

**GOVERNANCE AND CARBON DIOXIDE EMISSIONS:
THE MEDIATING ROLE OF MITIGATION FINANCE
IN DEVELOPING COUNTRIES***

ASTRID YAMILA LORÉ ACOSTA AND HYUN JEONG KIM

Inha University, Republic of Korea

Using panel data and a mediation framework, this study explores the indirect and direct impact of governance dimension on carbon emissions and its indirect effects through mitigation finance in developing countries. The results demonstrate a heterogenous effects of the governance dimensions, regulatory quality associated with lower emissions and greater mitigation finance, with other dimensions linked to increased carbon emissions. These findings highlight the trade-offs between government development and economic growth, particularly when they are not aligned with environmental objectives. Overall, this study underscores the role of regulatory quality in shaping emissions reduction and mitigation finance allocation.

Keywords: Mitigation Finance; Governance; Carbon Dioxide Emissions; Developing Countries

JEL Classification: O44; Q54; Q56; Q58

1. INTRODUCTION

Climate change remains one of the most pressing global challenges driven by the continuous rise in global CO₂ emissions over recent decades. The rise in these emissions have historically originated from developed countries, while developing countries are often the most affected by climate change (Mertz et al., 2009). Recognizing the increase and imbalance in emissions, the Paris Agreement was established to limit global emissions and Article 6 addresses this disparity by establishing that developed countries should provide financial assistance to developing countries to support their adaptation

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and mitigation efforts, highlighting the importance of prioritizing the most vulnerable to the effects of climate change (UNFCCC, 2015). A key mechanism to deliver this financial support to developing countries is mitigation finance, which allows them to transition to low-emissions development pathways. This financial support is essential, as many developing countries must balance climate ambitions with other needs such as economic development, poverty reduction and lack of a well-developed private sector and domestic technological innovation (Marquardt et al., 2023).

Since transitioning to low-carbon technologies and improving energy efficiency are neither simple nor inexpensive, support from developed countries to developing countries is essential for pursuing climate-friendly development across sectors, enabling developing countries to adopt policies that improve energy efficiency and expand the use of renewable energy (Li, 2011). However, because of the nature of these investments, developing countries must show their capacity to administer them and deliver results. Often this capacity can be shown by the transparency and stability of their institutions, which can make them more attractive recipients of financial support.

Moreover, mitigation finance must be accompanied with a government that is aligned with the goals of these funds and support the activities to achieve them. Effective governance can help societies in the adoption of low-carbon technologies and in designing policies that consider the environment (Ochi and Saidi, 2024). Furthermore, governance can enable the wider use of renewable energy and the control of the pollution levels (Otim et al., 2025).

Despite growing emphasis on the nexus between mitigation finance and governance, there remains limited research on how governance impacts direct and indirectly carbon dioxide emissions through mitigation finance. Therefore, this study investigates the relationship between governance, mitigation finance and carbon dioxide emissions in developing countries with special attention to how institutional quality influences environmental outcomes through the allocation and effectiveness of mitigation finance.

2. LITERATURE REVIEW

2.1. Governance and CO₂ Emissions

Carbon dioxide is the main contributor to human-induced environmental degradation and is widely recognized as a major driver of the increase of global temperatures (Wu et al., 2015; Rehan and Nehdi, 2005; Azam et al., 2016). Given the environmental and climate harm caused by carbon dioxide emissions, a joint effort by all countries to reduce them is essential (Filonchik et al., 2024). Therefore, it is fundamental for actions to achieve this goal to start from within each country, where the quality of governance plays a fundamental role by providing transparent mechanisms and accountable practices that motivate individuals and businesses to reduce pollution, support climate

action and promote development that doesn't harm the environment (Dash et al., 2024). Furthermore, strong governance provides political stability, which in the absence of no matter how well-designed and implemented programs are, they're unlikely to succeed (Abid, 2016).

