Does energy efficiency affect economic growth? Evidence from aggregate and disaggregate levels

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Abstract
This paper empirically examines the relationship between energy efficiency, CO2 emissions, foreign direct investment, exports, and real gross domestic product at both aggregate and disaggregate levels in Malaysia based on an autoregressive distributed lag approach. The annual data for the period of 1971–2013 are employed. The results indicate that energy efficiency Granger causes economic growth at the aggregate level, but not in each of the three main sectors (primary, secondary, and tertiary) of the economy. Another important finding of the study is that the export-led growth hypothesis is found to be valid in Malaysia at both the aggregate and disaggregate levels. The results of our study also confirm the fact that CO2 emissions do affect the overall economic performance and growth in all sectors, except for the primary sector. This finding implies that pollution from both secondary and tertiary sectors has led to economic growth in Malaysia. Moreover, it is also discovered that foreign direct investment does not have a significant impact on economic growth in Malaysia. The results of this study are essential for policymakers of Malaysia in designing appropriate policies in each sector that can lead to robust growth in the country. In addition to focusing on enhancing energy efficiency and promoting foreign direct investment, the policymakers should also start to look for alternative strategies to ensure long-term economic growth in the country.

Keywords
Energy efficiency, aggregate level, disaggregate level, real GDP, ARDL bounds test, Malaysia

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