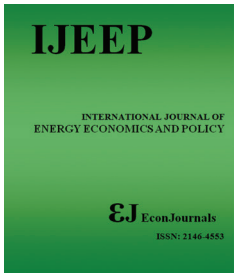

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2025, 15(4), 673-682.

The Impact of Political Stability on Environmental Situation: Comparative NARDL Analysis on Developed and Developing Countries

Randa Sharkas, Mohanad Ismael*

Department of Economics, Faculty of Business Economics, Birzeit University, Birzeit, Palestine. *Email: maburjaile@birzeit.edu

Received: 04 Februrary 2025 **Accepted:** 28 May 2025 **DOI:** https://doi.org/10.32479/ijeep.19663

ABSTRACT

The influence of political stability on environmental conditions is a complicated and multifaceted problem that needs a thorough examination. The main objective of the study is to consider a comparative nonlinear autoregressive distributed lag (NARDL) analysis to evaluate the linkage amongst political stability and environmental conditions in both developed and developing nations. The analysis uses secondary dataset including the World Bank and the Environmental Performance Index (EPI), from 1996 to 2019. The study's sample size is 14 nations, comprising 7 developed and 7 developing countries. The findings show that increasing political stability in developing nations by one degree over time reduces CO_2 emissions by 26.4% with a 1-year time lag. Furthermore, rising GDP leads to higher CO_2 emissions. Political stability has the same influence on developed nations as it does on poor ones, while GDP has a favorable impact on environmental problems.

Keywords: Political Stability, CO_2 Emissions, Nonlinear Autoregressive Distributed Lag, Financial Development, Environment
JEL Classifications: C33, E60, G21, P0

1. INTRODUCTION

Recently, the global priority of protecting the environment has emerged due to the rising importance of good environmental conditions in different life aspects, such as the economy and human wellbeing in general (Hale et al., 2016). Meanwhile, the most serious threat to the globe today is climate change driven via carbon dioxide emissions (Akadiri et al., 2021). The stability of the environment is influenced through various aspects comprising the political condition that denotes to the government's ability to fulfill its aims though maintaining the power (Agheli and Taghvaeeb, 2022), as a result, it has always played an important role in societal well-being (Sohail et al., 2021). Therefore, the stability of political circumstances, and the political institutions' actions, are critical factors in sustaining natural resources as well as preserving the environment (Samimi et al., 2012).

According to the Global Peace Index (2017), the amount of political conflicts increased by about 50% between 2006 and 2016. Furthermore, many of Sub-Saharan African nations have reported the highest increase in conflicts' number as well as lowest political stability index (Purcel 2019). Meanwhile, the CO_2 emissions rose from 610 kt to 2150 kt, respectively, which is more that 250% increase over 23 years. The unstable political situation not only worsens the clean energy consumption; but also, it affects the environmental quality, which leads to damage the whole environment in the long term (Sohail et al., 2021).

This paper studies the political situation effect on environment, by examining the political stability index degree on Carbon Dioxide emissions. The political stability index evaluates government's potential of instability through "unconstitutional or violent means, including politically-motivated violence and terrorism" (Ake, 1975). The index contains values that range from 2.5 to

−2.5, which reflects the most stable political situation, and the worst one, respectively. As mentioned before, one of the most dangerous environmental disasters is the climate change, which causes global warming. Such problems mostly occur due to the high expansion of CO_2 dioxide emissions, which eventually lead to extreme weather events in the long-term by the increase in temperatures and forests death (Grimm et al., 2008); therefore, this paper relies on CO_2 emissions as a measurement of environment's quality (Vadén et al., 2020; and Zhao et al., 2022).

The relation between the political circumstances and environment sustainability has been previously examined in literature, by showing how corruption (Cole, 2007), political risk (Adebayo et al., 2022), and political stability (Zhao et al., 2021) affect the quality of the environment. This research explores the political stability's influence on CO_2 emissions in the generally more politically stable developed European countries (Denmark, Sweden, Austria, Finland, United Kingdom, Norway, and Germany), and the same effect for lower politically stable developing Sub-Saharan African economies (Mali, Zimbabwe, Senegal, Niger, Congo- Dem- Rep., Burkina- Faso, Guinea) from 1996 to 2019.

The importance of this paper arises due to the lack of conducted studies covering the comparative analysis of the political-environmental nexus in selected developed and developing nations. Thereby, studying the political effect on environment in different world countries aids in understanding how different governments' regulations are imposed in regards of natural resources protection from overexploitation in industry, finance and other human actions considering the stability of country's political regime.

The paper contains five sections; Section 2 considers brief of literature, which reflects on the influence of politics on environmental situation. Thereafter, the paper discusses the problem statement and importance; the methodology used, hypotheses stated, and the variables examined are detailed in the third section. The data analysis as well as the results are described in section four while the conclusion is presented in section five.

2. LITERATURE REVIEW

The world's population is quickly increasing, both in terms of number and per capita energy use. Moreover, the demand on energy is even growing faster than the population itself (Miller et al., 2013). Today, fossil fuels account for more than 80% of energy use and constitute the main producer of CO_2 (IEA, 2021). Carbon dioxide emissions growth is a major contributor to the global warming crisis that have resulted in many losses and world catastrophes (Franjic, 2018). This problem is more apparent in the lower-income developing nations, resulting in increased suffering from malnutrition due to reduced crop yields resulted from the climate warming, such as in African regions (Awad et al., 2017). In general, the extreme weather events caused by the climate changing could be vital to different species, which are essential in eco- system balance (Zakari et al., 2021). In the context of environmental disasters, the lights were shed on institutional factors in recent years, as the implemented regulations and policies by institution actions that have an influence on the value of the environment either directly or indirectly (Fredriksson and Svensson, 2002). Therefore, in order to maintain a clean and healthy environment, some laws and regulations regarding human interactions with environment should be considered (Varvastian, 2019).

