

The political geography of the international energy transition in the Global South

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January 18, 2025

Abstract

What proportion of existing fossil fuel infrastructure in the Global South can be explained by political targeting compared to geographic endowments? How does this fossil fuel targeting affect countries' ability or willingness to transition to renewable energy sources? Canonically, natural resources for energy generation are geographically determined—but renewable energy sources are more flexible in their potential locations. I examine the political determinants of energy generation projects before and during the international community's green energy investment push. Using geolocated World Bank-sponsored energy projects over time and measures of political targeting, including leader birth regions, ethnicities, and traditional voting blocs, I map the political geography of the energy transition across the developing world. Initial results indicate that, in countries where fossil fuel is disproportionately politically targeted compared to other aid projects, renewable energy projects are disproportionately *less* likely to be politically allocated. The findings suggest that international efforts to support the green energy transition are likely to face opposition from local elites and raise questions about the efficacy of Just Energy Transition Partnerships.

1 Introduction

The global green energy transition requires countries to disinvest in fossil fuel and move towards renewable energy sources. In the Global South, capital constraints mean that much of the energy transition must be supported by international actors. Aid donors, particularly large international development organizations, play a crucial role in funding the energy

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transition in developing countries. However, these donors previously invested heavily in fossil fuel production to alleviate energy poverty in the same developing countries.

The question of whether, and how, energy aid projects are targeted to political constituents combines literature on aid targeting and energy politics in developing states. A large literature examines the political economy of the green energy transition in industrialized countries (Colantone *et al.*, 2022; Mildemberger, 2020; Stokes, 2020; Voeten, 2022)—the distributional effects of phasing out fossil fuels pose large political barriers to adopting green policies.

In the developing world, the dynamics differ. With few exceptions (notably South Africa), fossil fuel labor and industry are less intertwined than in the Global North, making the domestic fossil fuel constituency less politically powerful. For poor countries, however, the costs of abandoning fossil fuel plants are higher simply for the capital constraints these countries face (Bos & Gupta, 2019; Colgan & Hinthorn, 2023). Efforts to invest in new energy sources, while economically efficient in the long term, shift funding from other potential development projects. In places with energy security through fossil fuels, the premature contract termination of coal and oil plants effectively shifts years of revenue away from other development—and disruption of energy production during the transition can cause additional strife. Stranded assets in the global south are economically and politically costly.

While in industrialized countries the fossil fuel constituents hold direct sway over their political representatives, the late industrialization process in developing countries could reverse the direction of this power. In other words, political leaders can target fossil fuel development at their supporters rather than courting the support of fossil fuel constituents. Large infrastructure projects in development, particularly those funded by international donors, are often politically driven. A large literature highlights the political targeting of aid within recipient countries: ethnicity (Briggs, 2014; Isaksson & Kotsadam, 2018; Jablonski, 2014; O'Brien-Udry, 2022, 2021), political affiliation (Briggs, 2012, 2021), and leader birth region

(Dreher *et al.*, 2021) are all factors that cause greater levels of aid support for a given population. Political leaders direct aid to key voters in order to shore up support for their reigns (Briggs, 2015; Jablonski, 2014)—though several new papers question the efficacy of this targeting (Briggs, 2019; O’Brien-Udry, 2021).

Recent work on Chinese aid suggests that increases in Chinese steel exports lead to greater infrastructure investment in Africa and Belt-and-Road Initiative countries (Dreher *et al.*, 2022). The Chinese emphasis on infrastructure projects increases pressure on the World Bank itself to invest more heavily in large-scale infrastructure (Zeitz, 2021). Chinese development projects come with fewer conditions and greater flexibility for political leaders—leading to greater political favoritism in the targeting of Chinese aid projects in comparison to US or World Bank projects—and Chinese preference for infrastructure means that these large projects are especially likely to be politically targeted (Dreher *et al.*, 2021; Isaksson & Kotsadam, 2018).

In the case of energy aid, natural resources are often geographically bound. One cannot mine coal in an area without coal ore nor construct a hydropower station where there is no river. These physical constraints have inspired literature on natural resource windfalls—the discovery of economically productive natural resources either through new exploration or technological change that enhances the existing natural resources’ value. If energy production potential is fully exogenous, political targeting of energy aid would not occur.¹

However, energy production may be geographically fungible on the margins. While raw mineral extraction is certainly geographically constrained, refineries, processing plants, and other downstream industry activities have more flexibility. For renewable energy, these constraints are even less onerous. Solar and wind potential may be greater in some locations

¹A clear exception to this could be that energy potential in a geographic location leads that particular population to develop more economic and political power, causing its members to be more likely to come into office. Any additional investment in energy generation in this region could appear to be politically targeted but could, instead, be the result of energy potential creating political power rather than the opposite.

than others, but neither are fully dependent on geographical location. Even hydropower, constrained as it is to river sites, is politicized by the location along the river that is dammed (Bakker, 1999; Hancock & Sovacool, 2018). For all of these energy plants, an optimal economic location likely exists, and political geographic targeting may reduce energy output—however, this is the cost paid by all political targeting of public goods.

