

# **Market-Induced factors and dynamism in Carbon dioxide Emissions in selected three major economies of Sub-Saharan Africa**

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## **Abstract**

We describe the dynamic effect of market-induced factors (energy consumption, financial development, foreign direct investment, gross domestic product growth, and industrial performance) on carbon dioxide emissions in Nigeria, Ghana, and South Africa, which are the three major economies in sub-Saharan African (SSA) countries. We apply impulse response function, variance decomposition analysis and Toda-Yamamoto causality techniques. We adopted a secondary analysis wherein the quarterly time series data for the period from 1980Q1 to 2017Q1 is used. The findings from the result of impulse responses for Nigeria, Ghana and South Africa indicate negative shocks of energy consumption and industrial value toward CO<sub>2</sub> emissions. However, domestic credit and economic growth positively influence CO<sub>2</sub> in South Africa. SSA countries are in stages of rapid development as there is a substantial inflow of FDI, resulting in increased energy consumption and CO<sub>2</sub> emissions, which contribute to environmental pollution.

Nonetheless, the result from forecast error variance decomposition for Nigeria, Ghana and South Africa reveals that fossil fuel use, economic growth, FDI and industrial performance forecast positively on the trend of CO<sub>2</sub> emissions in the long-run quarter in these economies. Lastly, the outcome from the Toda-Yamamoto causality model in Nigeria shows the existence of causality between economic growth, industrial value, credit, and fossil fuel and CO<sub>2</sub> emissions. In the case of Ghana and South Africa, the result reveals no causality among the variables. However, energy resources have no influence on CO<sub>2</sub> discharge in South Africa. Given the results of energy use, industrial performance, foreign direct investment, and financial development have a significant negative impact on the level of CO<sub>2</sub> discharge in these countries. Policymakers need to emphasise more appropriate policies that will consider financial reforms, sound industrial policies and all possible ways to attract clean foreign direct investments to stimulate sustainable development in these economies. This could be through

further control of a high burst of CO<sub>2</sub> emissions by making the availability of low emissions technologies, provision of financial incentives that will encourage the use of low CO<sub>2</sub> technology and removing trade barriers that will attract foreign investment, human capital development and research.

**Keywords:** Energy consumption, financial development, CO<sub>2</sub>, VAR, Toda-Yamamoto