Environment degradation is a common problem in developing countries that are contributing high greenhouse emissions by forest-land conversion into agricultural land use. CO_2 emissions range from 100 to 250 metric tons per acre are retained to the atmosphere when the tropical forests are destroyed using slash-and-burn farming (Crutzen and Andreae, 1990; Naughton-Treves, 2004). The high degree of integration with the national and international economy, as well as population pressures, drives agricultural land growth in many tropical developing regions (FAO, 1997; 2003). Besides the mismanagement, in many developing nations, environmental policy receives little attention in the political discourse, which leads to a distorted environmental policy caused by a low importance in the political discussion, and by dishonesty, political unrest, and reckless political decisions (Fredriksson and Svensson, 2002). For example, regions especially the oil- producing ones have long been the reason of neglecting the environment friendly energy supplies, by rather polluting petroleum supplies around the world and for their own use, thus leading to expansion of CO_2 levels (Liu et al., 2008; Gleick, 1989).

Globally, it has been proven that the increased carbon emissions level is affirmed with the political unrest (Zhao et al., 2021; Adebayo et al., 2022). Numerous literature confirmed this relation with evidence covering 111 nations (Zhang and Chiu 2020), MoleA economies (Sekrafi & Sghaier 2018), Brazil, (Kirikkaleli & Adebayo, 2021) , Pakistan (Sohail et al., 2021), Asian countries (Agheli and Taghvaeeb, 2022), and Saudi Arabia (Mahmood and Alanzi, 2020). The unstable political and economic corrupt systems support the lawmakers to lenience towards polluters, instead of balancing the economic benefit and environmental protection (Helland and Whitford, 2003). Furthermore, the political instability contributes in the international and lobby organizations pressure to "limit the policy makers perspectives regarding strengthening the environment protection policies, due of the barrier from passing strong environmental regulations or embracing clean technology" (Purcel, 2019). For example, the unstable political situation due to the fragile government in Africa, led the country to weak natural resources management; thereby, the Sub-Saharan Africa's countries continue to depend on the natural resources for their socioeconomic growth (Brinkerhoff and Gage, 1992).

Moreover, the corrupt government system in Africa, which highly depends on funds from international development agencies served towards achieving the objectives defined by those agencies rather than by Africans (Bräutigam and Stephen, 2004) which led the Sub- Saharan region to incur large long- term foreign debts to industrialized countries; as a result, allowed the latest to exploit African's natural resources for their own interests (Mabogunje, 1995). For instance, in 1970, the entire indebtedness, excluding South Africa and Namibia, was just more than $5 billion, and

it had increased to about $140 billion by 1990. Furthermore, in 1990, there was over $20 billion in total private debt, compared to nothing in 1970 and the overall indebtedness of these regions was more than $171 billion by 1990 (Galinato, 2012).

Besides the political instability effect on natural resources degradation, it is also affecting the wellbeing of the poor class through different ways. Among others, it leads to decline in investment that are associated with the reduction of human and physical capital (Dollar and Kraay, 2002). Particularly, developing countries tend to strengthen their economies by promoting industrialization and output levels, which leads to high energy consumption, hence a spike in emissions of carbon dioxide, as the fossil fuel is the basic current energy source in these countries (Chen et al., 2019), which harms human welfare, and the sustainable progress (Danish, 2019). For example, the annual growth of energy demand in Sub- Saharan regions reached 3.8% from 2000 to 2017 according to economic development activities (Wang and Dong, 2019). In 2014, 822,819.03 kilotons of CO_2 were emitted in Sub-Saharan Africa, a 4.94% increase over the prior year (World Bank, 2017).

Each country has its own government system. Thus, having a stable political system encourages the country to set stern environment protection policies and rules (Majeed et al., 2021); thereby, protecting the natural resources, and optimizing their use. Moreover, the democratic political regimes attract more signatories on country's international agreements on environment matters; for example, the political stability encourages the international corporations to invest, which results in more foreign investment attractions that encourages the governments of these nations to deal with the climate issue more promptly (Congleton, 1992). Furthermore, Canadian Government has invested around $22 billion to promote renewable energy, such as the availability of clean air and water to build green infrastructure and reduce greenhouse gas emissions (Adebayo et al., 2022).

Generally, most of developed countries tend to execute ecologically friendly, low carbon emissions, and climate-resilient improvement paths (Htike et al., 2022). For example, Norway implemented carbon taxes policy since 1991which seeks to raise fossil fuel costs, which affects climate gas emissions indirectly through adjustment in overall cost transfers, industry competition, and labor market, and directly through energy efficiency and substitution (Bruvoll and Larsen, 2003). Furthermore, the government also declared that it would equal the EU's 2030 target of a 40% decrease in carbon emissions from 1990 levels (Norway's Ministry of the Environment, 2008). Eventually, the renewable energy in Norway powers the vast majority of its electricity generation needs, where 85% of Norway's energy production in 2018 was renewable such as hydro/marine, and the renewables made up 60.8% of Norway's total energy share then (Earth Organization, 2021).

Besides the importance of the political institutions in determining proper environmental regulations to control the pollution, this paper considers the economic growth effect on environment is relatively new trend in economy; yet there exist theories that explain this relation, such as Environmental Kuznets Curve (EKC) theory, Brundtland Curve and Daly Curve. The three theories agree on the scale effect in explaining the evolution of CO_2 levels (Dinda, 2004). As they suggest that the increased production creates pollution and increases the environmental damage (Cederborg and Snöbohm, 2016). However, the first two theories agree on a turning point where more economic growth, leads to better investment in cleaner and environment friendly technologies (Javid and Sharif, 2016; Ahmed and Long, 2013). However, they disagree when attempting to explain how economic development and carbon dioxide emissions are related to each other's economic stage (Cederborg and Snöbohm, 2016).

Rapid economic expansion necessitates enormous amounts of energy use, as stated in the empirical examination in EKC hypothesis. Empirical evidence shows that economic performance and energy use are considered as chief causes of CO_2 emissions. As a higher energy consumption leads to more CO_2 emissions; as a result, the energy as well as economic growth are recognized as a key predictor of CO_2 emissions (Hwang and Gum, 1992) and (Khalid and Jalil, 2019).

