

Political Ideology, Environmental Policy Adaptation, and Greenhouse Gas Emissions

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ABSTRACT

It is widely believed that the willingness to adopt stringent environmental and energy policies, as well as to participate in global climate agreements, is influenced by the political ideology of the party in power. This paper examines how political ideology affects both the adoption and effectiveness of environmental policies, including energy policies, in reducing greenhouse gas emissions (GHGE) across OECD countries. Specifically, we investigate whether the political ideology of ruling parties influences a country's decision to join the global climate action agenda, pursue domestic climate initiatives, and how these choices translate into measurable emission reductions. Using panel data for 31 OECD countries from 1995 to 2021, we employ contemporaneous, lagged, and threshold models within the STIRPAT framework. We find no significant evidence that political ideology alone determines the adoption of global environmental policies. However, when coupled with strong domestic and global environmental policy adaptation and implementation, political ideology contributes significantly to reductions in GHGE. These results are robust across models and alternative estimation techniques. Our findings highlight the economic and policy importance of moving beyond symbolic participation toward genuine climate action, aligning national energy policies with international commitments, and integrating political economy considerations into climate policy design.

Keywords: Political ideology, environmental policy stringency, global climate agreements, greenhouse gas emissions, OECD countries.

1. INTRODUCTION

The accelerating pace of climate change has escalated the need for global cooperation and national responsiveness to environmental policy. Within the Organization for Economic Co-operation and Development (OECD), countries vary significantly in their environmental commitments, often shaped by the political ideology of the prevailing governments. Understanding how these ideologies influence the adoption and effectiveness of global and national climate policies is essential for advancing collective climate action.

The effectiveness of environmental protection policies is often shaped by the political landscape in which they are developed and implemented. Among OECD countries, governments differ widely in their approach to climate action. While some are bold and take proactive steps, others engage more cautiously or reactively. These differences reflect deeper political dynamics that influence how, and whether, environmental policies are prioritized. Gaining a clearer understanding of this relationship is critical for creating policies that are both effective and politically feasible, especially as countries work toward shared sustainability goals.

Using OECD panel data from 1995 to 2021, this study applies a comprehensive analysis framework and robust statistical methodologies to examine the effect of political ideology on environmental policy adaptation. The research objective is to uncover the underlying mechanisms driving policy change and to contribute to the literature on environmental policy development. The findings offer insights to support strategic decision-making and promote sustainable development.

Global climate agreements have provided the foundation for national level climate policies. Over time, these agreements have evolved in response to the escalating urgency of climate change. The 1992 United Nations Framework Convention on Climate Change (UNFCCC) was the first major step, establishing international cooperation on climate mitigation and adaptation. It was followed by the 1997 Kyoto Protocol, the first legally binding treaty requiring developed countries to reduce emissions. However, its second phase never fully materialized due to ratification delays and limited participation in the successor agreement, the Doha Amendment, and the absence of major emitters like the United States.

The 2015 Paris Agreement marked a turning point by involving all countries in the climate effort. It introduced flexible, non-binding nationally determined contributions (NDCs) and set ambitious goals to keep global warming well below 2°C, aiming for 1.5°C. While widely supported, it faces ongoing challenges such as increasing emissions-reduction ambition, securing financing for climate adaptation and mitigation, and addressing climate justice and equity issues. Nonetheless, the Paris Agreement has become a central driver of national climate policy, emphasizing collective responsibility to safeguard the planet for future generations.

OECD countries have responded to global climate agreements with a range of domestic measures including carbon pricing, renewable energy investments, and climate adaptation strategies. However, the pace and rigor of these responses vary. There is some evidence that political ideology plays a significant role with left-leaning and democratic regimes tending to adopt more proactive environmental policies, while right-leaning and autocratic governments often exhibit reluctance or weaker enforcement mechanisms.

Past literature on the association between democratization and environmental policy and outcomes yields mixed results. Some research has linked democratization to more stringent environmental policies and declining CO₂ emissions (Fredriksson & Wollscheid, 2007; Muttakin, Rana & Mihret, 2022; Nazarov and Obydenkova, 2022; Neumayer (2002). Wang, Feng, Wang & Chang (2022) find that left-wing governments are more strongly associated with lower greenhouse gas emissions than right-wing governments, indicating the influence of political ideology on environmental policy and outcomes. Research findings by Lundquist (2024), and Neumayer (2003) on OECD countries support the connection between political party and environmental stringency.

However, a meta-analysis of 72 articles and book chapters reveals that while democracies tend to adopt more environmental policies, the empirical evidence finds only a weak association between democratic development and lower CO₂ emissions (Lindvall & Karlsson, 2024). In addition, democracies grapple with political polarization and lobbying pressures which hinder environmental policy implementation and effectiveness (Li & Reuveny, 2006; Bernauer & Koubi, 2009). Empirical evidence by Escher and Walter-Rogg (2020) finds no consistent evidence that democracies inherently outperform autocracies environmentally. Research on autocratic political systems such as China's finds that the mobility of party secretaries among cities is associated with positive environmental outcomes, though the positive effects can be short-lived (Shao & Chou, 2023; Zhu & Yang, 2023). Wu and Gupta (2022) found that while autocratic regimes with centralized decision-making can implement policies swiftly, they often do so without aligning with public interests.

Beckman (2023) postulates that international institutions can help improve policy implementation by embedding environmental norms in domestic governance frameworks. Research on the impact of international climate agreements shows a reduction in emissions, though outcomes remain mixed when it comes to achieving emissions targets. (Huang et al, 2008; Cifci & Oliver, 2018).

The past literature reveals a complex interplay between political regimes and environmental policy outcomes with inconclusive results. This study addresses the following significant gaps in the literature:

1. Existing research has not explored the interaction between political ideology and policy instruments, such as international climate agreements and measures of policy stringency, which may modify the effect on emissions outcomes. This paper contributes to the literature by examining these interactions to determine, for instance, if the impact of political regime is influenced by signing onto an international climate agreement. The research results imply that political ideology alone is not effective but the coupling of political ideology with policy is effective at either amplifying or diminishing the effectiveness of policy.
2. Most existing literature treats countries as homogeneous units rather than categorizing them based on emission levels. This paper contributes to the literature by distinguishing between high- and low-emitting countries to determine if policy and ideology have different effects across emission regimes. The results indicate that policy and ideology behave differently in high emissions countries compared to low emissions countries.

This study investigates the multifaceted relationship between political ideology and environmental responsiveness across OECD nations from 1995 to 2021 and addresses the following research questions:

- Does political ideology affect participation in global climate agreements?
- Does political ideology influence reductions in greenhouse gas emissions (GHGE)?
- Do national and global environmental policies reduce GHGE?
- Does the interaction between political ideology and environmental policy enhance GHGE reduction?

The empirical investigation is carried out with the Stochastic Impacts by Regression on Population, Affluence, and Technology (STIRPAT) model. An extended version of the STIRPAT model is estimated with panel data from 31 OECD countries over the 27-year period, from 1995 to 2021. By examining both short- and long-term dynamics using panel data and robust econometric methods, this research contributes to the growing literature on environmental governance and political economy. The findings are intended to guide policymakers and scholars in advancing effective climate policy implementation.

