A Comparative Analysis of the Relationship between Renewable Energy Production and Economic Growth

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Abstract:

Energy production has been an indispensable factor in economic growth of countries. Initially, the world relied heavily on non-renewable sources in energy production however, other affordable and renewable sources such as wind, solar, geothermal and solar panel began to be used with the advent of new technologies and increased environmental awareness. Although renewable energy investment is costly, especially for developing countries, energy continuity provided by these sustainable sources can lower investment costs dramatically in the long run. Improvement of factors like economic growth and social welfare are believed to increase awareness on sustainable energy production. In this context, this paper examines the relationship between renewable energy production and economic growth of Germany, France, which are energy-independent countries, and Turkey, which is heavily-dependent on external sources in terms of energy. The paper utilizes modern time series analysis methods to investigate this relationship using annual data between 1970-2018. The stationarity of variables was tested with methods developed by Zivot and Andrews (1992), and Enders and Lee (2012). Cointegration analysis with structural breaks developed by Gregory and Hansen (1996) was used to evaluate the relationship between variables. Fully-modified OLS (FMOLS) showed that the long run equilibrium coefficients for Germany, France and Turkey were 1.47, 0.39 and 2.09, respectively. The results from regime shift model indicate that structural reforms caused a big regime shift in the relationship between energy production and economic growth in Germany and Turkey whereas the reforms did not lead to such shift in France. The results of the causality analysis indicate a unidirectional causality from GDP to RN for Turkey and Germany.

Keywords: Renewable Energy, Growth, Co-integration, Fourier Approach

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