2 Theory

Is internationally funded energy production politically targeted? The answer may depend on the type of good and the timing of the energy project. Compared to other types of projects, fossil fuel projects may be more likely to be politically targeted based on the economic benefits that accrue to local populations. The low-skilled labor market generated by fossil fuel production offers employment opportunities to local constituents. These labor conditions then create demand for additional goods and services that stimulate the local economy. Renewable energy, which requires higher-skilled labor and less daily maintenance, is less likely to cause the same local economic boom. With these assumptions, we should expect fossil fuels to be more politically targeted than renewables.

H1a: Fossil fuel production is more likely to be politically targeted than general aid projects.

H1b: Renewable energy is less likely to be politically targeted than general aid projects.

H1c: Fossil fuel production is more likely to be politically targeted than renewable energy projects.

Renewable technology has advanced rapidly in the last few decades, challenging the axiomatic economic superiority of fossil fuels. At the same time, the costs of climate change and imperative for action to reduce emissions has led aid donors to prioritize decarbonization and the green energy transition. In 2013, the World Bank officially declared it would no longer fund new coal projects (Bank, 2013). With one notable exception, the New Kosovo

coal project in the Balkans (O’Brien-Udry, 2023), the Bank pledged to shift its funding from coal production to renewable energy.

Does political targeting for fossil fuel and renewable energy change when the international community reverses its priorities? Post-2013, two competing pressures emerge. First, the international community’s increased focus on renewable energy should drive greater supply of renewable projects, making it easier for political leaders to capture these projects. If leaders are indeed more likely to come from areas with existing fossil fuel projects, new renewable funding could be a means of compensating the local population for lost development. Second, while the international community increased its funding for renewables, the structural factors that make fossil fuels attractive for political targeting—local labor market forces—still hold in the post-2013 era. These two opposing theories lead to two hypotheses.

H2a: Post-2013, fossil fuels are less politically targeted than renewable energy.

H2b: Post-2013, fossil fuels are more politically targeted than renewable energy.

If donor-funded fossil fuel energy projects are not politically targeted, the international community’s efforts for a just energy transition are more likely to be successful. Concentrating fossil fuel projects in areas with political power likely slows the pace of progress on decarbonization in the same way as developed nations. On the other hand, the political targeting of renewables could generate coalitions of support for decarbonization. In the following sections, I map the locations of energy projects across the world and test whether these projects are colocated in leader birth regions.

3 Data

I identify the universe of World Bank projects from 1955 to 2022 aimed at energy generation through sector categorization and project descriptions. These include any project that invests in: fossil fuel production, renewable production, fossil fuel mining, and fuel trans-

portation. These *do not* include efforts to strengthen the electric grid, energy efficiency, building insulation, battery storage, or other activities that, while improving energy capacity, do not actively invest in a given form of energy. Theoretically, projects aimed at generally improving the power sector in a given country do not generate political cleavages between fossil fuel and renewable energy producers.² Figure 1 shows the location of all energy projects funded by the World Bank globally. Each point represents an individual site; projects may have multiple sites under the same umbrella funding. Fossil fuel projects (orange circles) outnumber renewable energy projects (green triangles).