2 EMPIRICAL MODEL, VARIABLES & DATA, and ESTIMATION STRATEGY

2.1 Empirical Model

Given that the IPAT model is an identity, impracticalities result in challenges for statistical analysis. In response to the challenges, Dietz and Rosa (1994, 1997) and York et al (2003a, b) developed the testable STIRPAT model that can estimate the impact of environmental policy on greenhouse gas emissions. Later, Wei (2011), Wang, Wu, Zhu and Wei (2013), Shahbaz, Loganathan, Muzaffar, Ahmed and Jabran (2016), Wang, Zeng and Liu (2019), Aziz, Hossain and Lamb (2024) empirically applied the STIRPAT model to estimate the environmental impact to overcome the drawbacks of the IPAT model. The STIRPAT model is grounded in the IPAT model, as follows:

$$I = P A T \quad (1)$$

where, I is the environmental impact, P is population, A is affluence, and T is technology.

Similar to recent research (Parker and Bhatti, 2020; Li, Wang, Liu & Jiang, 2021) we use a per capita GHG emissions model in this study.

Applying the panel structure of equation (2), we can write

$$I_{it} = \alpha P_{i,t}^\beta A_{i,t}^\delta T_{i,t}^\varphi \varepsilon_{i,t} \quad (3)$$

where α and ε are the intercept and error term, respectively. β , δ and φ are the partial impacts of affluence and technology on the environment, respectively.

By taking the natural logarithm of both sides of equation (3), we can write,

$$\ln I_{i,t} = \mu + \beta \ln P_{i,t} + \delta \ln A_{i,t} + \varphi \ln T_{i,t} + e_{i,t} \quad (4)$$

Here, $\mu = \ln \alpha$, and $\ln \varepsilon_i = e_i$

None of the variables in equation (4) directly reflect environmental policy, however, signing the global climate agreements such as UNFCCC (1992), the Kyoto Protocol (UNFCCC 1998), and the Paris Agreement (UNFCCC 2015), directly influenced the member countries to focus on the mitigation of the greenhouse gas emissions, and environmental awareness in many countries has led to an internal rise in the stringency of environmental policy with the intent of reducing emissions. Thus, it is reasonable to suggest that both participating in the global climate commitments and internal environmental policy stringency may influence the dependent variable, environmental impact.

With the STIRPAT model, when the policy effects are identified, the estimation generally omits the variable $T_{i,t}$ (and any direct proxy for it) and instead constructs an estimate of $T_{i,t}$ as a residual. Using this approach, additional controls can be included to proxy components of T . In this case, the empirical model becomes,

$$\ln I_{i,t} = \mu + \beta \ln P_{i,t} + \delta \ln A_{i,t} + \{\tau(\text{Policy})_{i,t}\} + z\text{Contol}_{i,t} + e_{i,t} \quad (5)$$

Our "Policy" variable includes joining the global climate agreements for each country in the specific year(s) and employing the level of environmental policy stringency. The addition of a policy component to the STIRPAT model is theoretically novel, potentially broadening the use of the model in future applications. "Control" includes other variables such as trade openness (more trade, more emissions), renewable energy, etc.

The econometric model based on equation (5) can be written as,

$$\ln(GHGE)_{it} = \beta_0 + \beta_1 \ln(POP)_{i,t} + \beta_2 \ln(RGDP)_{i,t} + \beta_3(OPEN)_{i,t} + \beta_4(PI)_{i,t} + \beta_5(GCA)_{i,t} + \beta_6(EPS)_{i,t} + \beta_7(REN)_{i,t} + \lambda_i + \eta_t + e_{it} \quad (6)$$

where, $GHGE$ represents greenhouse gas emissions, $RGDP$ represents real GDP in dollars, $OPEN$ represents trade openness, PI for the political ideology of the ruling government, GCA for the participating years in global climate agreements, and EPS for environmental policy stringency (internal policy for environmental protection), and REN for renewable energy. λ_i for the country fixed effects, η_t for time fixed effects and e_{it} is the error term.

2.2. Variables and Data

The dependent variable, $GHGE$ represents trends in man-made emissions of major greenhouse gases and emissions by gas, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3), collected from the OECD Statistics. The *population* is the number of people in a country each year. *Real GDP* is the real GDP of each country in constant 2015 prices, expressed in U.S. dollars. Dollar figures for GDP are

converted from domestic currencies using 2015 official exchange rates. The *trade openness* variable is the trade (% of GDP), and the *renewable energy* variable is the renewable energy consumption (% of total final energy consumption). Data on population, real GDP, trade openness, and governance and institutions variables were collected from the World Development Indicators of the World Bank. Data for *global climate agreements* (UNFCCC, Kyoto Protocol, and Paris Agreement) came from the United Nations Treaty Collection (UNTC) database. Data for the *internal environmental policy* - Environmental Policy Stringency (EPS) index was collected from the OECD Environmental Policy Stringency Index. The *political ideology* of the ruling government is the proportional representation of parties' parliamentary seats in government (right-wing, left-wing, or center parties), adjusted based on the duration of their tenure within a given year. Data was collected from Armingeon, Engler, Leemann and Weisstanner's (2023) "Comparative Political Data Set 1960-2021". The key variables of political ideology, global climate agreements and environmental policy stringency are explained in greater detail below.

Political Ideology

Political ideology is an important variable for this study. Using the Comparative Political Data Set (Armingeon et al., 2023), we examined three broadly defined political ideologies in the OECD countries which may represent their attitude towards joining international climate agreements.

To capture the political ideology of a rolling government, multiple political ideology variables could be used from the existing databases, such as, (a) Cabinet posts of the parties as a percentage of total cabinet posts weighted by the number of days in office in each year. (b) Relative power position of the parties in government based on their seat share in parliament, measured as a percentage of the total parliamentary seat share of all governing parties weighted by the number of days in office in each year. (c) Parliamentary seat share of the parties in government weighted by the number of days in office in each year.

This study applied option c), as we believe this measure best represents a states' political ideology. There are three major classifications of political ideology of a government ruled by political parties. They are –(i) **Right-wing government:** parliamentary seat share of right-wing parties in government weighted by the number of days in office in each year. (ii) **Left-wing government:** parliamentary seat share of social democratic and other left parties in government weighted by the number of days in office in each year. (iii) **Centre government:** parliamentary seat share of center parties in government weighted by the number of days in office in each year.

Table 1 shows the descriptive statistics of the power share of the political ideologies during the period 1995-2021 for OECD countries, which illustrates that right-wing ideologies were in power for the longest period among the three political ideologies, followed by left-wing and then center ideologies.

Table 1: Political power-sharing matrix

Political Ideology	No of Year/Obs	Mean	SD	Dummy	
				0	1
Right-Wing	27/837	24.61	21.67	243	594
Left-wing	27/837	18.37	19.23	332	505
Center	27/837	11.35	15.64	396	441

Table 2 illustrates the parliament seat majority matrix of the political ideologies. The right-wing government received the majority in the parliaments for the highest number of periods between 1995 and 2021, followed by left-wing and then center ideologies.

