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# The Effect of Democratic Backsliding on Carbon Emissions Intensity

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## ABSTRACT

*This study examines the relationship between democratic backsliding and carbon emissions intensity, hypothesizing that government-induced economic failures in both public and private sectors increase emissions by exploiting environmental resources and diverting capital flow toward carbon-heavy energy sources. Employing fixed-effects regression on data from 153 countries between 2010 and 2022, the quantitative analysis finds a strong positive correlation between democratic backsliding and emissions levels. Complementary case studies of Nicaragua and Mali, the two regimes with the highest magnitude of backsliding during the studied period, offer qualitative evidence of derailed decarbonization efforts. These results are consistent with rent-seeking theory, endogenous growth theory, and the environmental Kuznets curve hypothesis, emphasizing the role of stable governance in addressing intricate climate issues. Without sustained reforms supported by domestic and international groups, economic incentives will remain distorted in regressing nations, perpetuating cyclic fossil fuel reliance and stalling progress. Therefore, achieving global decarbonization targets and averting the most catastrophic climate effects will depend on the capability of the international community to decelerate democratic backsliding in affected countries and prevent its emergence elsewhere.*

## 1. Introduction

In the wake of the fall of the Berlin Wall and the subsequent dissolution of the Soviet Union, global scrutiny shifted toward the environmental credentials of various political systems. The ecological degradation under Soviet rule— marked by rampant pollution and blatant disregard for sustainable industrial practices—was indicative of the shortcomings inherent in autocratic regimes, where transparency and public accountability were absent (Waller & Millard, 2007). The remnants of the Soviet Union and the rubble of its satellite states stood emblematic of the preeminence of democracy in environmental matters. The notion that democracies, by their very nature, provide a more effective framework for tackling environmental challenges gained traction. Payne (1995), in a widely cited article, asserted that democratic systems are better

  

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equipped to confront complex and long-term challenges like climate change due to mechanisms such as the free flow of information and respect for advocacy groups.

As the climate change crisis has deepened, so too has the body of literature on the role of democracy in environmental quality. Studies have evaluated this relationship through energy-specific proxies, including emissions, consumption patterns, efficiency, and diversification. Although the correlation between democracy and environmental outcomes is relatively well-documented, there remain significant gaps in understanding the exact effects of democratic backsliding. Democratic backsliding, defined as the decline in adherence to democratic norms, institutions, and freedoms (Carothers & Press, 2022), presents pressing challenges to climate governance by disrupting economic mechanisms in both public and private sectors. Specifically, decarbonization efforts, which depend on sustained planning and investment, face severe setbacks when initiatives are delayed or left unfulfilled. Therefore, shifts in democratic governance may provide valuable perspectives into a country's capacity and commitment to advancing decarbonization policies.

To address this gap in the literature, this paper explores the question: To what extent does democratic backsliding influence the intensity of carbon emissions within a nation? It is hypothesized that a positive correlation exists between democratic backsliding and increased carbon emissions intensity, resulting from government-induced economic failures.

## 2. Literature Review

### 2.1 Theoretical Literature Review

The theoretical review applies causal analysis using economic incentives and constraints to examine how governance shapes environmental outcomes.

#### 2.1.1 Rent-Seeking Theory

In the public sector, rent-seeking theory suggests that individuals and entities leverage political influence to extract economic benefits without contributing to productivity or societal wealth. The normative side of this theory contends that resources expended to gain these advantages are wasted, redistributing wealth rather than generating it (Hartle, 1983). Scholars assert that government officials in democratic systems are less inclined to misuse their power and these valuable resources for personal enrichment, as accountability mechanisms like regular elections, public scrutiny, free flow of information, and institutional checks and balances encourage them to prioritize public welfare and adopt environmental policies like ESG criteria, carbon taxes, and subsidies (Bovens et al., 2014; Bettio, 2021). Leaders prioritizing their narrow interests over the collective good risk alienating political support and losing office. Conversely, autocratic and hybrid regimes tend to suppress dissent, public participation, and access to information, enabling elites to exploit the environment and its resources (Yang, 2022). As these regimes regress, rent-

  

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seeking behaviors often become more pronounced, with accountability mechanisms eroding and transparency diminishing. This is particularly harmful to the environment since the energy sector is one of the most lucrative and frequent targets of corruption (Gennaioli & Tavoni, 2016).