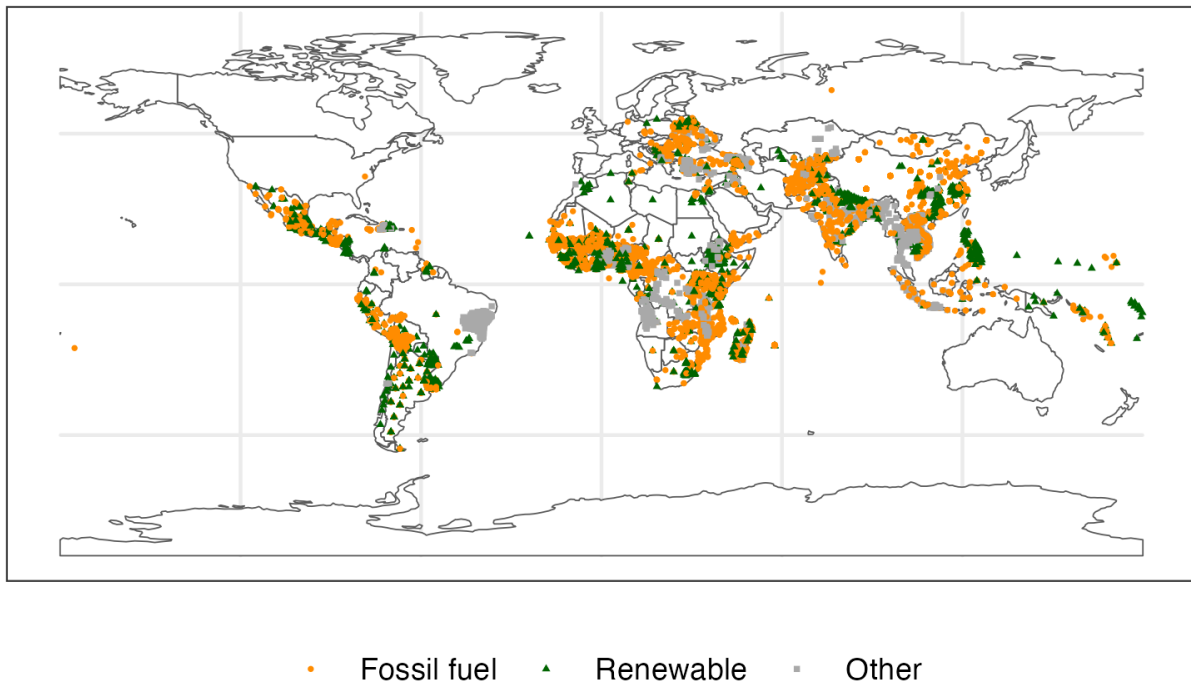


Figure 1: *Geography of energy projects*: Geolocated World Bank energy projects, 1955-2022. Orange circles indicate fossil fuel projects, green triangle renewables, and grey squares other projects.

I then identify whether individual projects are located in the birth region of political

²This is a simplification of energy dynamics for the purpose of initial analysis. See Appendix B for more on the role of grid stability, battery capacity, and overall energy efficiency in supporting the green energy transition. Robustness tests that include these projects do not substantively affect results.

leaders and developed during a leader’s reign. Data on leaders come from the Political Leaders Affiliation Dataset (PLAD) (Bomprezzi, 2020). Projects are considered colocated in a leader birth region if project site coordinates are contained in the district (ADM1) of the leader’s birth and are approved or implemented during a leader’s reign. Figure 2 shows the subset of project sites that are located in the region and started during the reign of a given leader.

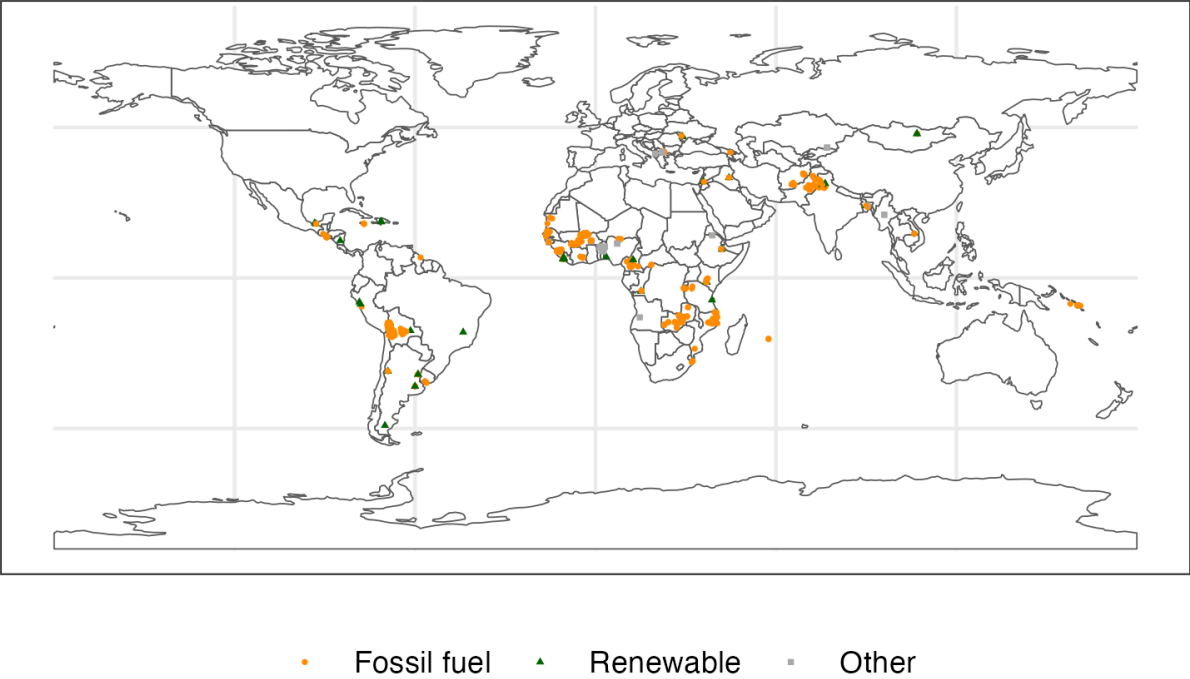


Figure 2: *Political geography of energy projects*: Geolocated World Bank energy projects, 1955-2022, subsetting to projects located in the birth region of political leaders and implemented during their reign. Orange circles indicate fossil fuel projects, green triangle renewables, and grey squares other projects.