Table 2: Majority Matrix (when equal number of seats – common majority power)

	Right-Majority	Left-Majority	Center- Majority
No of Years -Majority	414	295	156
Year of Sharing-Majority	R-L: 10 times R-C: 6 times	L-C: 13 times R-C: 6 times	

Note: R-L, R-C, and L-C are right-left, right-center and left-center shares of an equal number of seats in the parliament, respectively.

Global Climate Agreements

This study incorporates three international climate agreement variables to analyze the political regime under which a country joined the agreement, specifically examining the political ideology in power at the time of accession. A brief description of the measurement of these agreements follows.

(a) The UNFCCC (United Nations Framework Convention on Climate Change) is a dummy variable with a value of 1 for a country for each year it was a member of the UNFCCC. For instance, Australia is coded 1 from 1995-2021 indicating that it has been a member of the UNFCCC and has actively participated in the agreement during that time. The UNFCCC remains an active global agreement. While the Kyoto Protocol came into effect as a legally binding agreement in 2005, the UNFCCC remains the overarching framework for international cooperation on climate change. So, even though countries may have also participated in the Kyoto Protocol, their membership in the UNFCCC would still be ongoing. (b) The dummy variables for the Kyoto Protocol fluctuate to reflect changes in a country's participation or commitment during those years. A value of 1 indicates active participation or compliance, while a value of 0 suggests non-compliance or a period where the country was not bound by the protocol's commitments. (c) The Paris Agreement was adopted in 2015 and was open for signatures in April 2016. Therefore, no country signed the agreement in 2015. The delay between adoption and signing may be due to procedural or logistical reasons within individual countries. A value of 1 represents signing or compliance during the period since 2015.

Environmental Policy Stringency Index

This study incorporates the Environmental Policy Stringency Index (EPS) as a measure of the internal pro-environment policies adopted by OECD countries which has been used in similar research (Albrizio, Koźluk, Zipperer, 2017; Azziz, Hossain, Lamb, 2022). The OECD Environmental Policy Stringency Index (EPS) is an internationally comparable, country-specific measure of environmental policy stringency. It quantifies the extent to which environmental policies impose an explicit or implicit cost on polluting or environmentally harmful activities. The index evaluates the stringency of 13 environmental policy instruments, primarily targeting climate and air pollution. It ranges from 0 (least stringent) to 6 (most stringent) (Botta & Koźluk, 2014).

2.3. Estimation Strategy

Equation (6) is used as the baseline model. In addition to the focused and control variables, we have also included interaction terms to assess the joint impact of ideology and policy (*EPS* and *Paris*). In the case where the time dummy was used for global climate agreements, we applied only country-specific fixed effects.

Although the variance in income among OECD countries is not very large compared to the rest of the world, Table 3 shows a significant variation in political ideology, responses to global climate agreements, formulation of internal environmental policies, development of green technologies, and the level and rate of greenhouse gas emissions. Therefore, we apply the Fixed Effects Model (FEM) to account for country-specific heterogeneity in the empirical estimation. We also use the Pooled OLS (POLS) estimator to compare the results with those of the FEM.

It can be argued that the effects of political ideology and national and global policies may take time to influence outcome variables. Therefore, in addition to contemporaneous models, we also employ lagged models to examine their impact on greenhouse gas emissions (GHGE).

Although the analysis on the UNFCCC and Kyoto agreements is presented in Table 3, these agreements are not included in the empirical model. Although preventing “dangerous” human interference with the climate system is the ultimate goal of the UNFCCC, the UNFCCC was the first step in recognizing that there is an environmental problem and that there should be some reporting, responsibilities, and dialogue among the member countries. The Kyoto Agreement (with two commitment periods, 2005–2012 and 2013–2020) was an important 2nd step given the global agreement focused on legally binding emission reduction targets for developed countries during specific commitment periods. Moreover, the 2nd phase of the Kyoto Protocol overlaps with the Paris Agreement period. Unlike the Kyoto Protocol, the Paris Agreement (with a real plan to reach Net Zero Carbon Emission) requires all countries, both developed and developing, to submit Nationally Determined Contributions (NDCs) outlining their plans for GHG reductions and to update these plans every five years.

The Kyoto Protocol, which came into effect in 2005, aimed to reduce greenhouse gas emissions. However, it did not immediately result in significant emission reductions. This delay in effectiveness is largely because, like climate change itself, the impact of climate policies takes considerable time to become apparent in environmental outcomes. Meanwhile, we see a real plan in the Paris Agreement, which shows a more fruitful outcome than the other two global climate agreements.

The United States is the only OECD country that has never ratified the Kyoto Protocol. Therefore, the Kyoto Agreement dummy variable is assigned a value of 0 for the U.S. throughout the entire study period.

The United States signed the Paris Agreement on April 22, 2016, and formally joined on September 3, 2016. The treaty officially entered into force for the U.S. and other signatories on November 4, 2016, after the required threshold of countries and emissions share was met. Accordingly, our Global Climate Agreement variable for the Paris Agreement takes the value 1 for the period from 2016 to 2021. However, the U.S. case requires special consideration. On November 4, 2020, the U.S. officially withdrew from the agreement and then rejoined on February 19, 2021. A second withdrawal notice was issued on January 20, 2025. Since our dataset covers up to 2021, we treat the U.S. as an official member of the Paris Agreement during the period 2016–2019 and again in 2021.

3. DESCRIPTIVE ANALYSIS

Descriptive statistics of the key variables of political ideology, global climate agreements, policy stringency (EPS), emissions (GHGE) and green technology are presented in Table 3. The third column of Table 3 indicates whether political ideology appears to influence a country's decision to join each of the three global climate agreements (column 4). The descriptive statistics do not reveal an association between political ideology of the ruling parties and participation in global climate agreements with the sole exception of the US, where right-wing political ideology is consistently associated with not joining global climate agreements. In the US, the ideologically right party has always refused to sign global climate action agreements. The ideologically left party in the US was never in power during the signing years. According to the data in Table 3, there appears to be no meaningful difference in the participation of left-, right-, or center-leaning governments in global climate change agreements.

Regarding average annual emissions, shown in column (5), the US is the highest greenhouse gas emitter, followed by Japan, Germany, Canada, the UK, Australia, Italy, and France, among OECD countries, from 1995 to 2021. The group of countries referred to as high emitters have average annual emissions above the mean emissions value (461,172.2 Mt). Among the high emitters, the US — the highest emitter — has the lowest Environmental Policy Stringency (EPS) Index compared to all other high emitters countries.