In high-polluting countries, evidence shows that by improving governance 1%, emissions reduce by 0.19%, proving how needed is for policymakers to address environmental harm by strengthening governance and promoting investments in green energy to reduce emissions (Dash et al., 2024). Along with more evidence, this demonstrate that governance improvements are linked to measurables environmental improvements across various sectors. For example, an empirical study by Baloch and Wang (2019) on BRICS members (Brazil, Russia, India, China, and South Africa) found that governance dimensions are negatively associated with CO₂ emissions, highlighting the critical role of the government in developing policies and regulations to minimize environmental harm. Similarly, evidence from oil-producing countries, demonstrates that governance significantly influences reduction of CO₂ emission, since efficient governance can support the appropriate use of natural resources and enforce effective environmental policies, with a 1% improvement in governance associated with a 2.43% reduction in CO₂ emissions (Ronaghi et al., 2020). Governance also has been found to mitigate the effects of activities such as tourism, lessening their overall impact on the environment (Dossou et al., 2025). In the context on developing countries, evidence shows that governance, in particular political stability, rule of law and control of corruption are found to be strongly and negatively correlated with CO₂ emissions (Gani, 2012).

Empirical evidence across contexts consistently demonstrates the crucial role of governance in controlling emissions. The focus of the study is to expand the understating of this relationship particularly among developing countries, to explore the role of strong institutions influence on the environment, proposing the following hypothesis:

H1: Improved governance positively influences the reduction of CO₂ emissions.

2.2. Governance and Mitigation Finance

Governance refers to a government's capacity to create laws and policies, enforce them, and provide public services (Fukuyama, 2013). Weak governance, determined as high levels of corruption can significantly impede economic growth by introducing market distortions, discouraging investment due to high business costs, and worsening inequality, while also reflecting fundamental governance deficiencies (Azam and Emirullah, 2014). However, good governance, can facilitate the implementation of effective regulations that support climate change mitigation, natural resource management, sustainable urban planning, and pollution control (Adebayo et al., 2025). Giving these contrasting outcomes, mitigation finance providers often consider

governance when evaluating effectiveness and risk of funding environmental initiatives.

Mitigation finance are the financial flows specifically deployed to reduce greenhouse gas emissions, such as renewable energy deployment and energy efficiency improvements (Wei, 2025). Although the influence of the six governance dimensions can differ in magnitude, a growing body of empirical research shows that overall governance quality is positively associated with higher levels of mitigation finance inflows.

For instance, at the selection and allocation stage, developing countries with good governance are more likely to be selected as recipients of mitigation finance (Halimanjaya, 2015; Weiler and Sanubi, 2019). Furthermore, major donor countries considering providing mitigation finance often prefer developing countries with good governance, as good governance can be seen as a financial safeguard against misconduct such as corruption (Halimanjaya, 2016). Doku et al. (2021) found that among Sub-Saharan countries, those with lower levels of corruption control but strong regulatory quality and rule of law tend to attract more climate finance. However, other evidence suggests that improved control of corruption can itself signal a reduced risk of misusing allocated multilateral climate finance, as well-functioning systems for tracking and reporting results transparently are viewed by financial institutions and organizations as desirable requisites for providing funding (Yun, 2022). Similarly, Joo (2024) finds that recipient countries with strong control over corruption and democratic institutions are positively correlated with higher levels of mitigation finance. Conversely, Islam (2022) notes that weakness in governance and institutional capacity, along with conflict and violence common in many developing countries, can discourage funders due to the heightened perception of investment risk, as well as the fact that vulnerable countries may lack the human capital, technical expertise, and infrastructure needed to secure climate finance.

At the core, particularly in developing countries, high-quality governance can attract external investment, support global development initiatives, stabilize the economy, and promote sustained economic development (Gani, 2011). Furthermore, strong governance and institutions are essential for preparing cities to cope with climate-change-related hazards and risks (Li, 2011). Supported by evidence of the importance of donor merit in the process of providing mitigation finance, we propose the following hypothesis:

H2: Improved governance positively influences the amount of mitigation finance received.

2.3. Mitigation Finance and CO2 Emissions

The growing use of fossil fuels for energy generation is exacerbating the ongoing problem of greenhouse gas emissions and highlighting the importance of reducing them (Baloch and Wang, 2019). In this context, finance has an essential role in moving to a lower-carbon economy and becoming climate-resilient (Bhandary et al., 2021). As

previously mentioned, mitigation finance specifically serves this purpose by directing funds to projects and initiatives that reduce greenhouse gas emissions.