Moreover, the financial development effects on Carbon Dioxide emissions level differs according to the development status of the country (Shoaib et al., 2020). Studies have indicated that financial development has a favorable impact on the environment. For instance, the CO_2 emissions levels are lower in those countries where the equity financing is more important relative to bank lending (Nyarkoa and Kaya, 2021; De Haas and Popov, 2019). Moreover, the financial development has a major and beneficial impact on CO_2 emissions in the long run for both categories of countries (Shoaib et al., 2020). Hence, the entire quality of the environment worsens due to disorganized financial development (Zhang, 2011; Ozturk and Acaravci, 2013; and Dogan and Turkekul, 2016).

Eventually, this paper is diverse from the aforementioned researches because it accounts for the effect of the political stability in different countries with different development status. In particular, this paper's contributions are as follows: A few existing literatures analyzes the implications of a country's political conditions on environmental quality through assuming different indicators; yet the most literature use one indicator only, which actually cannot measure it well. Moreover, In recent epochs, a significant amount of research has explored the link between Carbon dioxide emissions, energy usage, and GDP (Mirza and Kanwal, 2017; Salahuddin et al., 2018; Kasman et al., 2015), but they ignored the role of country's political stability. Political stability is a multifaceted notion that has larger economic and political repercussions rather than a single phenomenon (Wenwen and Yi-Bin, 2020) this paper fills the gap and applies multifaceted indicators: Political, economic, and financial; therefore, it gives a more precise study on how all sorts of these indicators influence CO_2 emissions.

3. THEORETICAL FRAMEWORK

Theoretically, politics determines citizens' wellbeing, countries freedom of decision making, and organized management;

therefore, political stability contributes to better regulations, laws, consumption, resource management, and other important aspects of countries' (Zhang et al., 2016). Furthermore, political stability is crucial to many economic ramifications, including environmental policies and regulations (Purcel, 2019). Unstable politics cause a rise in corruption levels, thus increases the level of CO_2 emissions worldwide (Benlemlih et al., 2022). Therefore, both industrialized and developing countries' CO_2 emissions are thought to be negatively impacted by political stability.

Furthermore, unstable political situations have a substantial influence on environmental issues through interrupting the regulations and the policies that are necessary to environment protections. For instance, when the political situation is unstable, the government shortly aims to persist rather than to care about the long-run environmental policies. This can result in destroying the natural resources, adapting polluting industries and implementing bad environmental protections policies (Sachs, 2015; Burke et al., 2015). Political instability allow also the government to focus on security issues rather than on environment, resulting in natural resources exhausting and loss of diversity and more pollutions (Barbier, 2010).

According to the literature review, the models used to analyze GDP growth on CO_2 performance vary. For instance, the EKC theory, which is associated with the classical school of economics, follows an inverted U-shape curve in which environmental harm originally rises in response to economic growth before falling off after a certain level of wealth (Kong and Khan, 2019; Khan and Ullah, 2019). The EKC theory proposes more effective global trade and production, which demand for a clean environment primarily drives down environmental harm throughout the final phases of economic development (Khalid, 2013). The Brundtland curve hypothesis, on the other hand, contends that greater economic expansion previous to the turning point lowers poverty rates and, consequently, gives environmental protection higher priority. The Daly theory states that if the fundamental principles of capitalism are not changed, the environmental damage will rise with economic growth.

There is a chance that financial development will contribute to both rising and falling CO_2 emissions (Ziaei, 2015). These effects are caused by the wealth and scale effect. The wealth effect allows to increase customers' liquidity which allows them to increase their capital to consume more, thereby increasing the energy use, eventually rising the CO_2 productions (de Haas and Popov, 2019). The scale effect encourages the large- scale purchases such as equipment by industrial factories that causes more carbon emissions (Shoaib et al., 2020). Yet, the improved and controlled stock markets result in better tendencies towards investment in environment friendly industries (De Haas and Popov, 2019). Last but not least, improved financial development encourages trade and market openness, which leads to a more effective distribution of financial resources (Shoaib et al., 2020; Le et al., 2016). Even so, the pollution haven hypothesis contends that in this situation, developing nations will act as established nations' sources of pollution (Zhang, 2011). To sum up, how a nation allocates its financial resources and the state of its financial equity system determine the impact of financial development.

4. DATA AND METHODOLOGY

4.1. Data

Data is primarily taken from the World Bank, with the exception of political stability index data, which is gathered from the Economist Intelligence website. The collected data covers seven developed Europe countries and seven developing Sub-Saharan region countries. Countries' selection was based on a stratified random sample for a period from 1996 to 2019. The selected developed countries are Denmark, Sweden, Austria, Finland, United Kingdom, Norway, and Germany; while the developing countries are: Mali, Congo, Zimbabwe, Niger, Senegal, Burkina Faso, and Guinea.

In particular, data covers CO_2 emissions that measure environment quality, political stability index ranges from −2.5 for worst stability to 2.5 for perfect stability, and two controlling variables which are GDP per capita and the domestic credit to private sector (% of GDP) that measures the financial development.

The paper choses the stratified random sampling, since nations with various levels of political stability have clearly diverse economic, risk, and environmental features, which might generate a fundamentally different CO_2-political stability nexus. In addition, it divides the samples into the most politically stable and the least politically stable nations to reduce sample variability and find shared results in a homogenous group, so complementing the existing scarcity of data on both groups.

4.2. Methodology

This paper uses the collected panel data to conduct a non-linear autoregressive distributed lag model (NARDL) analysis. Moreover, it adopts the following CO_2 emissions model specification for both sets of countries (developed and developing countries):

- Model construction

$$CO_{2it} = F\,(PS_{it}, GDP_{it}, FD_{it} \quad (1)$$

Since the PS: Is the political stability index, GDP: GDP per capita, FD: Financial Credits to private sector (% GDP).

$$CO_{2it} = \beta_0 + \beta_1 PS_{it} + \beta_2 GDP_{it} + \beta_3 FD_{it} + \varepsilon_{it} \quad (2)$$

The parameters βi = 1,2,3 are the coefficients and εit measures the error. Where i represents countries in the panel, which are 14 countries: 7 developed and 7 developing countries.

$$lnCO_{2it} = \beta_0 + \beta_1 PS_{it} + \beta_2 lnGDP_{it} + \beta_3 FD_{it} + \varepsilon_{it} \quad (3)$$

The GDP and CO_2 emissions' natural logarithms are used to guarantee that the variables are homogeneous and the coefficients are treated as elasticities.