Table 3: Political Ideology, Global Climate Agreements, Internal Environmental Policy, and GHGE

(1)	(2)	(3)	(4)			(5)	(6)
Country	Code	Is joining Global Climate Agreements associated with a political ideology?	Share of representation in the parliament & year of signing the agreement			Average GHGE	Average EPS (Scale 0 to 6)
			UNFCCC (1992)	Kyoto Protocol (1997, effective from 2005)	Paris Agreement (2015)		
1. Australia	AUS	No	Left 54.4 (1995)	Right 53.39 (2007)	Right 55.78 (2016)	526,155.7	1.937
2. Austria	AUT	No	Left 35.5 & Centre 28.4 (1995)	Right 28.4, Centre 28.4 (2002)	Left 28.4, Centre 26.7 (2016)	82,768.91	2.485
3. Belgium	BEL	No	Left 28.44, Central 27.11 (1995)	Right 27.3, left 35.3 (2002)	Right 22.6, central 34.0 (2016)	133,785.6	2.311
4. Canada	CAN	Yes, central	Central 60.0 (1995)	Central 57.1 (2002)	Central 54.4 (2016)	706,871.8	2.165
5. Czech Republic	CZE	No	Right 45.0, Centre 7.5 (1995)	Left 37 (2001)	Right 24.31, Left 23.7 (2017)	140,656.1	2.362
6. Denmark	DNK	No	Left 35.4, Right 4.6, Centre 2.9 (1995)	Right 41.1 (2002)	Right 30.3 (2017)	65,647.11	2.998
7. Estonia	EST	No	Left 32.27, Right 14.25, Centre 8.66 (1995)	Centre 25.65, Right 19.12, Left 1.24 (2002)	Right 40.44, Left 14.9, Centre 2.85 (2016)	18,818.46	2.526
8. Finland	FIN	No	Left 33.87, Right 25.64, Centre 7.68 (1995)	Left 29.11 Centre 19.51 Right 11.62 (2002)	Right 37.5, Centre 24.5 (2016)	67,762.95	3.008
9. France	FRA	No	Right 44.5, Centre 37.3	Right 36.83, left 18.57, central 4.91	Left 53.2 (2016)	506,986.6	3.076

			(1995)	(2002)			
10. Germany	DEU	Somewhat, centre & left	Centre 43.7, Right 7 (1995)	Left 51.34 (2002)	Centre 49.3, Left 30.6 (2016)	957,161.4	2.643
11. Greece	GRC	Yes, left	Left 56.7 (1995)	Left 52.7 (2002)	Left 48.3, Right 3.3 (2016)	113,438.3	2.075
12. Hungary	HUN	No	Left 54.1, Right 17.9 (1995)	Left 32.62, Right 20.2 (2002)	Right 66.8 (2016)	70,276.8	2.324
13. Iceland	ISL	Right	Right 40.19, Centre 16.5, left 4.88 (1995)	Right 41.3, Centre 19 (2002)	Right 32.48, Centre 17.34 (2016)	4,455.06	.395
14. Ireland	IRL	Centre & Right	Centre 27.1, Left 22.3	Right 51.55 (2002)	Centre 36.49, Left 7.68 (2016)	64,917.75	2.052
15. Italy	ITA	No difference	Right 2.6, Centre 0.23 (1995)	Right 49.9, Centre 6.5 (2002)	Left 47.34, Centre 4.57 (2016)	511,785.4	2.806
16. Japan	JPN	Right	Right 43.6, Left 13.7, Centre 2.5 (1995)	Right 50.0, Centre 6.5 (2002)	Right 61.1, Centre 7.4 (2016)	1,326,980	3.094
17. Latvia	LVA	Right	Right 36.09, Left 0.78, Centre 0.24 (1995)	Right 57.47, Left 6.75, Centre 3.44 (2002)	Right 40, Centre 21 (2017)	11,149.07	-
18. Lithuania	LTU	Left	Left 51.8 (1995)	Left 34, Central 19.9 (2002)	Left 51.02 (2017)	21,277.16	-
19. Luxembourg	LUX	No difference	Left 28.3, Centre 35 (1995)	Right 25, Centre 31.7 (2002)	Right 21.7, Left 31.7 (2016)	10,828.25	2.853
20. Netherlands	NLD	Right	Right 20.7, Left 21.7, Centre 16 (1995)	Right 25.22, Left 16.6, Centre 17.96 (2002)	Right 27.3, Left 25.3 (2016)	206,412.1	2.58
21. New Zealand	NZL	No difference	Right 50.5 (1995)	Left 47.54 (2002)	Right 49.57 (2016)	77,186.51	.566

22. Norway	NOR	No difference	Left 40.6 (1995)	Right 24.2, Central 13.3 (2002)	Right 45.6 (2016)	53,537.14	2.806
23. Poland	POL	No difference	Left 65.9 (1995)	Left 56.1 (2002)	Right 51.1 (2016)	404,308.5	2.128
24. Portugal	PRT	Right	Right 48, Left 8.67 (1995)	Right 38.03, Left 13.29 (2002)	Right 37.3 (2016)	72,724.54	2.181
25. Slovakia	SVK	Right	Right 46.5, Left 8.1 (1995)	Right 33.34, Left 13.37, Centre 14.03 (2002)	Right 25.37, Left 25.8, Centre 3.65 (2016)	46,566.68	1.856
26. Slovenia	SLV	Right	Right 24.5, Left 15.6, Centre 16.7 (1995)	Right 37.8, Left 22.36 (2002)	Right 40.0, Left 17.8 (2016)	19,017.82	1.802
27. Spain	ESP	Left & Centre	Left 45.40 (1995)	Centre 52.30 (2002)	Centre 38.30 (2017)	358,071.3	2.053
28. Sweden	SWE	Left	Left 46.10 (1995)	Left 38.45 (2002)	Left 39.6 (2016)	62,127.22	2.935
29. Switzerland	CHE	Yes, right	Right 34.6, Left 20.84, Centre 17.95 (1995)	Right 43.5, Left 25.5, Centre 17.5 (2002)	Right 49, Left 28.6, Centre 14 (2016)	52,190.9	3.072
30. UK	GBR	No	Right 51.6 (1995)	Left 62.5 (2002)	Right 50.81 (2016)	621,844.4	2.435
31. USA	USA	No, centre is in favour and right is against	Centre 46.9 (1995)	NONE	Centre 48.2, Right 2.68 (2021)	6,980,628	1.891

Note 1: Ratification years are in parentheses. The United Nations Framework Convention on Climate Change (UNFCCC) is the designated avenue within the UN for negotiating measures aimed at curbing perilous climate shifts, established in 1992. Subsequently, the Kyoto Protocol, sanctioned on December 11, 1997, took effect on February 16, 2005. The Paris Agreement, also known as the Paris Accords or Paris Climate Accords, emerged as an international treaty addressing climate change, ratified in 2015.

Note 2: Bold font in column 5 indicates the countries with emissions levels above the mean level of 461,172.2 Mt.

