

RENEWABLE ENERGY CONSUMPTION, CO₂ EMISSIONS AND ECONOMIC GROWTH IN MALAYSIA

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Overview

Due to the increasing concern over issues related to global warming and climate change, a number of developing economies have started to explore the use of renewable energy as an alternative to current energy sources. Moreover, with the growing prominence of sustainable development, the role of renewable energy consumption on economic growth have appear to be perceived as an important contributor to sustainable growth and energy security. Strategically located between 1° and 7° north of the Equator, Malaysia is endowed with an abundance of natural resources for renewable energy exploitation. As one of the most rapidly developing ASEAN countries, Malaysia is in the midst of exploiting the use of renewable energy such as solar, wind, hydro and biomass power. A positive relationship between renewable energy consumption and economic growth is expected as the higher the economic growth, the renewable energy usage will be increased. Hence, it is anticipated that renewable energy resources can bridge the gap between economic growth and environmental protection.

Methods

The framework for the analysis is the economic interaction between economic growth, renewable energy consumption, pollutant emissions and non-renewable energy consumption. The Vector Error Correction Model (VECM) approach is employed which allows all these variables to be endogenous, thereby allowing for additional channels of causality. For example, it allows for both renewable energy and economic growth to have a causal relationship with a third endogenous variable, without restricting the direction of this relationship. This would explain the correlation between economic growth and renewableenergy without implying that there is a causal relationship between the two.

Results

The finding of this study shows that economic growth, renewable energy consumption, carbon dioxide emissions and non-renewable energy consumption are $I(1)$. The results also provide evidence for the existence of long-run relationship between these variables for the period 1970-2013. The empirical results suggest that the variables are co-integrated. Hence, there is a long-run relationship among the variables. In addition, the empirical evidence indicates that renewable energy consumption has a positive effect on economic growth, i.e an increase in renewable energy consumption increases the economic growth by 0.05%. Thus, Malaysia's recent attempt to enhance the use of renewable energy use with rest of the world could have had a high impact on reducing CO₂ emission in this country. In contrast, an increase in the carbon dioxide emission and non-renewable energy consumption tend to decrease the economic growth by 0.28% and 0.94%, respectively.

With respect to the causal relationship between renewable energy consumption and economic growth, there is unidirectional Granger causality from economic growth to renewable energy consumption, but not vice versa. The implication of this finding is that an increase in economic growth can lead to a positive impact on the use of the renewable energy. Because the VECM approach allows for additional channels of causality, we also find that there is evidence of unidirectional Granger causality from emission and non-renewable energy consumption to renewable energy consumption.

Conclusions

This study analyses the relationship between economic growth, renewable energy consumption, CO₂ emission and non-renewable energy consumption in Malaysia using annual data from 1970 to 2013. In contrast to most of the earlier studies that investigated the validity of the emission-growth nexus and the energy-growth nexus in the same framework, this study contributes to the literature by focussing on the role of renewable energy use in the emissions-energy-growth relationship. We analysed the dynamic linkages among the variables by applying time-series techniques such as unit root and co-integration tests, VECM and Granger causality tests. The VECM approach used in this paper allows all variables to be endogenous, thereby allowing for additional channels of causality. The equations of the VECM were then tested for robustness by way of diagnostic checking.

The empirical results suggest that there is a long-run relationship among the variables. In addition, the empirical evidence indicates that renewable energy consumption has a positive effect on economic growth. In contrast, an increase in the carbon dioxide emission and non-renewable energy consumption tend to decrease the economic growth. Results reveal that there is unidirectional Granger causality from economic growth to renewable energy consumption, but not vice versa. We also find that there is evidence of unidirectional Granger causality from emission and non-renewable energy consumption to renewable energy consumption.

In terms of policy recommendations, this study reveals that the consumption of renewable energy is vital to achieve sustainable development. Therefore, there is a strong need for the government of Malaysia to develop specific national and local energy policies to promote renewable energy consumption. Moreover, there is an alternative and feasible option for Malaysia to enhance the use of alternative sources of energy that are relatively free from pollutant emissions. Appropriate efforts undertaken by governments, such as reducing the consumption of conventional energy and increasing the proportion of renewable energy use, will not only benefit the government but will also ensure that sustainable development can be achieved. Hence energy policy in Malaysia should be designed taking into consideration economic development, environmental development and energy consumption.