Khan et al. (2024), in a study of developing countries, found that increased domestic mitigation finance significantly reduces CO2 emissions, effectively fulfilling its intended purpose of limiting greenhouse gas emissions. Similarly, Lee et al. (2022) report that mitigation finance in developing countries reduces CO2 emissions and improves environmental outcomes, because funds are allocated to projects designed to reduce environmental degradation. The latter study also emphasizes the importance of introducing policies that engage the public in environmental awareness and encourage the use of clean fuels. This is particularly relevant in many developing countries, where energy production relies on less efficient technologies, presenting an important opportunity to reduce CO2 emissions and overall energy consumption (Ward et al., 2017).

Within the Congo Basin, mitigation finance has a positive effect on CO2 reduction, suggesting that increased financial support leads to a greater adoption of renewable energy and, in turn, lower carbon dioxide emissions (Aquilas and Atemnkeng, 2022), aligning with the goal of mitigation finance in combating climate change. While climate action cannot rely solely on international cooperation and governments must work to relocate their own resources (Ley et al., 2023), external assistance remains essential, much needed, and well deserved for developing countries to cope with the impacts of climate change.

Therefore, this study aims to examine how mitigation finance can reduce CO2 emissions and contribute to global efforts to combat climate change and to explore whether it mediates the relationship between effective governance and CO2 emissions. Accordingly, the following hypothesis is proposed:

H3: Mitigation Finance positively mediates the relationship between governance and CO2 emissions.

3. METHODOLOGY

3.1. Research Model

This study proposes the following research model to assess the mediating role of mitigation finance in the relationship between governance and carbon dioxide emissions.

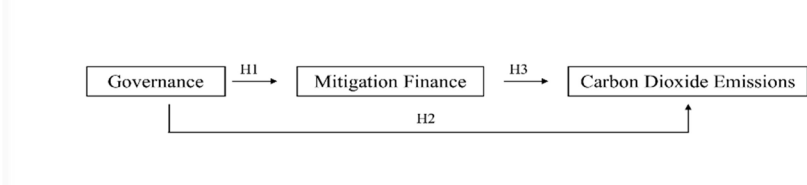


Figure 1. Research Model

3.2. Data

This study uses panel data from 136 developing countries for the 2012-2022 period. The dependent variable, carbon dioxide emissions, is measured as annual carbon dioxide emissions expressed in megatons of CO₂ equivalent (Mt CO₂e). This measure includes CO₂ emissions from the agriculture, energy, waste, and industrial sectors, while excluding those from land use, land use change and forestry (LULUCF).

The mediating variable, mitigation finance, is measured as the annual amount of mitigation-related climate aid disbursed (in current million USD) reported in the Creditor Reporting System (CRS) database of the Organisation for Economic Co-operation and Development (OECD). Mitigation finance is identified using Rio Markers for mitigation, which classifies funds intended to stabilize greenhouse gases (GHG) in the atmosphere, in line with the objectives of the Paris Agreement. Activities marked as “principal” receive 2 points, those classified as “significant” are given 1 point and activities not targeting mitigation are given 0 points. Following Klöck et al., (2018), this study calculates mitigation finance as the sum of all “principal” activities and 50% of the total value for “significant” activities.

The independent variables are the six dimensions of governance: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Each indicator ranges from -2.5 (weak governance) to 2.5 (strong governance).

Based on prior literature, a set of control variables were included into the model. Population, measured as the total population of the country (in millions), is commonly used in previous studies on mitigation finance determinants (Halimanjaya, 2016; Joo, 2024; Islam, 2022; Yun, 2022). It is included to account for potential small-country bias, as smaller countries may receive more aid per-capita, while larger countries tend to attract more donor attention due to their geopolitical relevance (Weiler et al., 2018). Population also serves as a determinants of CO₂ emissions, since population growth is associated with an increase of carbon dioxide emissions (Dong et al., 2019; Wen et al., 2022).