### 2.1.2 Endogenous Growth Theory

In the private sector, endogenous growth theory posits that long-term economic growth is driven by internal factors such as human capital, technological innovation, and knowledge accumulation (Howitt, 2010). Robust democratic institutions—such as independent regulatory bodies, transparent financial systems, and independent judiciaries— foster conducive conditions for private sector investments in green technologies by increasing innovation and reducing uncertainties. However, democratic backsliding weakens these institutions, thereby economic development and environmental stewardship. Without clear and stable incentives, private actors retreat from high-risk, long-term investments in renewable energy, instead opting for short-term returns from carbon-intensive industries. This dual shift—reduced investment in renewables and flow of capital toward fossil fuel extraction—doubles the environmental harm by postponing clean energy adoption while simultaneously entrenching high-emission practices.

### 2.1.3 Environmental Kuznets Curve (EKC)

The environmental Kuznets curve hypothesis proposes an inverted U-shaped relationship between environmental degradation and economic development, where pollution rises during early industrialization but declines as economies mature due to technological advancements and societal demands for sustainability (Stern, 2004). This theory assumes that democratic systems, with strong economic and political institutions, are better equipped to facilitate the latter stages of the EKC (Bhattarai & Hammig, 2001). Democratic backsliding, however, disrupts this progression by causing countries to delay or neglect indispensable environmental policies. With carbon dependence cemented, regressing nations are left ill-prepared to transition towards low-carbon energy solutions and away from fossil fuels (Morais de Sá e Silva & de Ávila Gomide, 2024).

## 2.2 Empirical Literature Review

The empirical review explores how democracy, alongside the limited research on democratic backsliding specifically, influences environmental policymaking. Although this relationship has been widely studied, much literature has not explicitly framed these dynamics from an economic perspective. To establish a comprehensive basis for this analysis, it is thus necessary to review the broader studies on democracy's impact on environmental governance.

### 2.2.1 Democracy and Environmental Outcomes

  

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A growing body of empirical research indicates that democratic institutions enable more productive environmental policies and outcomes than autocratic or hybrid regimes, attributed to mechanisms such as transparency, accountability, and civil society participation (Scholte, 2002). These mechanisms promote long-term policies that support low-carbon energy solutions. For instance, Bättig and Bernauer (2009) analyzed 185 countries from 1990 to 2004, showing that democratic nations are more cooperative in global climate negotiations; they disclose more accurate data, commit to stricter decarbonization targets, and enforce policies more effectively. Consistent with these findings, Neumayer (2002) observed that democracies are more likely to sign and ratify international environmental treaties.

Beyond multilateral commitments, democracies also tend to implement policies that support renewable energy deployment on the domestic front. Research by Solomon and Zhou (2021) indicates that democracies establish renewable portfolio standards more frequently, driven by public pressure and stakeholder input. Pahle and Schweizerhof (2015) highlighted Germany's Renewable Energy Sources Act as a pertinent example of how these standards can be effectively achieved. Furthermore, Feng et al. (2024), employing a bi-level numerical model, demonstrated that democratic governance is strongly associated with increased implementation of carbon taxes and subsidies for low-carbon energy sources. As a result, Clulow and Reiner (2022) noted that democracies typically harness a greater share of energy from wind, solar, and hydropower sources.

