

Causal Link among Economic Growth, Renewable Energy Consumption, and Energy Use on CO2 Emission using FMOLS regression: Empirical Result in South Africa 1990 – 2020

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Abstract

This research investigates the impact of economic growth, renewable energy consumption, and energy use on CO2 emissions in South Africa, utilizing the Fully Modified-Ordinary Least Squares (FMOLS) regression approach for the period from 1990 to 2020. The findings reveal that economic growth is positively associated with CO2 emissions, indicating that economic expansion leads to increased emissions. Additionally, renewable energy consumption is modestly negatively correlated with CO2 emissions, suggesting that a rise in renewable energy use could help mitigate emissions. Conversely, energy consumption exhibits a direct positive relationship with CO2 emissions, highlighting the critical need for improved energy efficiency. This study offers significant insights into the complex interactions between economic growth, energy consumption, and renewable energy in relation to CO2 emissions, emphasizing the necessity for a holistic strategy to combat climate change by integrating these factors effectively.

Keywords: CO2 emission, economic growth, energy use, FMOLS, renewable energy consumption