Figure 1: History of high-emitter countries and their ruling governments' political ideology

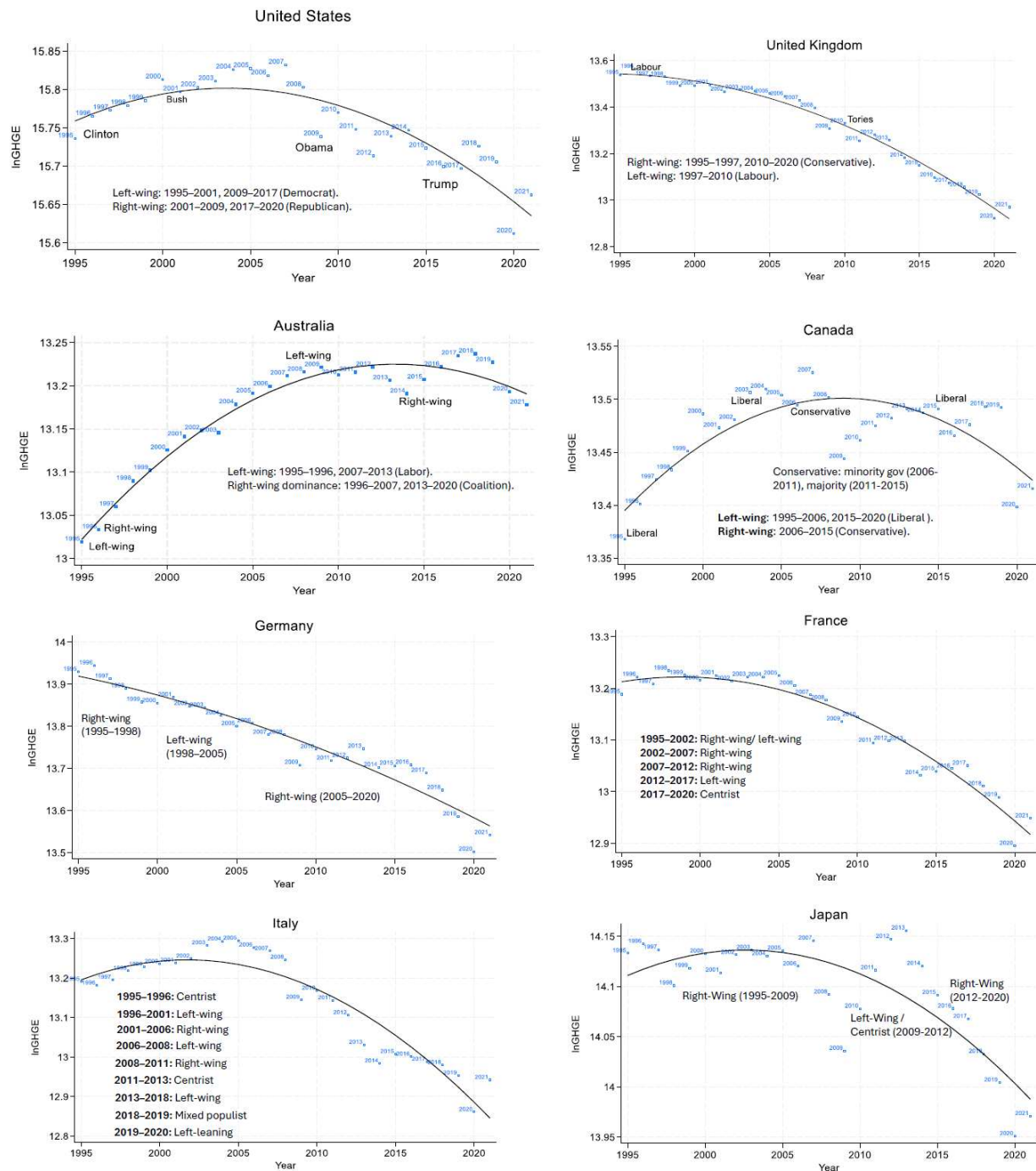


Figure 1 illustrates the trajectory of logged greenhouse gas emissions (lnGHGE) from 1995 to 2020 across eight major OECD countries, overlaid with the political orientation of their ruling governments. Most countries display an inverted-U pattern in emissions, with peaks occurring at various points in the early to mid-2000s, followed by gradual declines—suggesting a long-run downward trend in emissions

irrespective of political ideology. However, political shifts may influence the pace and intensity of these changes.

Generally, left-wing or centrist governments tend to be associated with more pronounced reductions in lnGHGE, particularly in the UK, Germany, and France. For instance, the UK experienced sustained emissions declines during Labour (1997–2010) and Conservative (2010–2020) leadership, while Germany and France experienced sharper decreases under right-wing and centrist regimes in the 2010s. In contrast, the U.S. saw emissions stagnate or rise during republican leadership (Bush and Trump), with some decline during Obama’s democratic tenure. These patterns suggest that although emissions are falling across OECD countries, political ideology—particularly shifts between left- and right-leaning governments—may moderate the rate and consistency of progress toward decarbonization.

5. ESTIMATED RESULTS AND ANALYSIS

We estimated the empirical model (6) with the results presented in Table 4a. The basic model (1) yields the expected results with population, real GDP, and trade openness having positive and significant effects on greenhouse gas emissions, while investment in renewable energy significantly reduces emissions.

The fixed effects models (2) and (3) introduce the political ideology of the ruling government and domestic and global policy adaptation and/or implementation. Model (3) builds upon model (2) by adding interactions between government ideology and policy variables (EPS and Paris Agreement). The results of model (2) indicate no significant influence of either political ideology (PI) of the ruling governments on reducing GHGE. However, the results imply that the national and global environmental policies (EPS and Paris), coupled with the political ideology can significantly reduce the GHGE. Left-wing governments play a stronger role in reducing GHGE, compared to right-wing governments. Why do the right majority and the left majority governments become positive and significant in model (3) compared to model (2)? This can be explained by the fact that model (2) averages across all values of EPS and the Paris Agreement, so it dilutes the ideological effect, which explains the non-significance.

In model (3), interaction between ideology and policies (EPS, Paris), the base coefficients for right-wing and left-wing majority governments now capture the effect of ideology when policy is absent or zero. In Model (3), positive and significant coefficients of political ideology suggest that in the absence of strong EPS or the Paris Agreement, both right-wing and left-wing governments tend to increase GHG emissions relative to the omitted (centrist/no-majority) category. The most pertinent results of this study are revealed in models (2) and (3). A summary of the key results is shown in Table 4(b).

Table 4a: Impact of Political Ideology and National and Global Environmental Policy on GHGE of OECD countries

Variables	Fixed Effects			Pooled OLS		
Dep. lnGHGE	(1) Basic	(2) PI	(3) PI*EP	(4) Basic	(5) PI	(6) PI*EP
lnPOP	.232*** (.050)	.404*** (.064)	.386*** (.063)	.605*** (.021)	.690*** (.021)	.686*** (.021)
lnRGDP	.091*** (.020)	.240*** (.027)	.219*** (.027)	.263*** (.017)	.215*** (.021)	.210*** (.021)
lnOpen	.045* (.025)	.079*** (.024)	.090*** (.023)	-.315*** (.030)	-.210*** (.038)	-.222*** (.038)
lnRenewable	-.221*** (.008)	-.177*** (.008)	-.177*** (.008)	-.215*** (.014)	-.143*** (.015)	-.149*** (.016)
EPS (National Policy Adaptation Index)		-.043*** (.005)	-.020** (.009)		-.092*** (.014)	-.156*** (.033)
Paris (Global policy adoption dummy)		-.088*** (.007)	-.056*** (.014)		-.042 (.031)	.093 (.064)
Right_majority (dummy)		-.009 (.008)	.057** (.021)		-.144*** (.032)	-.286*** (.090)
Left_majority (dummy)		-.005 (.008)	.081*** (.022)		-.201*** (.032)	-.364*** (.092)
Right-EPS			-.021** (.008)			.072* (.037)
Left-EPS			-.028*** (.008)			.085** (.038)
Right_Paris			-.022 (.016)			-.138* (.072)
Left_Paris			-.071*** (.018)			-.203** (.082)
Con.	5.866*** (.764)	-.951 (.920)	-.211 (.913)	-3.145*** (.369)	-3.50*** (.521)	-3.133*** (.544)
Obs.	804	751	751	804	751	751
Countries	31	29	29	31	29	29
Country FE	Yes	Yes	Yes	No	No	No
R ² (o.a) /Adj R ²	.89	.94	.94	.96	.96	.96
F-Stat	238.8***	170.48***	123.35***	4618.2***	2371.9***	1591***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses. Although both the FEM and pooled models are presented in the table, our main analysis is based on the FEM, as accounting for country fixed effects is important for this study.

