

The Interactive Effect of Geopolitical Risk and Oil Rent on Carbon Emissions in Oil Exporting Countries

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Type of Article: **Research** 10.22126/pse.2024.10509.1118 Received: 21 April 2024; Accepted: 08 July 2024 P.P: 59-90

Abstract

The main purpose of this research is to investigate the effect of oil rent and geopolitical risk (GPR) and also, the interactive effect of these two variables on carbon emissions in oil exporting countries. For this purpose, the statistical information of 25 oil-exporting countries during the years 2000-2021 has been used in the form of panel data analysis method including panel co-integration with cross-sectional dependence and fixed effects estimator (FE). The results indicate the positive effect of oil rent on CO2 emissions and confirm the carbon curse hypothesis in the studied countries; in such a way that with a one percent increase in the share of oil rent from GDP, CO2 emissions will increase by about 0.09 percent. Also, the interactive effect of oil rent and the GPR index on CO2 emissions is positive, indicating that the negative environmental effects of oil rent increase when oil exporting economies are exposed to geopolitical risks. The robustness of the obtained experimental results has been confirmed by separating the oil exporting countries into two categories countries with GPR above the sample average (first category) and countries with GPR lower than the sample average (second category). Based on this, the results show that the positive effect of oil rent on CO2 emissions in the first-category countries is much higher than in the countries of the second category.

Keywords: Oil Rent, Carbon Curse, Geopolitical Risk, Interactive Effect, Oil Exporting Countries.

JEL Classification: Q58, Q53, F18, C33.

Homepage of this Article: https://pse.razi.ac.ir/article_3130.html?lang=en

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Citations: Golkhandan, A. & Jahangiri, L. (2025). "The Interactive Effect of Geopolitical Risk and Oil Rent on Carbon Emissions in Oil Exporting Countries". *Public Sector Economics Studies*, 4 (11), 59-90.

Volume 4, Issue 11, Spring 2025

Climate change and global warming have become one of the most important challenges for humanity in recent years. This issue affects both developing and advanced economies and has adverse consequences for the current situation and the achievement of sustainable development goals. Additionally, although emissions of greenhouse gases (GHGs) are the primary contributing factor to environmental pollution and damage, CO2 emissions account for the most significant proportion of these emissions by volume (76% of total GHG emissions). As a result, CO2 emissions are the most critical greenhouse gas among all GHG emissions. To accomplish the ultimate goal of sustainable development, CO2 emissions must be controlled and monitored. As a result, prudent policy measures are necessary to reduce it. Among the countries with the highest carbon intensity in the world, there are many natural resource-rich countries. This suggests the existence of a carbon curse: resource-rich countries would tend to follow more carbon-intensive development paths than resource-poor countries. Various factors have been introduced to justify and strengthen or weaken the carbon curse hypothesis. Geopolitical risk (GPR) is one of these factors. GPR refers to the risk associated with wars, terrorist acts, and state tensions that affect international relations' normal and peaceful course. Based on the above description, the main purpose of this article is to investigate the interactive effect of GPR and oil rent on carbon emissions in the 25 oil-exporting countries during the period of 2000-2021 using panel regression models.

2. Theoretical Framework

The carbon curse is a new theory, related to but distinct from the resource curse. It states that fossil-fuel-rich countries tend to follow more carbon-intensive developmental pathways than fossil-fuel-poor countries for the following reasons. First, fuel-rich countries emit significant amounts of CO2 in fuel extraction and through associated wasteful practices such as gas flaring. Second, easy access to domestic fuel in such countries leads to crowding-out effects for their energy mix and economic structure (for example, abundant oil may displace other fuels from the energy mix and lead to the "Dutch Disease"). Third, fuel abundance weakens the economic incentive to invest in energy efficiency. Fourth, governments in fuel-rich countries are under considerable pressure to grant uneconomic fuel consumption subsidies, further increasing the carbon intensity of their economic output. On the other hand, shifting traditional technologies from advanced and cleaner ones could be possible by establishing green funds through natural resource revenues. Moreover, abundant natural resources can help to boost the economic performance of a country that helps to climb the economic development ladder; which in turn, undesired results of economic development on the environment can be internalized as envisaged in the Environmental Kuznets Curve (EKC) hypothesis.