4.2.1. Unit roots tests

The acceptance of the outcomes and the selection of the model frequently is contingent on the stationarity and cointegration of the data. So, the outcomes are regarded untrustworthy if the data

is nonstationary. The research uses IPS (Im Pesaran Shin) to check the stationarity of the variables. The null hypothesis for IPS is the existence of the unit root. Consequently, it is necessary to reject the null hypothesis. In addition, the results show that the variables are stationary at the first difference, and we may go on to the next step of co-integration.

4.2.2. Co-integration

The long-term relationship between variables is investigated using the cointegration test. Panel statistics and group statistics are the two types of statistics used in the Pedroni test (Pedroni, 2004). The absence of co-integration between the variables is shown by the null hypothesis. Both in wealthy and emerging countries, the null hypothesis is rejected, according to the Modified Phillips Perron and Augmented Dickey Fuller tests.

4.2.3. ARDL approach

After examining the co-integration test, Since the NARDL model fits the regression model with extra regressors representing the independent factors and delays of the dependent variable, it is used. There are a number of co-integration techniques, but in this research the NARDL test is used because it is more beneficial than the others for the following reasons: It is adaptable and enables the use of factors integrated at orders t and t+1 in the regression. In comparison to the traditional co-integration tests, the NARDL investigation can estimate a small sample size and produces reliable long-run findings.

The PMG estimator applies the requirement of long-term parameter similarity. Additionally, by using the ARDL model, it permits simultaneous variation in the short-term correlations among countries. Pedroni co-integration test would be employed when the chosen variables behave steadily at the first difference (Al-Mulali et al., 2015; Hafeez et al., 2019). Since it can be applied to both sets of series, whether they have I(1) or I(0) order of co-integration, The ARDL model has grown in popularity throughout the past few years. Additionally, the ARDL model is suitable to concurrently generate long-run and short-run analysis.

$$CO_{2it} = \theta + \sum\theta_1 \Delta lnCO_{2it} + \sum\theta_2 \Delta PS_{it} + \sum\theta_3 \Delta lnGDP_{it} + \sum\theta_4 \Delta FD_{it} + \pi_1 lnCO_{2it-1} + \pi_2 PS^{it} + \pi_3 lnGDP_{it} + \pi_4 FD_{it} + \varepsilon_t \quad (4)$$

Where θi (i = 1,…,5) characterizes the short-run coefficients while πi (i = 1,…,5) represents the long term coefficients.

5. RESULTS AND DISCUSSION

5.1. Results and Analysis

Regarding the empirical estimation, testing if the series are stationary at the first difference or at the level is essential. The outcomes of the level Im-Pesaran-Shin unit-root at levels are shown in Table 1a and 1b for developing and developed countries, respectively. While the first difference tests are presenting in Table 2a and 2b. Furthermore, at the first difference, every variable is stationary. Then, the Modified Phillips-Perron test shows the existence of cointegration in developed and developing countries Table 3a and 3b. Therefore, the ARDL test an appropriate choice based on the existence of cointegration as aforementioned in both developed and developing countries data.

Table 1a: Im–Pesaran–Shin unit-root/developing countries

ADF regression: 1 lags		
	Statistic	**P-value**
W-t-bar	4.5750	1.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t-bar	1.5860	0.9436
ADF regression: 1 lags		
	Statistic	**P-value**
W-t-bar	2.4165	0.9922
ADF regression: 1 lags		
	Statistic	**P-value**
W-t-bar	5.6879	1.000

Table 1b: Im–Pesaran–Shin unit-root/developed countries

ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	2.5553	0.9947
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	0.8199	0.7939
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	0.1779	0.5706
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	5.2172	1.000

Table 2a: First difference/developing countries

ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−5.4005	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−7.1060	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−6.4879	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−2.3427	0.000

Table 2b: First difference/developed countries

ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−6.5775	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−7.2164	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−4.0632	0.000
ADF regression: 1 lags		
	Statistic	**P-value**
W-t- bar	−5.8384	0.000

Furthermore, after testing for the best lags for both categories of countries' cross-sectional variables, it is found that 1 year lag for the CO_2 emissions level, without any lags in other variables. Therefore, the ARDL looks like (1,0,0,0) it provides impartial estimates and is perfect for analyzing both short-term and long-term elasticities, and resolves endogeneity concerns.

Table 4a and 4b report the ARDL estimations for short term and long term: developed and developing using the pooled mean group. The main hypothesis for developing countries is rejected under 95% degrees of confidence, as the tested P = 0.000 < 0.05. This indicates that a one-degree rise in political stability over time results in a 26.4% reduction in CO_2 emissions during a 1-year period. However, in the short run, there is a positive correlation between the variables since a 1% rise in political stability corresponds to a 3.72% increase in the rate of CO_2 emissions.

In developed nations, the long-term effects of financial development, economic expansion, and political stability are all detrimental to CO_2 emissions. The rise by one degree in the political stability leads to lower the CO_2 emissions by 0.008%, while the increase of the GDP per capita by 1% accounts in eliminating the emissions by 0.35%. Lastly, with a year's delay in CO_2 emissions, a 1% increase in domestic credits for the private sector reduces CO_2 emissions by 0.002%. The short run impact exists only for GDP per capita, where if it is increases by 1% implies a 0.84% increase in the CO_2 emissions. However, there is no effect of neither political stability, nor of the financial development on the CO_2 emissions level (Table 4a).

In developing countries, over time, there is a positive correlation between GDP per capita growth and carbon dioxide emissions; specifically, a 1% increase in political stability corresponds to a 0.264% decrease in carbon dioxide emissions. Furthermore, financial development does not have any impact on the environment. In the short term, GDP per capita has the same influence on carbon dioxide emissions as political stability, but political stability has the opposite effect (Table 4b).

