

Dynamic Relationship Between Energy Consumption and Economic Growth Incorporating a Structural Break: An Empirical Study of Sri Lanka

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ABSTRACT

The interplay of several severe internal and external shocks has posed substantial challenges to the stability of the Sri Lankan economy. Therefore, this study investigates the presence of structural breaks in the relationship between energy consumption and economic growth in Sri Lanka, using annual data from 1990 to 2023. In addition to energy consumption and economic growth, gross fixed capital formation and labour force participation are incorporated as key explanatory variables. The Chow test is applied to identify structural breaks, and the VAR Granger causality test is used to examine the direction of causality between the variables. Also, the ARDL bound test is used to identify the cointegration relationship between energy consumption and economic growth, incorporating structural breaks. The Chow test results indicate the presence of structural breaks in 2004, 2008, 2020, and 2022 periods. These breakpoints align with major economic and environmental shocks, including the 2004 Indian Ocean tsunami, the 2008 global financial crisis, the COVID-19 pandemic, and the recent economic crisis in Sri Lanka. The results of the Zivod-Andrews test indicate that economic growth, energy consumption, and labour force participation are stationary variables in first difference $I(1)$. On the other hand, Gross fixed capital formation is found to be stationary at level $I(0)$. The VAR Granger causality test shows no short-term causal relationship between energy consumption and economic growth in the absence of structural breaks. However, a short-run unidirectional causal relationship exists when considering structural breaks. The empirical findings show that the variables in the study are cointegrated, indicating the existence of a long-run relationship among them. The ARDL bounds test shows a positive long-run impact of energy consumption on economic growth; this relationship does not hold in the short run. Notably, when structural breaks are considered, energy consumption negatively impacts economic growth in the short run, while its long-term impact becomes statistically insignificant. These findings suggest that external and internal shocks have disrupted the energy growth nexus in Sri Lanka. This study offers new insights for policymakers to account for structural breaks in policy formulation to address the short-run adverse impact of energy consumption on economic growth.

Keywords: *Chow Test, Economic Growth, Energy Consumption, Sri Lanka, Structural Break*