Journal of Economic Cooperation and Development

Decarbonization, Energy Transition, and Economic Resilience: West African Policy Directions towards Net-Zero and Sustainable Development

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ABSTRACT

This study examines the relationships between decarbonization, energy transition and economic resilience across 16 West African countries from 2000 to 2023. Three complementary econometric strategies are employed: an interactive fixed effect (IFE) model, panel quantile regression and panel smooth transition regression (PSTR). The study pursues three objectives: (i) to investigate the effect of energy transition on greenhouse gas (GHG) and carbon dioxide (CO_2) emissions; (ii) to examine how fiscal, macroeconomic, financial and external sector resilience dimensions shape decarbonization outcomes across the emissions distribution; and (iii) to identify the renewable energy threshold at which energy transition generates significant GDP growth benefits. Renewable energy consumption significantly reduces both GHG and CO_2 emissions, while energy intensity and fossil-fuel-dependent electrification raise them. Economic resilience dimensions produce heterogeneous and non-linear effects that depend on pollutant type and emission intensity. Threshold analysis identifies that a remarkable increase in GDP growth might only start when renewables considerably surpass 88.6% of total final energy consumption, whereas the onset of emission reductions takes place at more conservative thresholds of 46.2% for GHG and 77.1% for CO_2. Macroeconomic resilience is always on the side of the high-transition regime. These results underscore the fact that rewards from the green economic revolution are thus a government, financial and institutional dividend along with the renewable energy scale deployment, that is, decarbonization at scale. The paper contributes an integrated regional analysis, which is currently absent from the West African energy transition literature.

Keywords: Decarbonization; Energy Transition; Economic Resilience; Greenhouse Gas Emissions; West Africa; Panel Threshold Regression.

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