Gross Domestic Product (GDP) per capita, measured in constant 2015 U.S. dollars, defined as total income earned through the production of goods and services in an economic territory during a given year divided by the general population. Prior research has identified GDP per capita as an important determinant in mitigation finance allocation (Yun, 2022; Islam, 2022). It serves a proxy for poverty and influences donor decision-making, as they may prioritize countries where the funds are expected to generate the greatest impact, typically favoring countries with higher GDP per capita (Islam, 2022). Additionally, GDP per capita is included in the analysis to account for economy growth as it typically influences the production and consumption of goods, leading to higher pollution levels, and is considered one of the most robust predictors of CO₂ emissions (Aller et al., 2021).

Trade Openness, measured as the sum of import and exports in percentage of GDP,

has being widely used as a determinant of CO2 emissions in previous studies (Wen et al., 2022; Yun, 2022). Higher trade openness can contribute to lower CO2 emission due to the expansion of goods and services circulating, facilitating technology transfer, and improving production efficiency (Zhang et al., 2017). By promoting the adoption of innovative and cleaner technologies, trade openness supports sustainable development by enhancing environmental quality while allowing continued economic growth (Sachan et al.,2024). Moreover, trade openness is associated with greater economic resilience and facilitates access to climate related finance, international markets, and technologies (Munguambe and Aung, 2025).

A summary of the all the variables included in this study is presented in Table 1.

Table 1. Summary of Variables

Variable Type	Variable Name	Code	Source
Dependent	Carbon Dioxide	CO2	World Development Indicators, World Bank
Mediating	Mitigation Finance	MF	Creditor Reporting System (CRS), OECD
Independent	Voice and Accountability	VA	Worldwide Governance Indicators, World Bank
Independent	Political Stability and Absence of Violence/Terrorism	PS	Worldwide Governance Indicators, World Bank
Independent	Government Effectiveness	GE	Worldwide Governance Indicators, World Bank
Independent	Regulatory Quality	RQ	Worldwide Governance Indicators, World Bank
Independent	Rule of Law	RL	Worldwide Governance Indicators, World Bank
Independent	Control of Corruption	CC	Worldwide Governance Indicators, World Bank
Control	Gross Domestic Product per capita	GDPPC	World Development Indicators, World Bank
Control	Trade Openness	TO	World Development Indicators, World Bank
Control	Population	POP	World Development Indicators, World Bank

3.3. Model Specification

Given the conceptual and empirical overlap among the six World Governance Indicators, multicollinearity may arise if they are included simultaneously. To mitigate this concern and to capture dimension-specific effects, each governance indicator is entered separately in the regression models, following prior literature. This approach reduces multicollinearity bias while allowing a nuanced interpretation of governance

heterogeneity. The mediation analysis follows the procedure proposed by Baron and Kenny (1986) to determine whether mitigation finance mediates the relationship between governance and carbon dioxide emissions. The first step (Model 1) tests the direct effect of the governance dimensions on carbon dioxide emissions. The second step (Model 2) examines the direct effect of the governance dimensions on mitigation finance. The third step (Model 3) tests for the effect of the mediator (mitigation finance) on carbon dioxide emissions while controlling for the independent variables (governance dimensions). If the coefficient of the mediator is significant and the coefficients of the governance indicators decrease in absolute value compared to Model 1, this suggests partial mediation. If the governance indicators become insignificant while mitigation finance remains significant, this suggests full mediation. All models are estimated using a two-way fixed effects model to account for unobserved, time-invariant heterogeneity across countries and shocks or trends common to all countries.

4. RESULTS AND DISCUSSION

The descriptive statistics of the for all the variables included in the analysis are presented on Table 2.

Table 2. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
GDPPC	1462	4435.058	3875.139	253.692	19481.646
TO	1297	76.856	38.512	2.699	347.720
MF	1450	66.529	154.219	0	2164.920
CO2	1452	158.437	1010.628	0	12621.615
POP	1496	45.762	168.393	0.010	1425.423
GE	1496	-0.522	0.671	-2.440	1.178
CC	1496	-0.499	0.683	-1.937	1.699
RQ	1496	-0.515	0.679	-2.387	1.536
RL	1496	-0.516	0.680	-2.418	1.349
PV	1496	-0.382	0.926	-2.996	1.391
VA	1496	-0.358	0.841	-2.259	1.307

The Pearson’s Correlation Test is presented on Table 3.