The number of renewable projects in leader birth regions is substantially lower than the number of fossil fuel projects. As Table 1 depicts, almost twice as many individual fossil fuel projects are located in leader birth regions compared to renewable energy projects—and four times as many individual fossil fuel sites. Substantively, the proportion of fossil fuel projects

in leader birth regions (20%) is greater than both renewable energy projects (16%), other energy projects (18%), and non-energy projects (18%). Notable, renewable energy projects are less likely than other project subsets to be colocated in leader birth regions.

	# projects		Birth region		Fiscal year			Proj. cost (mill. USD)	GDPpc (country)
	Indv.	Sites	Indv.	Sites	Min.	Max	Mean		
Fossil fuel	350	14485	87	443	2002	2021	2013	178.15	7542
Renewable	226	4711	45	102	1999	2021	2011	205.43	6011.2
Other energy	215	5888	50	255	1996	2020	2012	264.1	4081.8
General	2833	96023	615	2508	1997	2024	2013	134.8	6777.7
Total	3392	114256	738	3041	1996	2024	2013	143.1	6790.9

Table 1: *Summary statistics*

I control for time trends and a number of additional country- and project-level covariates. Richer countries are more likely to receive aid and may have higher capacities to absorb energy aid costs, thus I control for `GDP`. More populous countries may also have higher labor capacity to staff energy projects and are also more likely to receive aid (`Population`). Larger countries may have a greater abundance of natural resources that contribute to energy projects (`Land area`). Democracies are more likely to receive aid than autocracies (`VDem`). Finally, energy projects are likely to be more expensive than general projects due to the infrastructure needed to operationalize these projects (`Project cost`). `GDP`, `Population`, and `Land area` come from the World Development Indicators. `VDem` is the polyarchy variable from Lindberg *et al.* (2014). The `Project cost` come from the Bank’s project-level data. I include country fixed-effects, thus results should be interpreted as within-country changes. I also cluster the robust standard errors by project—as Table 1 shows, projects often have multiple sites. I consider spatial autocorrelation between projects and report Conley standard errors in addition to the robust standard errors.

4 Results

Table 2 displays the main results for OLS regressions. Compared to other types of projects, fossil fuel projects are more likely to be located in a political leader’s birth region. Renewable projects are less likely to be located in a leader birth region, but the estimate is not statistically significant. Comparing renewable projects to fossil fuel projects, renewable projects are highly negatively correlated with collocation in a leader’s birth region.

However, the World Bank does not officially remove its support from any fossil fuels until 2013 when it bans coal. The results in Table 2 may mask important differences in Bank lending before and after its policy change. Splitting the sample before and after the coal ban, Table 3 shows clear changes in political associations of fossil fuels and renewables pre- and post-2013.

In line with the main results, fossil fuels are more likely to be politically co-located prior to 2013. Renewables are much more likely *not* to be co-located politically during this period—both compared to general projects (Model 3) and fossil fuel projects specifically (Model 5). There are no significant differences in energy lending after the 2013 period.

Figure 3 shows yearly estimates of the difference in political collocation of fossil fuel (Panel A) and renewable (Panel B) projects and general projects. The results broadly align with the more coarse analysis of Table 3—fossil fuel projects are more likely to be politically colocated in the pre-2013 era while renewable projects are less likely to be politically colocated during this time period. Appendix Figure 4 shows the comparison between renewable and fossil fuel projects; the pre-2013 era has a discrepancy in collocation that disappears in the post-2013 era.

The results support the theory of political targeting of fossil fuels at the expense of renewable energy. However, the international community’s push towards renewable investment in the post-2013 world shows a change in political targeting of energy projects. Neither fos-

Outcome: energy project (0/1)			
	FF	Renewable	Renewable (vs FF)
	(1)	(2)	(3)
Leader birth region	0.037+ (0.019) [0.015]	-0.008 (0.006) [0.004]	-0.064** (0.023) [0.017]
Year	-0.004+ (0.003) [0.002]	-0.006* (0.003) [0.001]	0.002 (0.010) [0.007]
GDP (log)	0.027 (0.034) [0.032]	0.023 (0.051) [0.023]	-0.431 (0.281) [0.162]
Population (log)	-0.036 (0.053) [0.038]	0.005 (0.048) [0.026]	0.608 (0.433) [0.244]
VDem	0.079 (0.131) [0.134]	-0.048 (0.069) [0.044]	0.074 (0.597) [0.424]
Land area (log)	0.012 (0.020) [0.009]	0.004 (0.035) [0.012]	-0.007 (0.095) [0.035]
Project cost (log)	0.003 (0.007) [0.005]	-0.006* (0.003) [0.002]	-0.031 (0.022) [0.014]
Country FE	✓	✓	✓
Num.Obs.	50397	48002	7140
R2	0.135	0.115	0.484
R2 Adj.	0.132	0.112	0.475