To sum up: First, long-term political stability and carbon dioxide emissions are negatively correlated in both industrialized and developing nations, indicating that nations that prioritize environmental conservation are those with more stable political environments. According to the results, the political stability positively influence the CO_2 emissions in the short-run in developing countries that could be addressed to rapid growth using primitive polluting technologies (Everett et al., 2010). For example, Senegal has showed an increase in CO_2 emissions by 720kt when the political stability index increased by 0.08° in 2015 compared to 2014. The reason behind this relation is addressed from the past aforementioned literature, as when the political situation becomes more stable in the long-run, the government becomes more organized in their planning, thus enhances country's chances to attract investments, manage economic plans and restrict the external interventions with disastrous results (Purcel, 2019; and Fredriksson and Svensson, 2002). Second, the findings demonstrate that, after a country reaches a particular stage of development, there is a negative correlation

Table 3a: Cointegration tests/developing countries

Panel cointegration tests	Statistic	P-value
Modified Phillips-Perron t	0.7545	0.2253
Phillips-Perron t	−1.8952	0.0290
Augmented Dickey-Fuller t	−1.8349	0.0333

Table 3b: Cointegration tests/developed countries

Panel cointegration tests	Statistic	P-value
Modified Phillips-Perron t	0.4035	0.3433
Phillips-Perron t	−2.8414	0.0022
Augmented Dickey-Fuller t	−1.5576	0.0597

Table 4a: PMG long run and short run (Developed countries)

Log Likelihood=119.9047						
D. lnCO_2	Coefficient	Standard error	Z	P > |z|	(95% Confidence interval)	
PS	−0.0084875	0.0182178	2.05	0.041	−0.0976967	0.0807217
LnGDP	−0.3484826	0.0525016	−6.64	0.000	−0.4513839	−0.24558213
FD	−0.0017728	0.000742	−2.39	0.017	−0.0032272	−0.0003185
SR__ec	−0.6878573	0.1688599	−4.07	0.000	−1.018817	−0.3568981
PS D1.	−0.0902682	0.0704892	−1.28	0.200	−0.2284244	0.047888
LnGDP D1.	0.8464581	0.3894548	2.17	0.030	0.0831406	1.609776
FD D1.	0.0045282	0.0035004	1.29	0.196	−0.0023325	0.0113889
__cons	10.43998	2.576311	4.05	0.000	5.390505	15.48946

Table 4b: PMG long run and short run (developing countries

Log likelihood=187.5865						
D. ln CO_2	Coefficient	Standard Error	Z	P > |z|	95% Confidence interval	
PS	−0.2642095	0.0340527	−7.76	0.000	−0.3309515	−0.1974675
LnGDP	1.035549	0.1288423	8.04	0.000	0.7830227	1.288075
FD	0.0003644	0.0029471	0.12	0.902	−0.0054119	0.0061406
SR __ec	−0.2570253	0.1372876	−1.87	0.061	−0.526104	0.0120533
PS D1.	0.0372711	0.0182178	2.05	0.041	0.0015649	0.0729773
lnGDP D1.	0.5370141	0.1905449	2.82	0.005	0.1635529	0.9104753
FD D1.	−0.0035334	0.0045968	−0.77	0.442	−0.012543	0.0054762
__cons	0.0999623	0.0572834	1.75	0.081	−0.0123112	0.2122358

between economic growth and CO_2 emissions. This confirms the existence of the EKC. Finally, the financial development has two different impacts on environment: A positive impact as shown in developed countries while the absence of the impact in developing countries in the long term. The financial development contributes in decreasing carbon dioxide emissions through sponsoring renewable energy initiatives and ecologically beneficial technology advancements (Tamazian et al., 2009). In contrast, the unorganized loans encourage the private sector factories' purchases of high fossil fuel consuming machinery (Usman and Hammar, 2020) that become a burden for the environment in the long run. To sum up, a secure and stable political environment is a precondition for conducting commercial and economic activity that eventually play a role in improving the efficiency of natural recourses use, and overall country's prosperity (Agheli and Taghvaeeb, 2022).

6. CONCLUSION AND POLICY

6.1. Conclusion

Due to the significant economic and ecological harm that global warming causes, it is currently one of the most debatable issues. In this paper, Seven industrialized and seven developing countries' carbon emissions levels are studied using panel data throughout the period of 1996-2019. The co-integration analysis results demonstrate the long-term equilibrium connection between the chosen variables. Based on the ARDL test, the long-run estimators' findings revealed a negative correlation between political stability and CO_2 emissions. In summary, political stability has an adverse effect on the environmental system.

The results also show that, over time, both in developed and developing nations, political stability reduces emissions. The political stability increases the strictness and nuisance of environmental resolutions that implies CO_2 emissions lessening. Furhermore, it improves the effectiveness of government administrations that leads to progress the economic situation and ultimately diminish CO_2 via composition effect. It's worth noting that the effect of the political stability on pollution drop is greater in developing nations. When the PS increases, the tendencies towards protecting the environment in developing nations become more intensive than in developed nations, as low-income countries typically don't give long-term environmental issues as much thought when they have more pressing needs, such as seeking for economical food, work, or health care (Plumer, 2014). However, when the PS increases in such countries, the long-run flow of foreign investments with advanced technologies becomes higher, which boosts the actions towards environment protection (Adebayo et al., 2022).

Most of foreign investments involve new technologies that are cleaner than domestic producers are and usually tend to increase citizens' incomes, which makes them demand for cleaner environment, as its priority becomes higher. For instance, the rank of the climate is the ninth on priority list for developed countries; whereas it is the least priority in the same list for developing ones due to the firstly mentioned priorities, resulted from low-income levels (Mabey and McNally, 1999).

