Green Technology Rebellion and Energy Expertise are Renovating Sustainability

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ABSTRACT

Green technology revolution has increased continual appreciation due to expanding concerns about environmental sustainability. It has the possible to advance energy proficiency by increasing total factor carbon productivity through modifying effects. This research investigations the asymmetric nexus between green technology revolution and energy proficiency in the top ten green innovator economies (Denmark, Japan, Switzerland, Sweden, Germany, Norway , Finland, UK, Netherlands, and USA). Previous investigations applied panel data methods to acquire tenacious outcomes on the green technology revolution-energy proficiency nexus, even though some countries did not individually demonstrate such a link. Moderately, this study employs a distinguishing 'Quantile-on-Quantile' technique that enables detectives to examine time-series dependency in each country by providing an international yet economy-specified understanding of the conjunction between the variables. Approximations disclose that green technology revolution advances energy proficiency in the majority of our selected economies at particular quantiles. It is also demonstrated that the asymmetries between our variables fluctuate among countries, highlighting the need for special care when adopting green revolution, energy proficiency, and sustainable environment policies.

INTRODUCTION

Energy proficiency (EP) is a vital aspect of sustainable development, as it can significantly reduce emissions and contribute to a more viable future. The cumulative energy demand, coupled with the restricted supply of fossil fuels and the necessity to diminish carbon emissions, has led to enhancing interest in alternative energy sources and energy-proficient technologies [1]. EP can be enhanced through various means, including energy-proficient technologies, alternative energy sources, and energy-saving practices [[2], [3], [4]]. Green technological revolution (GTR) can be crucial in improving EP and reducing the carbon footprint of energy production and consumption. GTR is a technology designed to minimalize its environmental inspiration and encourage sustainable development [1,5]. This technology can take many forms, including renewable energy technologies,

energy-proficient technologies, and clean production technologies [6,7]. The development of green technologies has also been driven by market demand for more energy-proficient and sustainable products and processes, as well as technological developments that have enabled new forms of GTR [8,9]. To reach high environmental superiority (ENS) standards and achieve strong economic development, the world must invest extensively in green technologies.

Analyzing the correlation between GTR and EP is arduous. Does the influence of GTR on EE exhibit asymmetrical behavior? How could information from different regions impact the GTR-EE nexus? Moreover, it remains uncertain the probable ramifications of GTR-induced changes in EE. According to available literature, there are several unresolved issues that have only been minimally explored through empirical investigations. This research endeavors to enhance prior studies by comprehensively exploring these challenges. Previous empirical works have taken R&D as a proxy for technical innovation that may not come in the scope of GTR, giving incorrect results. During current years, few works have been probed the GTR-EP nexus [2,6,10,11]. To our knowledge, though, no prior investigations have explored the asymmetrical interdependence between GTR and EP in top green innovator nations. Previous investigations have employed panel data strategies to exhibit the connection between GTR and EP, even though this interrelation is not detected in many nations. The present work adopts the Quantile-on-Quantile (QQ) methodology to deliver comprehensive yet locally-specified evidence about the kinship between the variables. The QQ proved its usefulness for exploring the time-series relationship of each country separately. The association between GTR and EP presents certain complexities that make typical econometric instruments, for example, Ordinary Least Squares (OLS) and simple quantile regression (QR), challenging to assess.

Typical parametric procedures are prone to deviations and incapable of accounting for slope heterogeneity. Thus, the QQ method, which is robust to irregularities and proficient in managing heterogeneous slopes, is used to examine the impact of GTR on EP [12,13]. Thereby, to check out the influence of GTR on EP, a reliable econometric tool, such as QQ, is required. Prior studies have analyzed the complete data set about certain signs (neutral, inverse, or positive). Conversely, the current analyses establish that various components (either positive or negative) might be gathered throughout numerous quantile ranges. The impact of GTR on EP may differ during an economic downswing compared to a period of prosperity. High GTR levels may impact EP in a distinct manner than lower levels. As the magnitude of GTR intensifies, the relationship between GTR and EP may turn into much tricky and dynamic. We predict an asymmetrical GTR-EP nexus resulting from the nonlinear distribution of features causing asymmetric variations in macroeconomic indicators [14]. Since the link between

variables differs by locality, our chosen single-economy strategy might offer required nation-specific recommendations to governments and policymakers for accomplishing political, economic, and social aims across the uppermost, median, or lower quantiles of the variables.