Table 3. Pearson's Correlation Test.

Variables	CO2	MF	TO	GDPPC	POP	GE	CC	RQ	RL	PV	VA
CO2	1.000	0.235***	-0.121***	0.120***	0.824***	0.159***	0.029	0.043	0.043	-0.040	-0.120***
MF	0.235***	1.000	-0.182***	-0.047	0.616***	0.159***	-0.000	0.132***	0.075**	-0.169***	0.018
TO	-0.121***	-0.182***	1.000	0.215***	-0.194***	0.212***	0.255***	0.180***	0.212***	0.363***	0.145***
GDPPC	0.120***	-0.047	0.215***	1.000	0.011	0.588***	0.494***	0.493***	0.501***	0.424***	0.391***
POP	0.824***	0.616***	-0.194***	0.011	1.000	0.134***	-0.013	0.033	0.032	-0.141***	-0.077**
GE	0.159***	0.159***	0.212***	0.588***	0.134***	1.000	0.794***	0.828***	0.839***	0.606***	0.598***
CC	0.029	-0.000	0.255***	0.494***	-0.013	0.794***	1.000	0.695***	0.875***	0.705***	0.712***
RQ	0.043	0.132***	0.180***	0.493***	0.033	0.828***	0.695***	1.000	0.781***	0.495***	0.672***
RL	0.043	0.075**	0.212***	0.501***	0.032	0.839***	0.875***	0.781***	1.000	0.726***	0.755***
PV	-0.040	-0.169***	0.363***	0.424***	-0.141***	0.606***	0.705***	0.495***	0.726***	1.000	0.636***
VA	-0.120***	0.018	0.145***	0.391***	-0.077**	0.598***	0.712***	0.672***	0.755***	0.636***	1.000

Note: *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 4. Effect of Governance Dimensions on Carbon Dioxide Emissions

Variables	GE	CC	RQ	RL	PS	VA
Trade Openness	-0.095 (0.075)	-0.094 (0.067)	-0.134 (0.082)	-0.081 (0.062)	-0.118 (0.076)	-0.115 (0.073)
GDP per Capita	0.035*** (0.007)	0.036*** (0.007)	0.037*** (0.007)	0.035*** (0.006)	0.036*** (0.007)	0.036*** (0.007)
Population	6.989*** (0.388)	6.998*** (0.389)	7.028*** (0.387)	6.999*** (0.384)	7.047*** (0.391)	7.045*** (0.387)
Government Effectiveness	10.862** (4.357)					
Control of Corruption		13.460 (11.679)				
Regulatory Quality			-15.641*** (3.993)			
Rule of Law				26.485*** (9.506)		
Political Stability and Absence of Violence/Terrorism					-9.304* (4.935)	
Voice and Accountability						8.553*** (2.650)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,257	1,257	1,257	1,257	1,257	1,257
R ²	0.321	0.321	0.322	0.323	0.321	0.321
Adjusted R ²	0.243	0.243	0.243	0.245	0.243	0.242

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors in parentheses.

Table 5. Effect Of Governance Dimensions on Mitigation Finance

Variables	GE	CC	RQ	RL	PS	VA
Trade Openness	0.092 (0.087)	0.106 (0.085)	0.119 (0.089)	0.093 (0.082)	0.098 (0.084)	0.092 (0.084)
GDP per Capita	0.003 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.003 (0.002)
Population	8.313*** (0.732)	8.301*** (0.734)	8.296*** (0.735)	8.313*** (0.738)	8.241*** (0.745)	8.256*** (0.752)
Government Effectiveness	0.064 (4.411)					
Control of Corruption		9.776 (11.043)				
Regulatory Quality			23.261*** (6.810)			
Rule of Law				1.118 (6.520)		
Political Stability and Absence of Violence/Terrorism					20.111*** (5.015)	
Voice and Accountability						-17.652* (9.782)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,250	1,250	1,250	1,250	1,250	1,250
R ²	0.281	0.281	0.283	0.281	0.284	0.282
Adjusted R ²	0.197	0.198	0.200	0.197	0.201	0.199

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors in parentheses.