However, government action alone is insufficient in fully facilitating a green transition; the private sector is equally essential. Oueghlissi and Derbali (2023), identified a strong positive correlation between the degree of democratic governance and the adoption rates of renewable energy in 86 countries. They attribute this to transparent legal frameworks, electoral mechanisms, and policy signals—key hallmarks of democratic systems—that collectively attract capital to cleaner industries by creating conditions for higher returns and lower risks. Gu et al. (2024) corroborated these findings, concluding that improvements in the rule of law and transparency supported investor confidence in green energy projects, while corruption and income inequality had the opposite effect. Specifically, a 1% change in these variables resulted in variations of 0.33%, 0.45%, -0.25%, and -0.32%, respectively. Nonetheless, autocratic and hybrid regimes often struggle with unclear decision-making processes, which acutely deter investment in sustainable energy.

### 2.2.2 Democratic Backsliding and Environmental Outcomes

For the first time in over two decades, the global landscape is home to more closed autocracies than liberal democracies (Democracy Report, 2023). This shift carries significant consequences for climate governance, as democratic backsliding introduces risks distinct from those found in

  

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stable systems. Democratic backsliding, along with the instability it produces, is the process itself that creates the economic and political chaos often associated with the poor environmental performance characteristic of autocratic and hybrid regimes. The misallocation of public sector funds and decline in private sector investor confidence mean that backsliding governments outpace even stable non-democratic regimes in their inability to uphold climate commitments and sustainable projects, jeopardizing both national and international decarbonization objectives. Although existing studies have extensively explored the binary relationship between governance types and environmental performance, the specific impacts of democratic backsliding have received limited attention. This section aims to review the limited research available on its implications for climate governance.

Emerging empirical evidence suggests that authoritarian-leaning leadership prioritizes power consolidation, often at the expense of environmental initiatives and goals. Such leaders redirect state resources toward political repression instead of environmental projects, stalling or reversing progress (Koch, 2024). This phenomenon has been particularly observable in Brazil, where deforestation in the Amazon rainforest accelerated under President Jair Bolsonaro (Rached et al., 2022). Democratic backsliding also curtails the activities of non-governmental organizations and civil advocacy groups, which otherwise offer critical scrutiny over state-driven environmental policies. These limitations breed corruption, empowering special interests and industries that contribute to significant emissions (Amnesty International, 2023). In some instances, environmental advocates themselves—including independent groups, investigative journalists, and watchdog organizations—face increased legal harassment that limits their ability to promote climate policies, monitor pollution, expose harmful practices, and challenge polluting industries (Middeldorp & Le Billon, 2019).

Although research on the precise causal mechanisms remains sparse, evidence suggests that when countries lose democratic ground, they also forfeit crucial mechanisms—such as open debate, civil liberties, and institutional checks—that underpin effective environmental governance. Further research is necessary to establish causality, isolate mediating factors, and quantify the long-term climate impacts of this trend. Therefore, understanding how the erosion of democratic systems influences climate governance is essential to formulating strategies that safeguard environmental sustainability as the planet drifts toward rising sea levels and melting ice caps.

### 2.2.3 Empirical Gaps in the Literature

While the literature predominantly emphasizes the importance of democratic institutions in establishing and enforcing sustainable climate policies, most existing studies strictly classify countries as either democracies or autocracies. This binary simplification overlooks fluctuations

  

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in governance over time, leading to generalized conclusions that fail to account for the volatile nature of political transitions and the environmental outcomes accompanying them. Without addressing this dynamic, efforts to analyze and mitigate the challenges to a sustainable future remain incomplete and inadequate.

The empirical literature reviewed in Section 2.2.2 reveals several critical gaps. First, there is a shortage of empirical cross-country analyses that examine the relationship between democratic backsliding and environmental outcomes. Much of the existing research tends to concentrate on single individual cases, such as Brazil during Bolsonaro's administration, and often relies on qualitative observations—like weakened enforcement or policy rollbacks—rather than quantitative indicators such as carbon emissions intensity or rates of renewable energy adoption. Second, little has been done to connect specific policies and actions implemented—or neglected—by backsliding governments, and how these relate to the environmental harm they have caused. Third, although the literature acknowledges a causal link between backsliding and the reversal of decarbonization initiatives, it does not adequately analyze the specific economic mechanisms—such as misallocated resources or reduced investment incentives—through which backsliding exacerbates environmental degradation. These gaps impede a nuanced understanding of how democratic backsliding systematically affects climate governance.