GREEN INNOVATOR ECONOMIES

The present work concentrates on top-10 green innovator economies for several causes. Firstly, the chosen economies deteriorate ENQ by relying solely on traditional energy sources [15]. Secondly, due to economic integration, these economies share comparable economic, social, and political systems, thereby facilitating the swift spread of GTR from one economy to its neighbors, as confirmed by historic behavior. Due to growing concerns about climate change and the desire to be more energy secure, these countries have emerged as the leading promoters of renewable energy sources [15]. Furthermore, the energy sector of a country is impacted by the energy sectors of its bordering economies and economic disruptions [16]. Thirdly, we utilize the Quantile-on-Quantile (QQ) procedure, a time-series technique used to address differences in slopes and interdependence among nations by analyzing each country individually [12]. The GTR-EP nexus is more asymmetric due to rapid policy changes and economic growth [9]. Accordingly, the first stage of the present research will focus on every country exclusively to address the aforementioned challenges. Fourthly, although these economies are geographically close, they tend to have separate and distinct approaches to regulating GTR and EP. It is necessary to construct empirical models applying a suited econometric method, for example, the QQ, to account for the heterogeneities between countries. The findings acquired by us will provide a more refined perspective of the GTR-EP nexus than conventional econometric techniques could. Consequently, the study's results will lay the foundation for further examination of the GTR-EP association and its effects on other nations.

The remaining sections of the work are arranged as follows: Section 2 delivers an assessment regarding preceding empirical studies. The data and its description are outlined in Section 3, while the methodology is explained in Section 4. The econometric results and an exhaustive debate are presented in Section 5. In Section 6, recommendations for future research are given, along with a summary of the findings.

CONCLUSION

We have originated an asymmetric relation between GTI and EP in the top ten green visionary countries. A distinguishing QQ procedure observes time-series dependency in every economy by furnishing a universal yet locality-precise understanding of the connotation among the variables. Evaluations have revealed that GTI improves EP in the majority of the selected nations at precise quantiles

REFERENCES

1. H. Sun et al.Institutional quality, green innovation and energy efficiency Energy Pol (2019)

2. Z. Khan et al.Heterogeneous effect of eco-innovation and human capital on renewable & non-renewable energy consumption: Disaggregate analysis for G-7 countries Energy (2020)

3. L. Malka et al.Optimum insulation thickness design of exterior walls and overhauling cost to enhance the energy efficiency of Albanian's buildings stock J Clean Prod (2022)

4. S.R. Paramati et al. The role of environmental technology for energy demand and energy efficiency: evidence from OECD countries Renew Sustain Energy Rev (2022)

5. L. Malka et al. Energy system analysis with a focus on future energy demand projections: the case of Norway Energy (2023)

6. X. Zhao et al. Impacts of environmental regulations on green economic growth in China: new guidelines regarding renewable energy and energy efficiency Renew Energy (2022)

7. J.D. Wurlod et al. The impact of green innovation on energy intensity: an empirical analysis for 14 industrial sectors in OECD countries Energy Econ (2018)

8. A. Sharif et al. The renewable energy consumption-environmental degradation nexus in Top-10 polluted countries: fresh insights from quantile-on-quantile regression approach Renew Energy (2020)

9. B. Kocaarslan et al. Asymmetric pass-through between oil prices and the stock prices of clean energy firms: new evidence from a nonlinear analysis Energy Rep (2019)

10. S. Wang et al. Green financing role on renewable energy dependence and energy transition in E7 economies Renew Energy (2022)

11. U.M.M.E. Habiba et al. Do green technology innovations, financial development, and renewable energy use help to curb carbon emissions? Renew Energy (2022)

12. E. Naderi et al. A step toward cleaner energy production: a water saving-based optimization approach for economic dispatch in modern power systems Elec Power Syst Res (2022)

13. Y. Sun et al. Asymmetric role of renewable energy, green innovation, and globalization in deriving environmental sustainability: evidence from top-10 polluted countries Renew Energy (2022)

14. H.N. Su et al. Does innovation respond to climate change? Empirical evidence from patents and greenhouse gas emissions Technol Forecast Soc Change (2017)

15. K. Du et al. Do green technology innovations contribute to carbon dioxide emission reduction? Empirical evidence from patent data Technol Forecast Soc Change (2019)

16. M.A. Nasir et al. Environmental degradation & role of financialisation, economic development, industrialisation and trade liberalisation J Environ Manag (2021)

17. N.C. Onat et al. Eco-efficiency of electric vehicles in the United States: a life cycle assessment based principal component analysis J Clean Prod (2019)