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Connectedness Between Circular Economy, Environmental Technologies, And Energy Transition Amid Economic Shocks: Insights from Non-Parametric Approaches

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Abstract

This study utilizes global daily time-series data spanning from July 2, 2019, to March 31, 2023, to conduct a comprehensively analysis the influences of circular economy, green technology, and geopolitical risk on energy transition. Employing robust methodologies, including rolling window wavelet correlation and non-parametric Granger causality tests, we capture the dynamic interconnections among these variables while accounting for recent economic shocks, such as the COVID-19 pandemic and the Ukraine-Russia conflict. Our findings reveal that energy transition is positively influenced by both the circular economy and green technology, whereas geopolitical risk exhibits an inverse relationship. Notably, the magnitude and direction of these effects fluctuate across different quantiles and over time, highlighting the impact of economic shocks. Additionally, the non-parametric Granger causality test indicates that the circular economy, green technology, and geopolitical risk significantly Granger-cause energy transition across most quantiles. Overall, this study offers valuable insights on the role of circular economy, green technology, and geopolitical risk in shaping energy transition, emphasizing the critical need to consider external events in the analysis.

Keywords: sustainable development; energy transition; green technology; circular economy; economic shocks