Table 4(b) Comparison of results of key variables with and without interactions

Insight	FE Without Interactions (Model 2)	FE With Interactions (Model 3)
Political Ideology	Not significant	Significant, conditional on EPS & Paris
EPS Effect	Strong overall	Strong, and marginally larger under a left gov't
Paris Effect	Strong overall	Strong only under a left gov't

Why are right-wing and EPS interaction, and left-wing and EPS interaction terms negative and significant? These interaction terms capture how environmental policy stringency (EPS) reduces emissions under each ideology. Both coefficients are negative and significant, meaning that environmental policies work under both right and left governments, but the left-wing government's effect is slightly larger (coefficient: -0.028 vs. -0.022). Thus, we can suggest that when left-wing governments implement policy, the emissions are reduced more than when right-wing governments implement policy.

Why is the left-wing government and Paris Agreement interaction term significant while the right-wing government and Paris Agreement interaction term is not? Under left-wing governments, joining the Paris Agreement has a clear impact on lowering emissions (-0.071 , significant). However, under right-wing governments, joining the Paris Agreement does not significantly affect emissions (-0.022 , not significant). This means that the commitment to international climate agreements like Paris appears to be more effective when left-wing parties are in power, possibly due to stronger political will and implementation.

Lag Model

There is an argument that the influence of the political ideology of ruling governments and national and global environmental policies may take time to be reflected in any outcome variable, such as GHGE. Therefore, we use lag models to estimate the impact of those on GHGE with the results shown in Table 4(c).

Table 4(c): Impact of Political Ideology and National and Global Environmental Policy Adoption on GHGE of OECD countries (Lag models).

Variables	Fixed Effects			Pooled OLS		
Dep. lnGHGE	(1) Basic	(2) PI & EP	(3) PI*EP	(4) Basic	(5) PI & EP	(6) PI*EP
L1.lnPOP	.119** (.053)	.328*** (.068)	.319*** (.068)	.600*** (.021)	.687*** (.021)	.683*** (.021)
L1.lnRGDP	.078*** (.021)	.228*** (.029)	.207*** (.028)	.262*** (.018)	.216*** (.021)	.212*** (.021)
L1.lnOpen	-.013 (.026)	.026 (.025)	.034 (.025)	-.333*** (.031)	-.217*** (.038)	-.228*** (.038)
L1.lnRenewable	-.207*** (.009)	-.163*** (.009)	-.161*** (.009)	-.219*** (.014)	-.142*** (.016)	-.149*** (.016)
L1.EPS (National Policy Adaptation Index)		-.047*** (.005)	-.024** (.009)		-.099*** (.015)	-.166*** (.034)
L1.Paris		-.092***	-.072***		-.049	.077

(Global policy adoption dummy)		(.008)	(.015)		(.031)	(.064)
L1.Right_majority (dummy)		-.015*	.042*		-.151***	-.304***
		(.008)	(.023)		(.032)	(.090)
L1.Left_majority (dummy)		-.010	.072***		-.211***	-.384***
		(.008)	(.023)		(.033)	(.092)
L1.Right-EPS			-.019**			.074*
			(.009)			(.037)
L1.Left-EPS			-.027***			.089**
			(.009)			(.038)
L1.Right_Paris			-.004			-.123*
			(.017)			(.073)
L1.Left_Paris			-.066***			-.201**
			(.019)			(.083)
Con.	8.233***	-.812	1.414	-2.94***	-3.44***	-3.066***
	(.813)	(.980)	(.978)	(.373)	(.523)	(.545)
Obs.	804	751	751	804	751	751
Countries	31	29	29	31	29	29
Country FE	Yes	Yes	Yes	No	No	No
R ² (o.a) /Adj R ²	.85	.94	.94	.96	.96	.96
F-Stat	223.9***	161.8***	115.7***	4518.3***	2358***	1581.7***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses.

Table 4(c) indicates that the effect of control variables (POP, RGDP, Renewable) remains largely stable, suggesting robustness of these determinants across specifications.

The estimated results of model (3) show that the interactions between political ideology and environmental policy adaptation/implementation reduce greenhouse gas emissions, while political ideology alone does not. Model (3) reveals the importance of heterogeneity in how political ideology mediates policy effectiveness. Left governments appear more committed to global climate agreements (Paris) and more stringent environmental policies (EPS) leading to stronger emission reductions. Right governments, while still responsive to policy stringency, appear less committed or effective in leveraging international agreements.

In model (3), the positive and significant coefficients for right-wing majority and left-wing majority governments indicate that ideology alone, without policy tools, may be associated with higher emissions. However, when political ideologies are coupled with stronger environmental policy (EPS) or global agreements (Paris), both left-wing and right-wing governments reduce emissions, with left-wing governments being more effective. The left government's engagement with the Paris Agreement significantly reduces emissions, while the right-wing government's engagement does not.

Both models (2) and (3) account for a substantial portion of the within-country variation in emissions. While the inclusion of interaction terms in Model 3 does not significantly enhance the overall model fit, it adds valuable insights by clarifying the role of political ideology in shaping the effectiveness of environmental policies.

Threshold Model

Countries with relatively high emissions may behave differently than countries with relatively lower emissions, thus two models are estimated for each of the two country groups (see Figure 1 for high emitter countries). The models separate the sample into two groups, high emitters and low emitters, based on a threshold value of mean emissions (461,172.2 Mt). Those in the low emissions group have emissions below the mean and those in the high emissions group have emissions above the mean. Models (1) and (2) include both the political ideology and national and global environmental policy variables, whereas models (3) and (4) include the interaction variables as well.

Table 5(a): Impact of Political Ideology and National and Global Environmental Policy: Threshold GHGE Models.