This study advances the literature with a novel focus on the implications of democratic backsliding. Against this background, it offers a three-fold contribution. First, this paper is the inaugural study to quantitatively examine the correlation between democratic backsliding and any given environmental variable—namely, carbon emissions intensity—through a multivariable panel regression analysis encompassing 153 countries from 2010 to 2022, one of the most comprehensive datasets to date. Second, it complements this analysis with in-depth case studies of Nicaragua and Mali, the countries that experienced the most pronounced democratic erosion during this period. Third, these case studies provide a clear illustration of the economic mechanisms, such as misallocated resources and reduced investment incentives, which exacerbate environmental degradation in contexts of unstable governance. This research concludes that decelerating democratic backsliding is necessary for decarbonization and building sustainable institutions for a sustainable future.

## 3. Methodology

### 3.1 Methodology Framework

This study employed a mixed-methods approach to examine the correlation between democratic backsliding (DEMBS) and carbon emissions intensity (CI). The quantitative component applied fixed-effects panel regression to assess changes in CI, measured as $CO_2$ emissions per unit of

  

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GDP (kg/$), across 1,551 observations from 153 countries between 2010 and 2022. Data were sourced from publicly available repositories on Our World in Data (2024). Among these countries studied, 38 experienced statistically significant democratic backsliding, a decline of 0.5 or more in the Democracy Index. Each nation contributed 13 observations collected annually. The qualitative component focused on case studies of Nicaragua and Mali, the two countries with the highest magnitudes of backsliding during this period. Over the 13-year span, Nicaragua's Democracy Index experienced a decline of 3.23 units, while Mali's index decreased by 2.78 units. These case studies investigated the institutional and policy barriers from democratic backsliding and their implications for environmental governance.

The dependent variable, CI, was analyzed in relation to independent variables, including DEMBS and other factors influencing carbon emissions, such as governance quality, renewable energy adoption rates, and economic conditions.

By integrating fixed-effects panel regression with in-depth case studies, this methodological framework effectively captures both broad statistical patterns and nuanced, context-specific effects of democratic backsliding on carbon emissions intensity. This approach seeks to provide a robust foundation for understanding the complexities of this relationship.

**Table 1. Summary of Dependent and Independent Variables (Our World in Data, 2024)**

| **Dependent Variables** | **Acronym** |
|---|---|
| Share of electricity production from renewables (%):<br>*Renewables include electricity production from hydropower, solar, wind, biomass & waste, geothermal, wave, and tidal sources.* | RE |
| **Independent Variables** | |
| Democracy Index:<br>*It combines information on the extent to which citizens can choose their political leaders in free and fair elections, enjoy civil*<br>*liberties, prefer democracy over other political systems, can and do participate in politics, and have a functioning government that*<br>*acts on their behalf. It ranges from 0 to 10 (most democratic).* | DEM |
| Democracy Backslide: | DEMBS |

  

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|---|---|
| *Democracy index change from Year 2010* | |
| Carbon intensity: Kilograms of $CO_2$ emitted per dollar of GDP (kg/$): *Fossil fuel and industry emissions are included. Land-use change emissions are not included. GDP data is adjusted for inflation and differences in the cost of living between countries.* | CI |
| GDP per Capita ($): *This data is adjusted for inflation and for differences in the cost of living between countries. Take ln function of GDP.* | LnGDP |
| Foreign direct investment, net inflows as share of GDP (%): *Net inflows of foreign direct investment from foreign investors to the reporting economy.* | FDI |
| Political Corruption Index: *Based on the expert estimates and index by V-Dem. It captures the extent to which the executive, legislative, judiciary, and bureaucracy engage in bribery and theft, and the making and implementing of laws are susceptible to corruption.* | PCI |