Table 2: *Main results*: OLS estimates for the association between leader birth region and project locations. Model 1 estimates the difference between fossil fuel projects in comparison to other projects (excluding renewables). Model 2 estimates the difference between renewables projects in comparison to other projects (excluding fossil fuels). Model 3 compares renewable projects to fossil fuel projects. All models include country fixed effects and covariates. Robust standard errors clustered by project in parentheses. Conley standard errors in brackets.

Outcome: energy project (0/1)						
	Fossil fuel		Renewable		Renewable (vs FF)	
	Pre-2013	Post-2013	Pre-2013	Post-2013	Pre-2013	Post-2013
	(1)	(2)	(3)	(4)	(5)	(6)
Leader birth region	0.055+ (0.032) [0.026]	0.010 (0.012) [0.010]	-0.014* (0.007) [0.007]	0.004 (0.005) [0.005]	-0.052+ (0.031) [0.023]	-0.016 (0.015) [0.015]
Covariates	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Num.Obs.	26004	24393	24730	23272	4064	3076
R2	0.231	0.194	0.215	0.169	0.606	0.621
R2 Adj.	0.227	0.189	0.211	0.164	0.597	0.610

Table 3: *Temporal results*: OLS estimates for the association between leader birth region and project locations before and after the World Bank’s 2013 pledge to stop funding coal. Models 1 and 2 estimate the difference between fossil fuel projects in comparison to other projects (excluding renewables) pre- (1) and post- (2) 2013. Models 3 and 4 estimate the difference between renewables projects in comparison to other projects (excluding fossil fuels) pre- (3) and post- (4) 2013. Models 5 and 6 compares renewable projects to fossil fuel projects pre- (5) and post- (6) 2013. All models include country fixed effects and covariates. Robust standard errors clustered by project in parentheses. Conley standard errors in brackets.

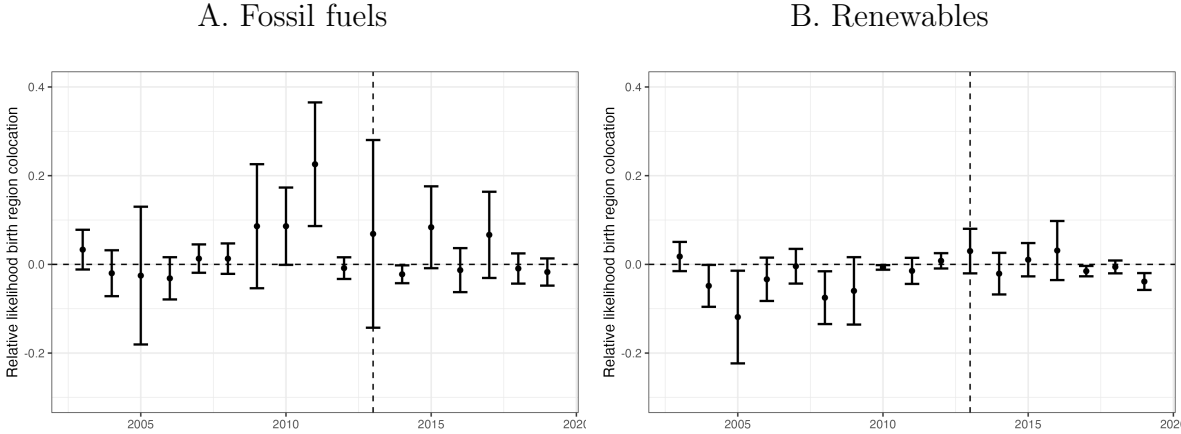


Figure 3: *Event study*: Probability an energy project is politically located by year compared to general projects. OLS with covariates and 95% confidence intervals constructed from Conley standard errors. Dotted line at 2013 to mark World Bank coal cut-off. Left panel (A) shows estimates for fossil fuel projects, right panel (B) for renewables.

oil fuels nor renewable energy projects are politically targeted at higher rates than other projects. The loss of political targeting for energy, particularly renewable energy, could be a sign of increased focus on effective energy development. It could also pose challenges for international efforts to decarbonize if renewable energy is not used to curry favor with political supporters. The lack of political targeting of fossil fuels post-2013, however, is evidence that political leaders may no longer see the economic or political benefits of fossil fuels for their constituents.

5 Conclusion

Under construction.