Furthermore, The long-term favorable effect of economic growth on pollution in low-income developing nations confirms the EKC hypothesis, which was established by previous studies, and a negative effect for developed ones, which indicates that only high- income developed countries, where the average GDP per capita for the studied countries is $ 39,628.28, have met the threshold level to decrease CO_2 emissions via income level. Thus, the advanced nations are on the downhill slope of the EKC, whilst the developing nations are on the rising slope. Furthermore, the contemporary developing nations are at the stage where the UK was 100 years ago (Panayotou, 2000). Back then, the current developed countries' economic growth was associated by rapid pollution, which suggests that at the earlier stages of economic growth are associated with obsolete technologies use. Simultaneously, government policies are more concerned about increasing economic growth activities rather than at environmental protection; later, when a country progresses through its developmental stages, the economy changes structurally from polluter to green economic activities. This is known as the composition effect and includes the transfer of factors from the polluting industries toward the cleaner sectors, and this transformation results in more government environment-saving strategies, and higher residents' demand for better environment.

The associated problems with economic growth are not spontaneously resolved at the advanced stages of economic development (Rashid et al., 2018), as these issues depend on institutional and demographic reforms as well, which frequently go hand in hand with rising income and are required to give citizens the opportunity to experience growth (Rashid et al., 2018; and Abid et al., 2016). The beneficial impact of financial growth on carbon dioxide emissions in developing countries validates the Pollution Haven Hypothesis, which holds that businesses would try to avoid paying for strict environmental regulations and high energy prices by locating manufacturing in countries where environmental requirements are less stringent (OECD, 2017). The private sector factories in developing countries are mostly owned by foreign agencies for the aforementioned purpose. For example, if there were international spillovers and the benefits of operating a polluting sector outweighed the disadvantages on a local level. Otherwise, legislation may battle for the authority to take a portion of the industry's rents if the sector is consolidated and pays rent to outside investors (Levinson and Taylor, 2008); thus, the credits for such factories results in increasing levels of carbon emissions in developing countries and decreasing them in developed. For instance, the more loans given to Mali's private factories in 2016, which were higher than in 2006 by 10%, caused a 2600kt increase in CO_2 emissions. Whereas, the double increase in the same indicator, decreased CO_2 emissions by 19,400kt in Finland for the same period.

Finally, the consistency of the economic preferences with country's political decisions regarding environment preservation, leads to overall eco-friendly production and consumption (Zhao and Madni, 2021). To illustrate, the influence of politics on the environment is replicated through the policies that political institutions implement (Zakari et al., 2021).

6.2. Policy Suggestions

According to the results reached, and past literatures the Sub- Sharan African regions lack from political liberties, awareness of the effects of environmental degradation, and have an inactive policy that are crucial for saving the environment (Abid et al., 2016). One of the most common pollution problems there is the air pollution, resulted from high fossil fuel consumption; especially in the uncontrolled transportation sector, which causes around 49,000 deaths/year. (Schwela and Haq, 2013). Regarding the aforementioned in this paper disasters from the climate warming, it is obvious that in the next years, emerging countries will have to take responsibility for preventing environmental deterioration. Thus, the understanding of the causes of such unstable situation, is the key to successful policy implementation and instability reductions in the long-term.

The Sub-Saharan region has experienced various forms of conflicts starting with the remittances of Cold War in forms of structural imbalances across all regions, civilian confrontation in South Sudan, election ferocity in Kenya, farmer-herder struggle in Nigeria, and armed conflict in Eastern Democratic republic of Congo. The main causes of such political instabilities are demographics, low levels of economic development, public administration, and horizontal disparities through cross-group discrimination. For example, Youth populations are expanding at a faster rate than the general population, which raises the possibility of political instability due to increased competition for limited resources like land. In addition, the low GDP per capita levels mean low investment in human development, thus increases revolutions and violence. Moreover, the abrupt regime changes usually result in political imbalances. Finally, the region has 72 different groups in ethnicity, religion, language, etc.; nonetheless, there is also relative deprivation along these groups that tends to encourage internal conflicts among them.

Moreover, African governments should mainly focus on solving the instability issues of the region's structure first by analyzing each cause and establishing stern regulations to avoid it. Eventually, this has better chances to save the environment through increasing opportunities of better advocacy from international and regional organizations on enhancing sustainable environment policies. Secondly, by preeminent manufacturing practices that create minor environmental devastation and promoting awareness on CO_2 emissions via seminars, meetings, and conferences for policy officials and business organizations.

7. ACKNOWLEDGEMENT

I would like to thank the participants in the "Politiques Publiques et Evidences Scientifiques: Apport des Methodes d'Evaluation d'Impact" symposium occurred in Kenitra, Morocco.

REFERENCES

Abid, M., Schilling, J., Scheffran, J., & Zulfiqar, F. (2016). Climate change vulnerability, adaptation and risk perceptions at farm level in Punjab, Pakistan. Science of the Total Environment, 547, 447-460.

Adebayo, T.S., Akadiri, S.S., Uhunamure, S.E., Altuntaş M., Shale, K. (2022), Does political stability contribute to environmental sustainability? Evidence from the most politically stable economies. Heliyon, 8, e12479.

Agheli, L., Taghvaeeb, V.M. (2022), Political stability effect on environment and weak sustainability in Asian countries. Sustainability Analytics and Modeling, 2, 100007.

Ahmed, K., Long, W. (2013), An empirical analysis of CO_2 emission in Pakistan using EKC hypothesis. Journal of International Trade Law and Policy, 12(2), 188-200.

Akadiri, S.S., Rjoub, H., Adebayo, T.S., Oladipupo, S.D., Sharif, A., Adeshola, I. (2021), The role of economic complexity in the environmental Kuznets curve of MINT economies: Evidence from method of moments quantile regression. Environmental Science and Pollution Research, 1(5), 468-479.

Ake, C. (1975). A definition of political stability. Comparative Politics, 7(2), 271- 283.

Al-Mulali, U., Choong, W.W., Sheau-Ting, L., Bin Mohammed, M. (2015), Investigating the environmental Kuznets curve (EKC) hypothesis by utilizing the ecological footprint as an indicator of environmental degradation. Ecological Indicators, 48, 315-323.

Awad, A., Warsame, M. (2017), Climate changes in Africa: Does economic growth matter? A semi-parametric approach: Semantic scholar. International Journal of Energy Economics and Policy, 7, 1-8.