**Table 2. Democratic Backsliding in 153 Countries from 2010 to 2022 (Our World in Data, 2024)**

| Country | DEMBS | Country | DEMBS | Country | DEMBS | Country | DEMBS |
|---|---|---|---|---|---|---|---|
| Nicaragua | 3.23 | Togo | 0.46 | Gambia | -1.09 | New Zealand | -0.35 |
| Mali | 2.78 | Belgium | 0.41 | Georgia | -0.61 | Niger | -0.35 |
| Lebanon | 2.18 | Albania | -0.55 | Germany | -0.42 | Nigeria | -0.76 |
| Afghanistan | 2.16 | Algeria | -0.22 | Ghana | -0.41 | North Macedonia | 0.06 |
| Russia | 1.98 | Angola | -0.64 | Greece | -0.05 | Norway | -0.01 |

  

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|---|---|---|---|---|---|---|---|
| Benin | 1.89 | Argentina | -0.01 | Guinea | 0.47 | Oman | -0.26 |
| Burundi | 1.88 | Armenia | -1.54 | Guinea-Bissau | -0.57 | Pakistan | 0.42 |
| Cambodia | 1.69 | Austria | 0.29 | Iceland | 0.13 | Panama | 0.24 |
| Mexico | 1.68 | Azerbaijan | 0.28 | India | 0.24 | Peru | 0.48 |
| Palestine | 1.58 | Bangladesh | -0.12 | Indonesia | -0.18 | Philippines | -0.61 |
| Bolivia | 1.41 | Bosnia and Herzegovina | 0.32 | Iran | -0.02 | Poland | 0.01 |
| EI Salvador | 1.41 | Botswana | -0.1 | Ireland | -0.34 | Portugal | 0.07 |
| Mozambique | 1.39 | Brazil | 0.34 | Israel | -0.45 | Qatar | -0.56 |
| Türkiye | 1.38 | Bulgaria | 0.31 | Italy | 0.14 | Romania | 0.15 |
| Guatemala | 1.37 | Canada | 0.2 | Jamaica | 0.08 | Rwanda | 0.15 |
| Belarus | 1.35 | Cabo Verde | 0.29 | Japan | -0.25 | Saudi Arabia | -0.24 |
| China | 1.2 | Central African Rep | 0.47 | Kazakhstan | 0.22 | Senegal | -0.45 |
| Haiti | 1.19 | Chad | -0.15 | Kenya | -0.34 | Serbia | 0 |
| Myanmar | 1.03 | Chile | -0.55 | Kuwait | 0.05 | Sierra Leone | -0.52 |
| Bahrain | 0.97 | Colombia | -0.17 | Laos | 0.33 | Singapore | -0.33 |
| Ukraine | 0.88 | Comoros | 0.21 | Latvia | -0.32 | Slovakia | 0.28 |
| Iraq | 0.87 | Congo | 0.1 | Lesotho | -0.17 | Slovenia | -0.06 |
| Cameroon | 0.85 | Costa Rica | -0.25 | Liberia | -0.36 | South Korea | 0.08 |

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|---|---|---|---|---|---|---|---|
| South Africa | 0.74 | Cote d'Lvoire | -1.2 | Libya | -0.12 | Spain | 0.09 |
| Kyrgyzstan | 0.69 | Croatia | 0.31 | Lithuania | -0.07 | Sri Lanka | 0.17 |
| Democratic Republic of Congo | 0.67 | Cyprus | -0.09 | Luxembourg | 0.07 | Sweden | 0.11 |
| Hong Kong | 0.64 | Czechia | 0.22 | Madagascar | -1.76 | Switzerland | -0.05 |
| Honduras | 0.61 | Denmark | 0.24 | Malawi | -0.07 | Thailand | -0.12 |
| Malta | 0.58 | Djibouti | -0.54 | Malaysia | -1.11 | Trinidad and Tobago | 0 |
| Hungary | 0.57 | Dominican Rep | -0.19 | Mauritania | -0.17 | Tunisia | -2.72 |
| Tajikistan | 0.57 | Ecuador | 0.08 | Mauritius | -0.1 | Turkmenistan | 0.06 |
| Jordan | 0.57 | Egypt | 0.14 | Moldova | 0.1 | United Arab Emirates | -0.38 |
| Tanzania | 0.54 | Equatorial Guinea | -0.08 | Mongolia | 0.01 | United Kingdom | -0.12 |
| Paraguay | 0.51 | Estonia | -0.28 | Montenegro | -0.18 | United States | 0.33 |
| Australia | 0.51 | Eswatini | -0.11 | Morocco | -1.25 | Uruguay | -0.81 |
| Ethiopia | 0.51 | Finland | -0.1 | Namibia | -0.29 | Uzbekistan | -0.38 |
| Burkina Faso | 0.51 | France | -0.3 | Nepal | -0.25 | Vietnam | 0.21 |
| Uganda | 0.5 | Gabon | -0.11 | Netherlands | -0.01 | Zambia | -0.12 |
| | | | | | | Zimbabwe | -0.28 |