6 To do:

- Integrate Chinese aid projects – expect more politically targeted
 - Initial results suggest not! Why?
- Map natural resource endowments to address reverse causality
- Geolocate fossil fuel locations slated for decommissioning; particularly those sponsored by the international community
- Placebo test of political targeting

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A Energy projects

Projects are identified as related to energy through keyword searches of project descriptions and titles scraped from the World Bank's website. Two RAs independently coded each World Bank energy project for its involvement in explicit energy generation according to protocol. Intercoder reliability was at XXXX%.

B Non-production energy sector projects

C Robustness

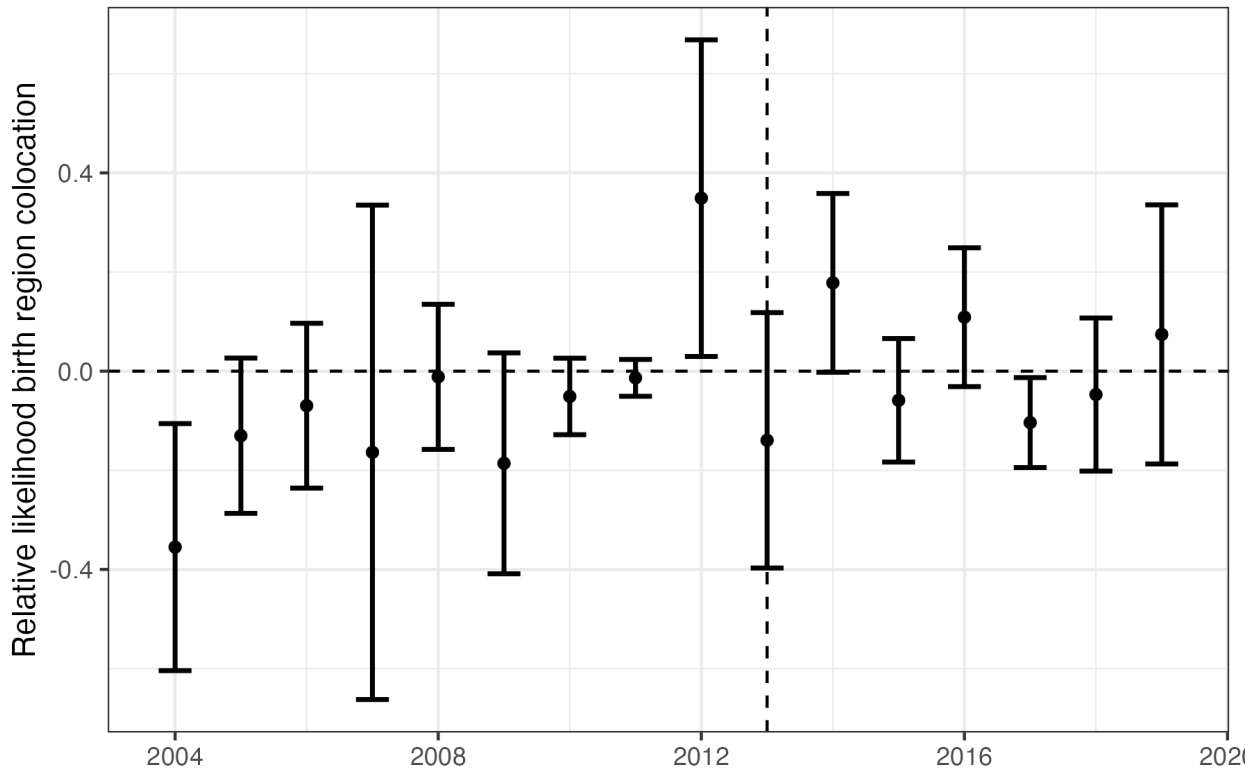


Figure 4: *Renewable vs fossil fuel event study*: Probability a renewable project is politically located by year compared to fossil fuel projects. OLS with covariates and 95% confidence intervals constructed from Conley standard errors. Dotted line at 2013 to mark World Bank coal cut-off.

