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A clean technological innovation and eco-efficiency enhancement: A multi-index assessment of sustainable economic and environmental management

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Abstract:
The relationship among economic growth, energy, and the environment is very complex and sensitive, demanding a comprehensive set of policies. This study examines the role of clean technological innovation in attaining win-win conditions for the involved sectors, along with some other macroeconomic variables. For this purpose, the five main indices used are the energy index, financial index, human index, fiscal index, and environmental index of vital macroeconomic indicators developed for G-7 countries. We employ the recently developed quantile autoregressive distributed lag (QARDL) model to assess clean technological innovation's impact on economic and environmental conditions along with other indicators for the 2008–2018 period. According to the results, the energy index, which consists of research and development (R&D) in clean technological innovation in energy and renewable energy, has a significant and negative impact on greenhouse gasses (GHG) emissions and has a

positive and significant impact on economic growth. This study is pioneering in its nature, finding that productive expenditures on R&D for clean technological innovation can simultaneously enhance economic growth and improve environmental conditions. Based on empirical outcomes, this study suggests advanced policies to enhance economic growth without compromising environmental conditions in G-7 countries.