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Recently, several mechanisms have been proposed for the effect of GPR on CO2. The first channel is the "consumption effect". The rise of GPR could lead to increased energy consumption and military-related activities and may also slow down research and development, limiting innovation in the field of renewable energy, which in turn will escalate CO2 emissions. The second channel is an "investment effect", which suggests that changes in GPR may promote energy independence and increase investment in green energy and related advanced technology projects, which retards CO2 emissions. Finally, GPR can hinder CO2 emissions through a "mitigation effect". According to this effect, GPR obstructs economic growth and reduces energy consumption efficiency, and these factors will control CO2 emissions. These indicate that GPR may increase or reduce CO2 emissions.

3. Methodology

This study's proposed model is as follows:

 $LnCO_{2it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 (LnGDP_{it})^2 + \beta_3 LnGPR_{it} + \beta_4 LnOilRent_{it} + \beta_4 LnOilRent_{it$

 β_5 (LnGPR_{it}*LnOilRent_{it})+ β_6 LnREC_{it}+ ε_{it}

In the above relationship, the variables are defined as follows:

CO2: Carbon Emission (metric tons per capita); GDP: Real GDP per capita (constant, 2015 US\$); GDP2: Real GDP per capita square; GPR: Geopolitical Risk Index; OilRent: Oil Rent (% of GDP); GPR×OilRent: the interactive effect of Oil Rent and Geopolitical Risk Index; REC: Renewable Energy Consumption (% of total final energy consumption) and ε_{it} : the error term. Also, in Eq. (1), countries are denoted by the subscript i (including 25 oil-exporting countries), and the subscript t indicates the period (2000-2021). Data on GPR has been obtained from Caldara and Iacoviello (2022). Data for Other variables have been obtained from the World Bank database. The estimation of the model has been done using the panel data analysis method, including cross-sectional dependence, panel unit root and panel co-integration tests, and Fixed Effects (FE) estimator.

4. Discussion

The results indicate the positive effect of oil rent on CO2 emissions and confirm the carbon curse hypothesis in the studied countries; in such a way that with a one percent increase in the share of oil rent from GDP, CO2 emissions will increase by about 0.09 percent. Also, the interactive effect of oil rent and the GPR index on CO2 emissions is positive, indicating that the negative environmental impact of oil rent increases when oil exporting economies are exposed to geopolitical risks. The robustness of the obtained experimental results has been confirmed by separating the oil exporting countries into two categories countries with GPR above the sample average (first category) and countries with GPR lower than the sample average (second category). Based on this, the results show that the positive effect Volume 4, Issue 11, Spring 2025

of oil rent on CO2 emissions in the first category countries is much higher than in the countries of the second category. Based on other results, the EKC hypothesis is not rejected for the studied countries, and an inverted U relationship between economic growth and CO2 emissions is confirmed. The effect of renewable energy consumption on CO2 emissions is also estimated to be negative.

5. Conclusion and Suggestions

The main results of this research show that oil rent and geopolitical risk have a positive effect on carbon emissions in oil-exporting countries, and the positive impact of oil rent on carbon emissions increases in the presence of geopolitical risks. Based on this, the oil exporting countries, especially the countries with high oil rents, should help reduce internal tensions and conflicts by implementing appropriate policies at the national level. At the international level, by increasing interactions and cooperation (especially at the regional level), take steps to reduce tensions and also fully deal with terrorism and terrorist threats. In addition, the policymakers of these countries should adopt the necessary control measures and policies to maintain and prevent excessive exploitation of oil resources, especially when the geopolitical risk increases. Also, a part of the revenues from the sale of oil (especially when its price increases) should be allocated to investing in suitable and environmentally friendly technologies by creating green funds.

6. Ethical Consideration

6.1. Compliance with ethical guidelines

The author of the article declares that research ethics have been observed in this article.

6.2. Funding

The author of the article has not received any budget from any organization or company to conduct the research.

6.3. Authors' Contribution

The author of the article declares that all aspects of this research have been conducted by them.

6.4. Conflict of interest

The author of the article declares that there is no conflict of interest in this research.

6.5. Acknowledgments

The valuable comments and suggestions of the respected reviewers are greatly appreciated for improving the status of the article.

Public Sector Economics Studies