DOES RENEWABLE ENERGY SUBSTITUTE LNG INTERNATIONAL TRADE IN THE ENERGY TRANSITION? [1]

Sarah Najm, King Saud University, snajm@ksu.edu.sa
Ken'ichi Matsumoto, Toyo University, matsumoto1005@toyo.jp

Overview

Renewable energy is a vital tool for the energy transition and achieving sustainable development goals (SDGs). The global economy, however, remains heavily reliant on fossil fuels. Demand for natural gas is rising as a bridge for moving towards a lower carbon economy. Gilbert and Sovacool (2017) argue that global emissions are expected to increase due to rising energy demand and methane leakage. Liquified natural gas (LNG) trade dynamic remain underexplored in the academic literature, compared to oil trade related studies (Maxwell and Zhu, 2011). Studies often neglect that different trading partners are affected by different institutional factors. This study examines the impact of green energy policies on LNG international trade. To what extent would natural gas and renewable energy represent substitutes in the global energy mix? This study aims to explore the impact of the rise of renewable energy policies on LNG international trade between 1988 and 2017 at the global level.

Methods

This study examines the impact of renewable energy policies on LNG trade using an unbalanced panel dataset during the annual period between 1988 and 2017. The empirical framework is based on the trade gravity model pioneered by Pöyhönen (1963) and Tinbergen (1962). Trade gravity models are used to predict trade-flows with the premise that larger countries trade more, and closer countries trade more. We conduct the analysis in a global trade gravity framework using fixed-effects to account for unobserved heterogeneity between trading partners. We measure renewable energy policies based on the ratio of renewable energy consumption to the total energy consumption in the importing country. This represents the main explanatory variable of interest to test the impact of green energy policies on LNG trade. This is a proxy for environmental incentives to trade between countries. We also account for other trade incentives as independent variables including, GDP of exporters and LNG price, and the role of WTO membership.

Results

The estimation results show that renewable energy policies have a negative and statistically significant impact on LNG international trade. This suggests that investing in cleaner energy technologies can reduce LNG trade globally, as a channel towards reducing natural gas consumption in aggregate. The results, therefore, are consistent with the narrative where natural gas and renewable energy represent partial substitutes, rather than, complements in terms of international trade. LNG price has a negative impact on the volume of LNG trade. We also find that freer trade policies and reducing trade barriers, measured by access to the WTO, have a positive impact on LNG trade. This outcome is consistent with economic theory where trade barriers may impede incentives to trade.

The estimation results are also robust when re-specifying the model using the value of LNG trade per GDP and the volume of LNG trade, respectively, as dependent variables. The impact of renewable energy policies remains with a negative and significant effect on both the value and volume of LNG trade per GDP.

Conclusions

This study concludes that the negative impact of green energy policies on LNG import is robust. The results imply that natural gas and renewable energy represent substitutes, rather than, complementary products. This suggests that investing in renewable energy is key for the energy transition. However, subgroup analysis indicates that less-developed economies and the shale revolution period seem to impede progress towards the energy transition. We also find that LNG patterns of trade are determined by both economic and institutional factors, such as prices and the WTO membership. It is important therefore to consider the nature of trade incentives when analyzing LNG patterns of trade.

---

[1] This paper is now available in the journal of *Energy Economics* as:
Najm, S. and Matsumoto, K. 2020. Does renewable energy substitute LNG international trade in the energy transition? *Energy Economics*, 92,104964.(https://www.sciencedirect.com/science/article/pii/S0140988320303042?dgcid=author)

References

Gilbert, A. Q. & Sovacool, B. K. 2017. US liquefied natural gas (LNG) exports: Boom or bust for the global climate? *Energy,* 141**,** 1671-1680.

Maxwell, D. & Zhu, Z. 2011. Natural gas prices, LNG transport costs, and the dynamics of LNG imports. *Energy Economics,* 33**,** 217-226.

Pöyhönen, P. 1963. A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archiv,* 90**,** 93-100.

Tinbergen, J. 1962. *Shaping the World Economy: Suggestions for an International Economic Policy.,* New York, Twentieth Century Fund.