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### 3.2 Stata Analysis

Panel data analysis is a statistical method used to examine datasets that track multiple subjects, such as countries or individuals, over a specified period. This form of data is two-dimensional, combining cross-sectional data, which captures differences between subjects at a single point in time, and longitudinal data, which tracks changes within the same subject across time. By synthesizing these dimensions, panel data provide a more comprehensive understanding of subject behavior and temporal dynamics.

There are two primary approaches for analyzing panel data. The fixed-effects model focuses solely on within-subject changes, while the random-effects model accounts for both within-subject and between-subject variations. To ascertain the most appropriate model, the Hausman Test was applied.

#### 3.2.1 Dataset Structuring

The observations in the panel dataset were organized by subject and time period, with the "Country" variable denoting cross-sectional data and the "Year" variable capturing longitudinal data.

#### 3.2.2 Fixed-Effects Model

A fixed-effects model was utilized to analyze within-subject changes over time. This methodology accounted for time-invariant characteristics of subjects, such as cultural or historical factors for countries, to isolate the effects of variables like GDP and inflation.

#### 3.2.3 Random-Effects Model

A random-effects model was subsequently applied to consider both within-subject changes and between-subject differences. Unlike the fixed-effects model, this approach presumes that variations between subjects are random and uncorrelated with the explanatory variables in the analysis.

**Table 3. Fixed-effects and Random-effects Panel Regression Results**

| **Fixed** | | | | | | | |
|---|---|---|---|---|---|---|---|
| CI | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
| DEMBS | .007 | .003 | 2.68 | .007 | .002 | .012 | *** |
| RE | -.002 | 0 | -13.76 | 0 | -.002 | -.002 | *** |

  

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|---|---|---|---|---|---|---|---|
| LnGDP | -.094 | .01 | -9.77 | 0 | -.113 | -.075 | *** |
| FDI | 0 | 0 | 1.36 | .174 | 0 | 0 | |
| PCI | .005 | .018 | 0.31 | .754 | -.029 | .04 | |
| Constant | 1.186 | .091 | 13.02 | 0 | 1.007 | 1.365 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.243 | SD dependent var | 0.161 |
| R-squared | 0.168 | Number of obs | 1830 |
| F-test | 67.324 | Prob > F | 0.000 |
| Akaike crit. (AIC) | -6981.028 | Bayesian crit. (BIC) | -6947.956 |

*** p<.01, ** p<.05, * p<.1*

| **Random** | | | | | | | |
|---|---|---|---|---|---|---|---|
| CI | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
| DEMBS | .007 | .003 | 2.60 | .009 | .002 | .012 | *** |
| RE | -.002 | 0 | -15.60 | 0 | -.002 | -.002 | *** |
| LnGDP | -.036 | .007 | -5.04 | 0 | -.05 | -.022 | *** |
| FDI | 0 | 0 | 1.44 | .15 | 0 | 0 | |
| PCI | .002 | .017 | 0.09 | .925 | -.031 | .034 | |
| Constant | .652 | .071 | 9.20 | 0 | .513 | .791 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.243 | SD dependent var | 0.161 |
| Overall r-squared | 0.052 | Number of obs | 1830 |
| Chi-square | 288.079 | Prob > chi2 | 0.000 |
| R-squared within | 0.149 | R-squared between | 0.048 |

