	0.00	0.00	0.01
12 Support funding renewables research	-0.21	-0.25	0.19	-0.23	0.05	-0.02	0.13	-0.28	-0.19	-0.09	0.63		0.00	0.00	0.84
13 Belief in anthropogenic climate change	-0.17	-0.22	0.44	-0.06	0.07	0.05	0.18	0.01	-0.16	-0.06	0.69	0.62		0.00	0.29
14 Change in republican vote share	0.07	0.07	-0.10	0.02	-0.01	-0.03	-0.08	-0.04	0.09	0.04	0.08	0.07	-0.10		0.18
15 Damages from natural disasters	0.00	0.01	-0.01	0.04	0.00	0.00	0.02	0.01	0.02	-0.01	-0.02	0.00	-0.01	0.01	

## Appendix 4. Pooled panel regression for shale county as explanatory variable

	<i>Dependent variable:</i>		
	Belief in anthropogenic climate change (1)	Support for funding renewables (2)	Support for CO2 regulation (3)
Shale county	1.009 (1.042)	3.477*** (0.717)	0.344 (0.850)
Change in mining income share	-0.177 (0.370)	-0.336 (0.255)	-0.291 (0.302)
Mining income share	8.654*** (1.548)	5.820*** (1.065)	7.345*** (1.262)
Change in average income	1.825** (0.822)	3.573*** (0.566)	2.911*** (0.671)
Average income	1.569* (0.817)	-0.896 (0.562)	-1.941*** (0.666)
Change in insurance premium	-0.583 (0.706)	0.055 (0.486)	-2.000*** (0.576)
Insurance premium	-0.394 (0.507)	1.111*** (0.349)	-0.771* (0.414)
Damages from natural disasters	0.003 (0.004)	0.007*** (0.003)	0.005 (0.003)
Change in republican support	0.227 (0.144)	0.265*** (0.099)	0.231** (0.117)
Constant	26.040*** (9.230)	73.531*** (6.348)	95.733*** (7.526)
Observations	8,609	8,609	8,609
R <sup>2</sup>	0.928	0.949	0.927
Adjusted R <sup>2</sup>	0.914	0.938	0.913
F Statistic (df = 1451; 7157)	63.813***	91.086***	62.950***

Note:

\* p&lt;0.1; \*\* p&lt;0.05; \*\*\* p&lt;0.01

One period lagged values used for time-variant regressors.

Logarithmic transformations for average income, insurance premium and damages from natural disasters.

All the regressions include control for year and county.

Counties with shale oil compared to counties with no oil or shale plays

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