Barbier, E.B. (2010), Poverty, development, and environmental degradation. Environmental Development, 1(1), 1-7.

Benlemlih, M., Assaf, C., & El Ouadghiri, I. (2022). Do political and social factors affect carbon emissions? Evidence from international data. Applied Economics, 54(52), 6022-6035.

Bräutigam, D.A., Stephen, K. (2004), Foreign aid, institutions, and governance in Sub-Saharan Africa. Economic Development and Cultural Change, 52(2), 255-285.

Brinkerhoff, D.W., Gage, J.D. (1992), Natural Resources Management Policy in Africa: Implementation Challenges for Public Managers. North Carolina: McFarland and Company, Inc.

Bruvoll, A., Larsen, B.M. (2003), Greenhouse Gas Emissions in Norway: Do Carbon Taxes Work? Discussion Papers, No. 337, Statistics Norway, Research Department, Oslo.

Burke, M., Hsiang, S.M., Miguel, E. (2015), *Global non-linear effect of temperature on human conflict*. Nature, 527(7577), 20-26.

Cederborg, J., Snöbohm, S. (2016), Is there a Relationship between Economic Growth and Carbon Dioxide Emissions? Sweden: Södertörns University Institution of Social Sciences.

Chen, H., He, L., Chen, J., Yuan, B., Huang, T., Cui, Q. (2019). Impacts of clean energy substitution for polluting fossil fuels in terminal energy consumption on the economy and environment in China. Sustainability, 11(22), 6419.

Cole, M. A. (2007). Corruption, income and the environment: an empirical analysis. Ecological Economics, 62(3-4), 637-647.

Congleton, R. (1992), Political institutions and pollution control. The Review of Economics and Statistics, 74(3), 412-421.

Crutzen, P., Andreae, M. (1990), Biomass burning in the tropics: Impact on atmospheric chemistry and biogeochemical cycles. Science, 250(4988), 1669-1678.

Danish, K. (2019), Moving toward sustainable development: The relationship between water productivity, natural resource rent, international trade, and carbon dioxide emissions. Sustainable Development, 28(4), 540-549.

De Haas, R., & Popov, A. A. (2019), Finance and carbon emissions. Available at SSRN 3459987.

Dinda, S. (2004), Environmental Kuznets curve hypothesis: A survey. Ecological Economics, 49(4), 431-455.

Dogan, E., Turkekul, B. (2016), CO_2 emissions, real output, energy consumption, trade, urbanization and 454 financial development: Testing the EKC hypothesis for the USA. Environmental Science