Variables	Fixed Effects (Threshold GHGE, Political Ideology, and Environmental Policy)			
	(1) Low emitter countries	(2) High emitter countries	(3) Low emitter countries with interactions	(4) High emitter countries with interactions
Dep. lnGHGE				
lnPOP	.406*** (.075)	.212 (.154)	.379*** (.076)	.200 (.159)
lnRGDP	.269*** (.032)	.144* (.076)	.243*** (.032)	.158** (.081)
lnOpen	.074*** (.030)	.113*** (.029)	.079*** (.030)	.108*** (.030)
lnRenewable	-.184*** (.011)	-.177*** (.010)	-.182*** (.011)	-.180*** (.010)
EPS (National Policy Adaption Index)	-.051*** (.006)	-.017** (.006)	-.018 (.012)	-.011 (.010)
Paris (Global policy adoption dummy)	-.094*** (.009)	-.048*** (.010)	-.050** (.020)	-.051*** (.013)
Right_majority (dummy)	-.014 (.010)	.008 (.009)	.075** (.030)	.034 (.022)
Left_majority (dummy)	-.007 (.010)	.001 (.011)	.105*** (.031)	-.010 (.027)
Right-EPS			-.027** (.012)	-.011 (.010)
Left-EPS			-.036*** (.012)	.006 (.011)
Right_Paris			-.032 (.022)	.020 (.018)
Left_Paris			-.076*** (.023)	-.072* (.043)
Con.	-1.94 (1.08)	5.79*** (1.58)	-.954* (1.09)	5.65*** (1.60)
Obs.	562	189	562	189
Countries	25	8	25	8
Country FE	Yes	Yes	Yes	Yes

Adj R ² (o.a)	.92	.60	.91	.60
F-Stat	103.18***	86.13***	75.26***	59.26***

Note: Average GHGE of OECD countries from 1995 to 2021 is 461172.2 million tonnes (megatonnes). The threshold GHGE dummy is equal to 1 if the country's GHGE is greater than or equal to 461172.2 in any year of the estimation period, otherwise zero.

The results of the fixed effects models are shown in Table 5 (a). The estimations for model (1) suggest that in low emitter countries, emissions respond predictably to economic size and renewable energy use. We also find that both national (EPS) and international (Paris) policies are effective in reducing GHGE. For model (2) with high emitters, renewable energy remains effective, but policy interventions (EPS, Paris) are less effective, indicating possible diminishing returns or enforcement gaps.

Models (3), the model with low emitters and interaction terms, shows that policy effectiveness is mediated by political ideology in low-emitting countries. Left-wing governments are more effective at implementing both national and global environmental policies. Finally, model (4), the model of high emitters with interactions, shows that in high emitter countries, even political ideology does not significantly enhance policy effectiveness, suggesting systemic limits to action, whether due to industrial inertia, political constraints, or technological limitations. For example, consider the USA and Canada: when the federal governments commit to global agreements to reduce GHG emissions, the interaction between political ideology and the global agreement shows a statistically significant impact at the 10% level. However, full compliance with these agreements at the subnational level, by U.S. states or Canadian provinces, does not occur immediately or uniformly. In the U.S., for instance, while blue (center/left-leaning) states are more likely to comply with federally signed global environmental agreements, red (right-leaning) states may not, due to differing political ideologies. Similarly, in Canada, conservative-leaning provinces may resist full implementation of federal environmental policies. These ideological divergences may explain why high-emitting countries struggle to reduce GHG emissions effectively, as evidenced by the coefficients of the interaction terms between political ideology and EPS (internal environmental policy).

Threshold Model with Lags

The threshold models are estimated with lags to account for the delayed effects, with the results shown in Table 5(b). The sample is split into high and low emitter countries as was done for the estimations in Table 5 (a) above.

Models (1) and (2) (without interaction terms) show that the environmental policies are more effective in countries below the mean emissions threshold, as evidenced by the relatively larger negative coefficients for EPS and Paris for the low emitter countries. High emitters may require stronger or different instruments to see comparable effects. Political ideology does not appear to matter without the inclusion of the interactions with the policy variables.

Table 5(b): Impact of Political Ideology and National and Global Environmental Policy Adoption - Threshold GHGE (Lag Models)

Variables	Fixed Effects (Threshold GHGE, Political Ideology, and Environmental Policy)			
	(1)	(2)	(3)	(4)
Dep. lnGHGE				

	Low emitter countries	High emitter countries	Low-emitters countries with interactions	High-emitters countries with interactions
L1.lnPOP	.320*** (.081)	.162 (.165)	.315*** (.081)	.149 (.167)
L1.lnRGDP	.256*** (.034)	.126 (.082)	.229*** (.034)	.115 (.086)
L1.lnOpen	.020 (.032)	.056* (.031)	.022 (.032)	.046 (.032)
L1.lnRenewable	-.163*** (.012)	-.171*** (.011)	-.161*** (.012)	-.173*** (.011)
L1.EPS (National Policy Adaptation Index)	-.054*** (.007)	-.015** (.007)	-.030** (.007)	.003 (.010)
L1.Paris (Global policy adaptation dummy)	-.098*** (.010)	-.045*** (.011)	-.064*** (.021)	-.069*** (.014)
L1.Right_majority (dummy)	-.018 (.011)	-.001 (.009)	.042 (.032)	.045* (.023)
L1.Left_majority (dummy)	-.011 (.011)	-.002 (.011)	.080** (.033)	.028 (.028)
L1.Right-EPS			-.018 (.004)	-.022** (.009)
L1.Left-EPS			-.028** (.013)	-.014 (.011)
L1.Right_Paris			-.016 (.023)	.057*** (.019)
L1.Left_Paris			-.074*** (.025)	-.023 (.044)
Con.	-.041 (1.16)	7.41*** (1.68)	-.652* (1.17)	8.00*** (1.67)
Obs.	564	187	564	187
Countries	25	8	25	8
Country FE	Yes	Yes	Yes	Yes
R ² (overall)	.92	.56	.92	.53
F-Stat	95.82***	77.48***	68.67***	54.98***

Models (3) and (4) include interaction terms which reveal that both right and left governments reduce emissions through policy, but left-wing governments are more effective, especially if they have signed the Paris Agreement. The results of the interaction terms suggest that ideology, if coupled with the domestic environmental policy and global environmental agreements, can modify the impact of policy tools.

Model (4) shows that in high-emitter countries, policy and ideology interact differently. Right-wing governments which signed the Paris Agreement may have symbolic participation without strong implementation, leading to ineffective or even counterproductive results.

6. DISCUSSIONS AND POLICY IMPLICATIONS

The empirical findings from this study highlight the complicated relationship between macroeconomic drivers, environmental policy instruments, political ideology, and greenhouse gas emissions (GHGE) across OECD countries. Consistent with prior research, our fixed effects estimations confirm that population growth, economic affluence (RGDP), and trade openness significantly increase emissions (York et al., 2003; Liddle & Lung, 2010; Shahbaz & Shabbir, 2013). These variables reflect the structural pressures of economic expansion, particularly in high-income nations.

Conversely, renewable energy use consistently exhibits a significant and negative effect on emissions, reinforcing its central role in decarbonization strategies (Aziz, Hossain & Lamb, 2022). National environmental policy stringency (EPS) and global commitments, particularly the Paris Agreement, are also associated with long-run reductions in GHGE. These findings are consistent with Albrizio, Kozluk & Zipperer (2017) and Botta & Kozluk (2014), who demonstrate that stricter environmental regulation and multilateral climate commitments can lower emissions intensity and improve environmental performance.