*** p<.01, ** p<.05, * p<.1*

### 3.2.4 Model Selection with Hausman Test

The Hausman Test was conducted to compare the fixed-effects and random-effects models, aiming to determine the most reliable approach for the dataset. Since we received a p-value of 0,

  

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the null hypothesis was rejected, signifying that the fixed-effects model as more appropriate. Consequently, the fixed-effects regression model was selected for the analysis.

## 4. Results

The fixed-effects regression analysis identified independent variables correlated with the dependent variable, with statistical significance determined by p-values below 0.05. In this study, the independent variables democratic backsliding, renewable energy, and gross domestic product significantly impacted the dependent variable, carbon emissions intensity, as presented in Table 4.

- DEMBS: The positive and statistically significant coefficient indicates that as DEMBS increases, CI also increases.
- RE: The negative and statistically significant coefficient indicates that as RE increases, CI decreases.
- LnGDP: The negative and statistically significant coefficient indicates that as LnGDP increases, CI decreases.

## 5. Discussion

### 5.1 Quantitative Analysis

The positive relationship between DEMBS and CI supports the hypothesis that economic instability and exploitation weaken economic investment and allocation of resources, resulting in heightened emissions. Addressing democratic backsliding, therefore, could be a vital first step toward realizing sustainable decarbonization goals.

The inverse relationship for RE suggests that a greater dependence on renewable energy is associated with lower emissions. This aligns with the shift from fossil fuels to cleaner energy sources, which inherently contributes to environmental decarbonization. Likewise, the negative coefficient for LnGDP indicates that wealthier nations generally exhibit lower emissions, as higher income levels often enable greater public and private investments in cleaner technologies, as described by the environmental Kuznets curve theory.

### 5.2 Error Analysis

While the quantitative analysis establishes a strong positive correlation between DEMBS and CI, issues related to data accuracy and availability may affect the robustness of the findings. Differences in how countries report emissions and governance indicators introduce measurement

  

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errors, particularly in regions with limited transparency or political interference in collection. Additionally, omitted variable bias remains a concern, as other political, social, or technological factors influencing emissions are not fully captured in the model. Finally, given that climate policies and corresponding changes in decarbonization, the temporal scope of the study (2010–2022) may overstate or understate the true long-term impacts.

### 5.3 Case Studies: Nicaragua and Mali

Since June 2021, the Ortega administration in Nicaragua has intensified its repressive measures, arresting political opponents, journalists, and activists. These actions have drawn international sanctions from both the United States and the European Union; yet, the regime's government-induced economic failures, which have led to an environmental catastrophe, have garnered far less attention. Nicaragua, home to the second-largest rainforest in the Americas, is currently facing the fastest rate of forest loss in the world. Between 2015 and 2020, annual forest loss doubled from 1.34% to 2.56% and since 2018, the regime has shut down 160 environmental organizations (OCCRP, 2021; Pearshouse, 2023).

In 2014, President Ortega seized control of the Instituto Nacional Forestal (INAFOR) to consolidate power. Leaked documents revealed that First Lady Rosario Murillo and other officials manipulated INAFOR to favor companies with political ties. For instance, the state-owned Empresa Nacional de Transmisión Eléctrica (ENATREL), linked to the Ortega family, received 317 special forestry permits between 2014 and 2018 (OCCRP, 2021). In 2020, Murillo also exempted ENATREL from paying inspection fees, reducing state revenues while further facilitating deforestation (OCCRP, 2021). ENATREL, however, still ended up channeling substantial funding back to the regime in a different form. In 2018 and 2019, ENATREL paid $500,000 in advertising contracts to Ortega family-owned businesses (Connectas).