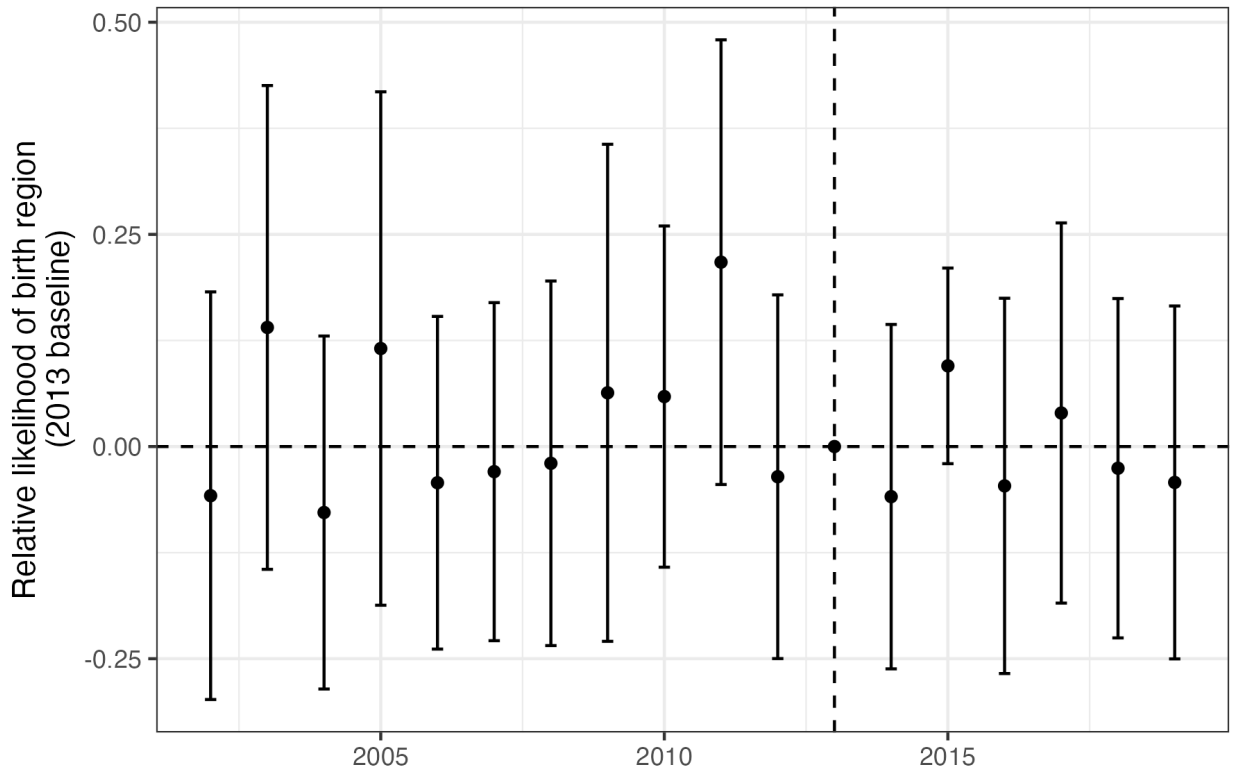


Figure 5: *Fossil fuel event study (2013 baseline)*: Probability a fossil fuel projects is politically located by year compared to 2013. OLS with covariates and 95% confidence intervals constructed from Conley standard errors. Dotted line at 2013 to mark World Bank coal cut-off.