and Pollution Research International, 23(2), 1203-1213.
Dollar, D., Kraay, A. (2002), Growth is good for the poor. Journal of Economic Growth, 7(3), 195-225.
Earth Organization. (2021), Environmental Policies and Climate Vulnerabilities. Norway: Earth Organization.
Everett, T., Ishwaran, M., Ansaloni, G.P., Rubin, A. (2010), Economic Growth and the Environment. United Kingdom: Department for Environment Food and Rural Affairs.
FAO. (1997), ???. Food and Agriculture Organization of the United Nations.
FAO. (2003), State of the World's Forests 2003. Available from: https://www.fao.org/3/Y7581E/Y7581E00.htm
Franjic, S. (2018), Importance of Environment Protection on the global level. Scientific Journal of Research and Reviews, 1, 2018.
Fredriksson, P.G., Svensson, J. (2002), Political instability, corruption and Policy Formation: The case of environmental policy. Journal of Public Economics, 87, 1383-1405.
Galinato, G. (2012), The effects of corruption control, political stability and economic growth on deforestation-induced carbon dioxide emissions. Environment and Development Economics, 17, 67-90.
Gleick, P. (1989), The implications of global climatic changes for international security. Climate Change, 15, 309-325.
Global Peace Index. (2017), World Relief Web. New Zealand: Global Peace Index.
Grimm, B., Faeth, S., Golubiewski, N., Redman, C., Wu, J., Bai, X., Briggs, J. (2008), Global change and the ecology of cities. Science (New York, N.Y.), 319, 756-760.
Hafeez, I., Yingjun, Z., Hafeez, S., Mansoor, R., Rehman, K.U. (2019), Impact of workplace environment on employee performance: Mediating role of employee health. Business, Management and Economics Engineering, 17(2), 173-193.
Hale, B. (2016). Rights, Rules, and respect for nature. In S. M. Gardiner and Alen Thompson eds. The oxford handbook of environmental ethics (pp. 211–222). Oxford University Press.
Helland, E., Whitford, A.B. (2003), Pollution incidence and political jurisdiction: Evidence from the TRI. Journal of Environmental Economics and Management, 46(3), 403-424.
Htike, M.M., Shrestha, A., Kakinaka, M. (2021), Investigating whether the environmental Kuznets curve hypothesis holds for sectoral CO_2 emissions: Evidence from developed and developing countries. Environment, Development and Sustainability, 24, 1-28.
Hwang, D.B.K., Gum, B. (1992), The causal relationship between energy and GNP: The case of Taiwan. The Journal of Energy and Development 16, 219-226.
IEA. (2021), Understanding the Contributions of Specific Fuels and Sectors to GHG emissions Associated with Combustion of Fuels from 1971 to 2020 for Over 203 Countries and 42 Regions. France: IEA.
Javid, M., Sharif, F. (2016), Environmental Kuznets curve and financial development in Pakistan. Renewable and Sustainable Energy Reviews, 54, 406-414.
Kasman, A. Duman, Y. (2015), CO_2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries: A panel data analysis. Economic Modelling, 44, 97-103.
Khalid, W., Jalil, A. (2019). An econometric analysis of inter-fuel substitution in energy sector of Pakistan. Environmental Science and Pollution Research, 26, 17021-17031.
Khan, D., Ullah, A. (2019), Testing the relationship between globalization and carbon dioxide emissions in Pakistan: Does environmental Kuznets curve exist? Environmental Science and Pollution Research, 26(15), 15194-15208.
Kirikkaleli, D., Adebayo, T.S. (2021), Do public-private partnerships in energy and renewable energy consumption matter for consumption-based carbon dioxide emissions in India? Environmental Science and Pollution Research, 28(23), 30139-30152.
Kong, Y., Khan, R. (2019), To examine environmental pollution by economic growth and their impact in an environmental Kuznets curve (EKC) among developed and developing countries. PLoS One, 14(3), e0209532.
Le, T.H., Chang, Y., Park, D. (2016), Trade openness and environmental quality: International evidence. Energy Policy, 92, 45-55.
Levinson, A., Taylor, M.S. (2008), Unmasking the pollution haven effect. International Economic Review, 49(1), 223-254.
Liu, D., Li, X., Wang, D., Wu, H., Li, Y., Li, Y., ... & Yin, Z. (2024). An evaluation method for synergistic effect of air pollutants and CO2 emission reduction in the Chinese petroleum refining technology. Journal of Environmental Management, 371, 123169.
Mabey, N., & McNally, R. (1999), Foreign direct investment and the environment. Godalming, Surrey: WWF-UK.
Mabogunje, A. L. (1995), The Environmental Challenges in Sub-Saharan Africa. Environment: Science and Policy for Sustainable Development, 37(4), 4–10.
Miller, C. A., Iles, A., & Jones, C. F. (2013). The social dimensions of energy transitions. Science as Culture, 22(2), 135-148.
Mirza, F. M., & Kanwal, A. (2017), Energy Consumption, Carbon Emissions and Economic Growth in Pakistan: Dynamic Causality Analysis. Renewable and Sustainable Energy Reviews, 72, 1233-1240.
Mahmood, H., & Alanzi, A. A. (2020), Rule of law and environment nexus in Saudi Arabia. International Journal of Energy Economics and Policy, 10(5), 7-12.
Naughton-Treves, L. (2004), Deforestation and carbon emissions at tropical frontiers: a case study from the Peruvian Amazon. World Development, 32(1), 173-190.
Norway's Ministry of the Environment. (2008), Norwegian National Allocation Plan for the emissions trading system in 2008-2012.
Nyarkoa, R., & Kaya, I. (2021), The Impact of Financial Development on the Environment- Focus on Middle-Income Countries. Linköping University | Department of Management and Engineering.
OECD. (2017), Pollution havens? Energy prices are not key drivers of offshoring. https://www.citethisforme.com/cite/sources/websiteautociteconfirm.
Ozturk, I., & Acaravci, A. (2013), The long-run and causal analysis of energy, growth, openness and financial 512 development on carbon emissions in Turkey. Energy Economics, 36, 262-267.
Panayotou, T. (2000), Globalization and Environment. Retrieved from https://core.ac.uk/download/pdf/6720364.pdf.
Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Econometric theory, 20(3), 597-625.
Plumer, B. (2014), Why Rich Countries Worry More about Global Warming than Poor Ones. VOX. https://www.vox.com/2014/9/23/6835285/why-rich-countries-worry-more-about-climate-change-than-poor-ones.
Purcel, A. A. (2019). Does political stability hinder pollution? Evidence from developing states. Economic Research Guardian, 9(2), 75-98.
Rashid, G.-A., Viswanathan, K. K., & Hassan, S. (2018), The Environmental Kuznets Curve (EKC) and the environmental problem of the day. Renewable and Sustainable Energy Reviews, 81, 1636–1642. doi:10.1016/j.rser.2017.05.247
Sachs, J. D. (2015), The age of sustainable development. Columbia University Press.
Salahuddin, M., Alam, K., Ozturk, I., & Sohag, K. (2018). The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO2 emissions in Kuwait. Renewable and sustainable energy reviews, 81, 2002-2010.
Samimi, A. J., Ahmadpour, M., & Ghaderi, S. (2012), Governance and environmental degradation in MENA region. Procedia-Social and Behavioral Sciences, 62, 503-507.

Schwela, D., & Haq, G. (2013), Transport and Environment in Sub-Saharan Africa. https://www.jstor.org/stable/resrep00434.

Sekrafi, H., & Sghaier, A. (2018). Examining the relationship between corruption, economic growth, environmental degradation, and energy consumption: a panel analysis in MENA region. Journal of the Knowledge Economy, 9, 963-979.

Shoaib, H. M., Rafique, M. Z., Nadeem, A. M., & Huang, S. (2020). Impact of financial development on CO 2 emissions: A comparative analysis of developing countries (D 8) and developed countries (G 8). Environmental science and pollution research, 27, 12461-12475.

Sohail, M.T, Majeed, P.A, Shaikh, Z. & Andlib, M. (2021), Environmental costs of political instability in Pakistan: policy options for clean energy consumption and environment. Environ. Sci. Pollut. Control Ser., 7 (3), pp. 1037-1051

Tamazian, A., & Rao, B. B. (2010), Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional economies. Energy economics, 32(1), 137-145.

Usman, M., Yaseen, M. R., Kousar, R., & Makhdum, M. S. A. (2021). Modeling financial development, tourism, energy consumption, and environmental quality: Is there any discrepancy between developing and developed countries?. Environmental Science and Pollution Research, 28(41), 58480-58501.

Vadén, T., Lähde, V., Majava, A., Järvensivu, P., Toivanen, T., Hakala, E., & Eronen, J. T. (2020), Decoupling for ecological sustainability: A categorisation and review of research literature. Environmental science & policy, 112, 236-244.

Varvastian, S. (2019). The Human Right to a Clean and Healthy Environment in Climate Change Litigation. Max Planck Institute for Comparative Public Law & International Law (MPIL) Research Paper No. 2019-09.

Wang, J., Dong, K. (2019), What drives environmental degradation? Evidence from 14 SubSaharan African countries. Sci. Total Environ. 656, 165–173.

World Bank, (2017), World Development Indicators. http://databank.worldbank.org/data/ reports.aspx?source=world-development-indicators.

Zakari, A., Adedoyin, F. F., & Bekun, F. V. (2021), The effect of energy consumption on the environment in the OECD countries: economic policy uncertainty perspectives. Environmental Science and Pollution Research, 28(37), 52295-52305.