Deforestation in Nicaragua is not merely an environmental issue, but a symptom of governance failure rooted in poor economic practices. Between 2007 and 2020, international donors, including the United Nations, the World Bank, and the Inter-American Development Bank, provided Nicaragua with over $513 million in grants, co-financing, and loans. Further, the Global Environmental Facility awarded an additional $3.68 billion for projects involving Nicaragua (OCCRP, 2021). Yet, much of this funding was misappropriated. For example, the National Reforestation Crusade, an INAFOR flagship initiative claiming to have planted 250,000 hectares of trees, redirected funds to private plantations tied to political elites (OCCRP, 2021). Similarly, Alba Forestal, established to support rural communities after Hurricane Felix in 2007, also became a mechanism for exploitation. From 2009 and 2016, it harvested over 12.4 million cubic meters of timber, frequently clearing healthy trees instead of salvaging hurricane-damaged ones (Herrera & Enríquez, 2020). This generated nearly $6 million for political elites within just

  

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four years, inflicting irreversible damage to local ecosystems and Indigenous communities (Connectas). Despite backsliding accelerating and deforestation worsening, Nicaragua's new national climate change policy introduced in February 2022 did not set a net-zero carbon emissions goal, nor did it outline even a rudimentary long-term low-carbon strategy (U.S. Department of State, 2024).

Nicaragua is not alone. Nicaragua's plight parallels that of Mali, where weak economic governance fuels a similar crisis. In a country teetering between conflict and collapse, Mali ranks tenth among the countries most susceptible to climate change and 161st in terms of preparedness to address the twin crises of desertification and decarbonization (UNICEF, 2025). This climate variability has severely compromised food security, as erratic rainfall and extreme droughts make it increasingly difficult for farmers and herders to sustain their livelihoods (Kalkavan, 2019). Armed factions, such as the Macina Liberation Front, take advantage of these scarcities and the desperation of impoverished communities by mediating resource conflicts and filling the void left by the failing state (ACCORD, 2021). Families, left to choose between hunger and survival, often have no choice but to turn to these groups for protection. By weaponizing grievances related to energy, food, shelter, and the environment, these groups perpetuate a vicious feedback loop where conflict exacerbates environmental degradation, and degradation deepens conflict (Dakar et al., 2020). When the climate heats up, conflicts flare. Meanwhile, Mali's government continues to feed its own greed, as local officials have gained notoriety for imposing arbitrary taxes on local farmers and herders.

These case studies support the quantitative regression findings, revealing a positive correlation between DEMBS and CI. Democratic backsliding has eroded the public sector economic accountability and private sector confidence necessary to enable meaningful environmental action. With Nicaragua and Mali continuing to slide further from sustainability, comprehensive government reforms and sustained international support will be critical to breaking the feedback cycles that have left these countries chained and complicit.

## 6. Conclusion

This study identifies a strong positive correlation between democratic backsliding and carbon emissions intensity. These findings support the hypothesis that democratic backsliding disrupts stable and accountable economic governance, thereby weakening environmental protections and derailing decarbonization efforts. Future research should focus on its long-term effects and impact on global climate governance since environmental policymaking demands more than innovative technical solutions—it necessitates robust, transparent, and accountable political systems capable of investing in and enforcing them.

  

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Climate change is not changing. From wildfires ravaging the West to sea levels swallowing the East, it will neither slow nor soften. Democratic backsliding will only amplify this crisis, challenging the international community to confront its most catastrophic consequences already etching devastation across every corner of the planet.

**Author Summary**

This study examines the relationship between democratic backsliding and carbon emissions intensity. It suggests that economic failures caused by the government in both public and private sectors lead to higher emissions by exploiting natural resources and funding carbon-heavy energy sources instead of clean renewables. Analyzing data from 153 countries from 2010 to 2022, the study shows that as democratic backsliding worsens, carbon emissions rise. These results align with complementary case studies of Nicaragua and Mali, which experienced the most significant backsliding during this period. Without action to decelerate backsliding, countries will struggle to transition to cleaner energy, jeopardizing global decarbonization goals as fossil fuel reliance deepens and sustainability stalls.

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