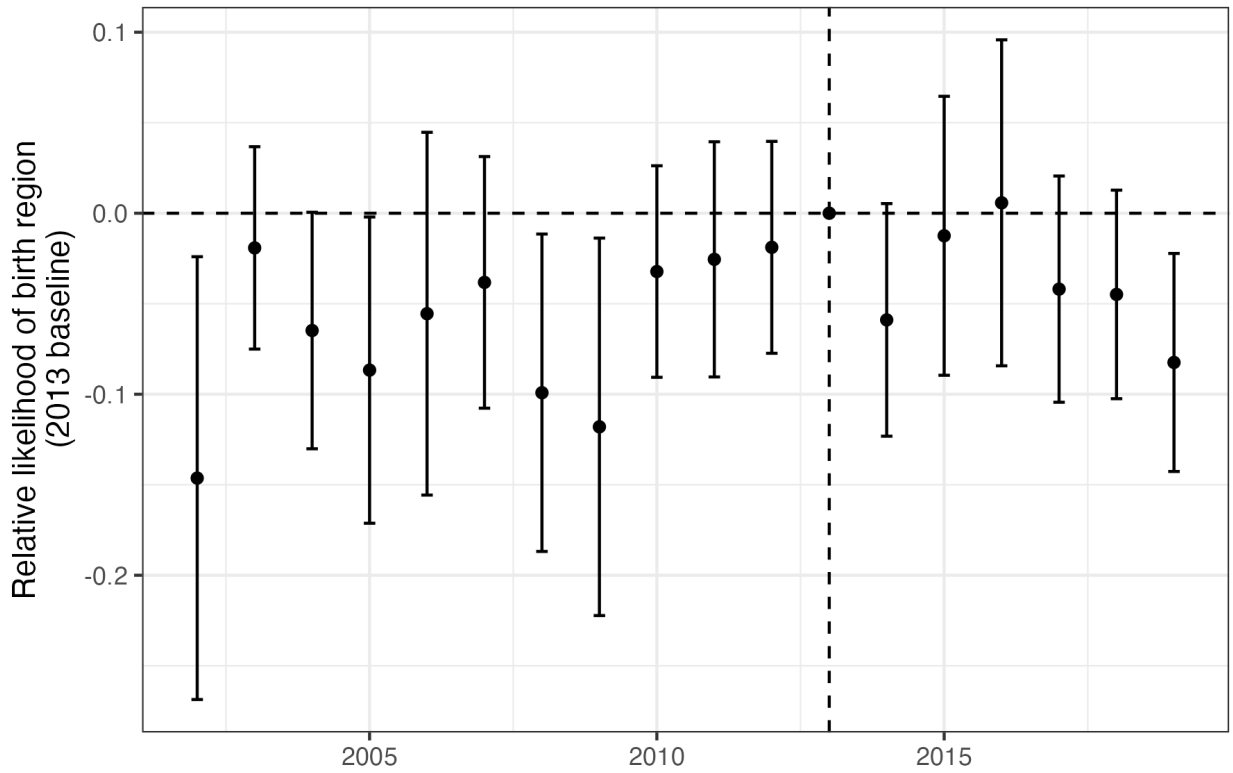


Figure 6: *Renewable event study (2013 baseline)*: Probability a renewable projects is politically located by year compared to 2013. OLS with covariates and 95% confidence intervals constructed from Conley standard errors. Dotted line at 2013 to mark World Bank coal cut-off.

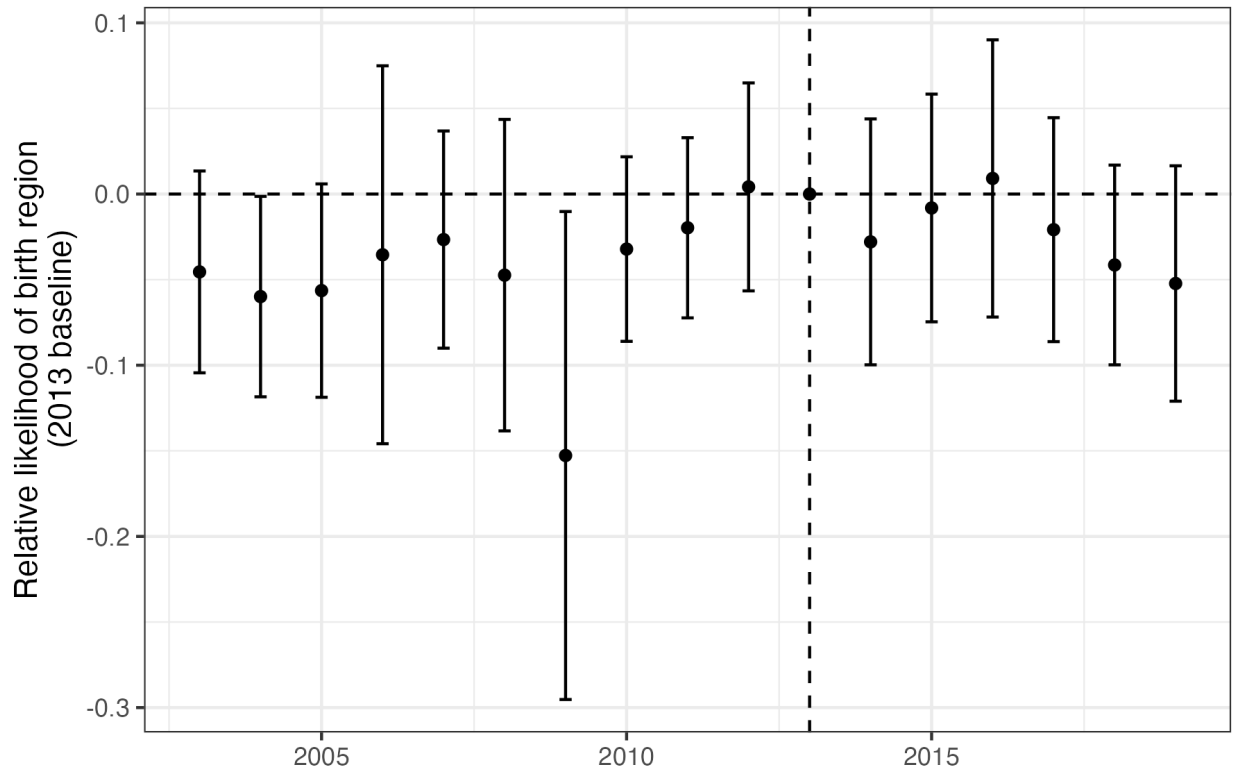


Figure 7: *Renewable vs fossil fuel event study (2013 baseline)*: Probability a renewable project is politically located vs fossil fuel by year compared to 2013. OLS with covariates and 95% confidence intervals constructed from Conley standard errors. Dotted line at 2013 to mark World Bank coal cut-off.