

Short Run Nexus between Energy Efficiency, Foreign Direct Investment and Policy Dynamics in BRICS Economies: A Panel Data Analysis

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Abstract: This study examines the distributional effects of foreign direct investment, renewable energy consumption, and macroeconomic conditions on energy intensity across BRICS economies over the period 1992 to 2024. Panel quantile regression is employed at five quantile points from Q10 through Q90, preceded by panel unit root tests to ensure estimation reliability. FDI is not found to exert a significant short run effect on energy intensity across any quantile, suggesting its efficiency benefits operate through long run structural channels. Renewable energy consumption significantly reduces energy intensity from Q25 upward, emerging as the most consistent determinant of energy efficiency improvement across the distribution. Economic growth is found to increase energy intensity across all quantiles, consistent with the early-stage Environmental Kuznets Curve prediction, while trade openness exhibits a sign reversal across the distribution. Fixed effects estimation corroborates the main findings. The study offers the first distributional account of the FDI and energy intensity nexus in BRICS, providing policy relevant insights on investment quality, renewable energy mandates, and trade policy tailored to the heterogeneous energy profiles of individual BRICS economies.

Keywords: Energy Intensity, Foreign Direct Investment, Renewable Energy Consumption, BRICS Economies, Panel Quantile Regression, Energy Transition

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