Table 6. Mediating Role of Mitigation Finance Between Governance and CO2 Emissions

Variables	GE	CC	RQ	RL	PS	VA
Mitigation Finance	-0.179** (0.070)	-0.180*** (0.069)	-0.177** (0.070)	-0.179*** (0.069)	-0.177** (0.069)	-0.178** (0.070)
Trade Openess	-0.118 (0.078)	-0.110 (0.073)	-0.152* (0.080)	-0.105* (0.063)	-0.138* (0.077)	-0.137* (0.075)
GDP per Capita	0.041*** (0.007)	0.042*** (0.006)	0.043*** (0.006)	0.041*** (0.006)	0.042*** (0.007)	0.042*** (0.007)
Population	8.390*** (0.837)	8.393*** (0.837)	8.404*** (0.837)	8.399*** (0.830)	8.419*** (0.838)	8.429*** (0.828)
Government Effectiveness	8.361* (4.363)					
Control of Corruption		17.390 (11.393)				
Regulatory Quality			-13.668*** (4.386)			
Rule of Law				24.375*** (9.264)		
Political Stability and Absence of Violence/Terrorism					-6.612 (4.587)	
Voice and Accountability						7.537 (4.673)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,213	1,213	1,213	1,213	1,213	1,213
R ²	0.357	0.358	0.357	0.359	0.357	0.357
Adjusted R ²	0.282	0.282	0.282	0.284	0.281	0.281

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors in parentheses.

5. DISCUSSION

Emissions range from 0 to 12621.615 metric tons of CO₂e, indicating a considerable difference among countries in environmental quality. All the governance dimensions show negative values, suggesting countries have below average governance performance. GDP per capita also shows considerable variation, ranging from 253.692 to 19481.646 (2015 constant USD), highlighting the significant economic disparity across countries.

In the first step of the mediation model, government effectiveness, rule of law and voice and accountability exhibit a positive and significant effect on carbon dioxide emissions. These results are counterintuitive, as better governance is mostly related to reduced carbon dioxide emissions. However, even with improvements in institutional quality, during periods of rapid economic growth, emissions tend to increase due to the prioritization of industrial expansion over environmental quality (Halдар and Sethi, 2021). Additionally, strong institutions can stimulate capital inflows and to reduce income disparities, thereby contributing to an increase in emissions (Yang et al., 2022). On the contrary, the regulatory quality dimension shows a significantly negative effect on carbon dioxide emissions, consistent with previous literature (Baloch and Wang, 2019; Halimanjaya, 2015). Regulatory quality guarantees there is a framework in place that acts as a safeguard that allows only firms that meet environmental protection requirements to operate (Farooq, 2022). Therefore, preventing harm to the environment due to harmful business practices. Overall, different governance dimensions affect carbon dioxide emissions in different ways, governance dimensions don't have a uniform effect on emissions and some dimensions may inadvertently increase emissions, while others contribute to their reduction (Halkos and Tzeremes, 2013).

The heterogeneous effects of governance dimensions on CO₂ emissions suggest that governance is not a monolithic concept. While regulatory quality directly constrains environmentally harmful activities, other dimensions such as government effectiveness or rule of law may stimulate economic expansion and capital inflows, which can increase emissions in the absence of stringent environmental regulations. This highlights the importance of a multidimensional governance perspective rather than a uniform governance–environment nexus.

In the second step of the mediation model, the results indicate that countries with stronger regulatory quality and political stability and absence of violence/terrorism receive higher amounts of mitigation finance. Previous research suggests that robust regulatory quality can promote the proper utilization of funds and reduce the likelihood of misuse (Liu et al., 2024). This is consistent with broader evidence on the merits of recipient countries of mitigation finance, strong governance plays an essential role in donor eligibility criteria, with a greater likelihood of funds being allocated to countries where they are more likely to be managed effectively (Tennant et al., 2024). In contrast, the voice and accountability dimension show a negative association with mitigation finance, although this effect is relatively weak and only marginally significant ($p < 0.1$).