A key insight from the results is that political ideology alone does not significantly influence emissions. Estimated results show that neither left- nor right-wing governments independently reduce GHGE. Both the descriptive analysis (see Table 3) and estimated results (see FEM in Tables 4(a), 4(b), 5(a) and 5(b)) confirm this finding. This supports the conclusions of Neumayer (2003) and McCright & Dunlap (2011), who argue that ideology must be examined in relation to policy instruments to reveal its full effect.

When we include interaction terms between political ideology and environmental policy, such as EPS or participation in the Paris Agreement, a more complex picture emerges. When coupled with strong policy tools, both right and left political ideological orientations of ruling governments can reduce emissions. The effect is more pronounced under left-wing governments, particularly when implementing the Paris Agreement. This finding is consistent with prior research by Neumayer (2004) and Winter et al (2022), which suggests that left-leaning governments tend to prioritize environmental goals more consistently.

The interaction between political ideology and EPS also reveals interesting impacts. Environmental policy stringency significantly reduces emissions under both left- and right-wing governments, but the reduction is larger under left-leaning administrations (-0.028 vs. -0.022). Similarly, the Paris Agreement only significantly lowers emissions under left-leaning governments, while right-leaning governments show no significant impact, suggesting symbolic participation without full policy follow-through (Bernauer & Böhmelt, 2013).

To account for temporal lags in policy implementation, we estimate lagged fixed effects models. These models reinforce our main finding that political ideology alone remains insignificant, but its interaction with policy instruments becomes more effective over time. This is aligned with Fredriksson et al. (2004) and Böhringer & Jochem (2007), who stress that environmental outcomes often reflect delayed policy effects due to institutional and technological adjustment lags.

The threshold models further reveal that emissions dynamics vary by country context. Among low-emitting countries, policies like EPS and the Paris Agreement significantly reduce emissions—likely due to lower marginal abatement costs and stronger administrative capacity (Ouyan et al, 2019; Wurzel, Liefferink & Connelly, 2013). However, among high-emitting countries, these same policies are less effective, even when implemented under left-leaning governments. This suggests deeper structural or political barriers, such as fossil fuel dependency, weak institutions, or political fragmentation, which limit effective implementation (Wu & Gupta, 2022; Zhu & Yang, 2023).

In summary, this study contributes to the literature by showing that environmental policy effectiveness depends on both political context and institutional capacity. Political ideology alone does not guarantee environmental gains, but when aligned with strong domestic and international policy frameworks, it can meaningfully enhance emissions reduction. Low-emitting countries are more likely to benefit from policy interventions, while high-emitting countries require structural reforms, institutional investment, and possibly international support to implement effective climate policies.

Policy Implications

The findings of this study highlight that the effectiveness of environmental interventions depends not only on policy but also on political ideology. Policymakers must recognize that climate strategies are not one-size-fits-all—policy effectiveness varies by country context, emissions level, and political environment. For international agreements like the Paris Accord to translate into real emissions reductions, they need to be supported by robust domestic policy frameworks and long-term institutional commitment, particularly in high-emitting countries where political division and resistance can undermine policy execution and effectiveness.

Investments in administrative, technical, and regulatory capacity are critical for achieving emissions reductions in countries with limited enforcement capability. At the same time, renewable energy expansion remains one of the most consistent tools for reducing emissions, regardless of ideology or income level. Governments need to strive toward more than symbolic participation and measurable progress to align national environmental policies with international obligations.

Finally, since both left- and right-leaning governments can be effective when equipped with strong policy tools, fostering cross-party support for environmental legislation can enhance policy effectiveness and reduce backsliding with electoral cycles. Ultimately, the integration of political feasibility, institutional readiness, and sustained policy commitment is key to advancing effective and equitable climate action.

6. Summary and Conclusion

This study investigates how political ideology influences the adoption and effectiveness of environmental policies for reducing GHGE across OECD countries. The primary objective is to understand whether the political orientation of ruling governments affects a country's participation in global climate agreements and the stringency of its internal environmental policies, and how these, in turn, affect GHGE.

The empirical analysis utilizes a panel dataset of 31 OECD countries over the period 1995–2021 with the key explanatory variables of political ideology (right, left, center), domestic environmental policy stringency (EPS), and participation in global climate agreements, namely the Paris Agreement. The estimation techniques include Fixed Effects Models, Pooled OLS, and Panel Threshold Models estimation with interactions between political ideology and policy variables being central to the analysis, along with lagged models to address delayed effects.

The results suggest that political ideology alone does not significantly explain a country's decision to join global climate agreements or reduce GHGE. Right-wing governments achieve significant emission reductions when strong environmental policies are in place. The most notable finding is that left-wing governments, when coupled with stringent domestic policies and/or participation in the Paris Agreement,

exhibit a stronger reduction in emissions than right-wing counterparts. This suggests that political will, while necessary, must be operationalized through solid policy mechanisms.

Furthermore, both national and global environmental policies are more effective in countries with lower than average emissions. In contrast, the marginal effectiveness of policies tends to be weaker in countries with higher than average emissions, possibly due to structural, technological, or institutional inaction. Across models, the proportion of renewable energy consumption is consistently significant.

The main contribution is the demonstration that the effectiveness of environmental policy is conditional on both political ideology and policy with neither alone being sufficient. This interdependence highlights the importance of aligning political incentives with stringent, enforceable environmental commitments. The results also imply that global agreements like the Paris Accord are more than symbolic, in fact they can be quite effective when supported by aligned political and policy environments.

In sum, this research contributes to the growing literature on environmental governance by empirically linking political ideology, national and international environmental policies, and emission outcomes. The main policy implication is that governments must develop environmental policy instruments that are sufficiently robust to achieve the set goals and resilient to changes in political leadership.

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APPENDICES

APPENDIX A: List of Countries.

1. Australia	9. France	17. Latvia	25. Slovakia
2. Austria	10. Germany	18. Lithuania	26. Slovenia
3. Belgium	11. Greece	19. Luxembourg	27. Spain
4. Canada	12. Hungary	20. Netherlands	28. Sweden
5. Czech Republic	13. Iceland	21. New Zealand	29. Switzerland
6. Denmark	14. Ireland	22. Norway	30. UK
7. Estonia	15. Italy	23. Poland	31. USA
8. Finland	16. Japan	24. Portugal	

APPENDIX B: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
GHGE	837	461172.2	1233423	3554.69	7511448
Population	837	3.12E+07	5.74E+07	267468	3.32E+08
Real GDP	835	1.25E+12	2.92E+12	9.14E+09	2.05E+13
Trade Openness	837	96.26007	55.95422	16.3901	393.1412

Renewable Energy Consumption	806	18.9322	16.34248	0.85	82.79
EPS	754	2.324748	1.081854	0	4.89
Paris Agreement	836	0.214115	0.410452	0	1
Kyoto Protocol	836	0.528708	0.499474	0	1
UNFCCC	837	0.998805	0.034565	0	1
Right-Majority Government	836	0.495215	0.500276	0	1
Left-Majority Government	837	0.352449	0.478019	0	1
Center-Majority Government	837	0.18638	0.389646	0	1