In the third step, mitigation finance has a negative effect on carbon dioxide across all governance dimension models. Demonstrating expected results, as the intended role of mitigation finance is to reduce carbon dioxide emissions by supporting the transition from fossil fuels to renewable energy. Highlighting the importance of deploying these funds to support developing countries in reducing emissions and demonstrating their effectiveness. Regarding the governance dimensions, rule of law remains positive and significant, while government effectiveness shows a marginally positive effect ($p < 0.1$). Regulatory quality, in contrast, shows a significantly negative effect, though of lower magnitude than in model 2, suggesting that mitigation finance partially mediates the relationship between regulatory quality and carbon dioxide emissions. Consequently, sound governance, specifically through regulatory quality, not only plays a significant direct role in reducing carbon dioxide emissions but also in attracting mitigation finance.

Regarding the control variables, population shows a significantly positive effect on mitigation finance across all governance dimensions equations in line with previous research (Islam, 2022; Doku et al., 2021), and a positive effect on carbon dioxide emissions in steps two and three of the mediation models. Unlike population, trade openness shows only a marginally negatively significant effect in model 3 of the mediation analysis. GDP per capita, meanwhile, exhibits a positive and significant effect on carbon dioxide emissions, consistent with literature supporting the effect of greater economic expansion on carbon dioxide emissions.

Although these findings provide meaningful insights, they should be interpreted with some methodological considerations. Although the mediation framework follows the classical approach proposed by Baron and Kenny (1986), which has been criticized for not directly testing the statistical significance of indirect effects, this approach remains useful for establishing baseline mediation structures in panel data settings. To address recent methodological concerns, future research could adopt causal mediation analysis or bootstrap-based indirect effect estimations to strengthen causal interpretation.

In addition, while endogeneity issues such as reverse causality and omitted variable bias can't be fully ruled out, the use of country and time fixed effects mitigates bias arising from unobserved time-invariant heterogeneity and common global shocks. The results should therefore be interpreted as conditional association rather than strict causal effects. Future studies may employ instrumental variable techniques or dynamic panel estimators to further address endogeneity.

Finally, this study employs total emissions rather than per capita emissions, as climate change mitigation targets absolute emission reductions at global level. Moreover, mitigation finance allocation is typically based on aggregate mitigation potential rather than individual-level emissions. To account for scale effects, population is explicitly included as a control variable. Nonetheless, future research could examine per capita or intensity-based emissions as robustness checks.

6. CONCLUSION

Mitigation finance plays a crucial role in helping developing countries reduce carbon emissions and thus support global efforts to limit temperature rise and slow climate change. However, to access these funds countries must demonstrate their ability to use them efficiently and achieve tangible results. This study finds that mitigation finance flows to countries perceived as reliable and capable of managing these funds efficiently. Such reliability is determined by governance, in specific regulatory quality and political stability and absence of violence/terrorism dimensions. Countries with robust institutional structures support appropriate project implementation and achieve measurable outcomes. Therefore, strengthening governance capacity is essential both for attracting mitigation finance and ensuring its effective use.

On the other hand, governance not only plays a role in attracting the much-needed mitigation finance needed to reduce emissions, but also directly impacts emissions themselves. Although the impact of governance on carbon emissions varies across dimensions with some dimensions contributing to reductions (such as regulatory quality) and others associated with increases (such as government effectiveness, rule of law and voice and accountability), governance remains essential, particularly in the context of economy growth, for achieving sustainable development and enabling countries to expand economically while preserving environmental quality.

In summary, this study demonstrates that mitigation finance partially mediates the relationship between regulatory quality and carbon dioxide emissions. Revealing that regulatory quality not only directly reduces carbon dioxide emissions but indirectly does so by attracting mitigation finance, which in turn helps lower emissions. Therefore, improvements in regulatory quality in developing countries can provide dual benefits by increasing access to mitigation finance and ensuring its effective use.

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Mailing Address: Hyun Jeong Kim, Department of Business Administration, College of Business Administration, Inha University, 100 Inha-Ro, Michuhol-Gu, Incheon, 22212, Republic of Korea, E-mail: kimhj@inha.ac.kr.

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