ENHANCING ENERGY EFFICIENCY TO TACKLE CLIMATE CHANGE: THE IMPACT OF ENVIRONMENTAL POLICY STRINGENCY IN EUROPEAN OECD COUNTRIES

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Overview

In recent years, addressing climate change has become increasingly urgent, with 2024 marking record-high global temperatures. This urgency necessitates effective environmental policies that mitigate climate change and enhance energy efficiency. Indeed, energy efficiency plays a crucial role in reducing greenhouse gas emissions, lowering energy consumption and promoting sustainable economic growth. However, implementing stringent environmental policies that effectively promote energy efficiency without harming national economies remains challenging.

Methods

This research aims to fill a notable gap in the literature by empirically investigating how stringent environmental policies can contribute to energy efficiency. It employs a rigorous empirical approach using quantile regression capturing the heterogeneous effects of Environmental Policy Stringency (EPS) across different quantiles of energy efficiency distribution, for 18 European OECD countries from 2000 to 2020. This method provides insights into how these impacts vary among countries with different levels of energy efficiency, measured by the ODEX index. The Environmental Policy Stringency Index (EPSI) is used to measure policy stringency, allowing for international comparison. The analysis considers three types of policies: Market-Based (MB), Non Market-Based (NMB), and Technology Support (TS) policies.

Results

Results indicate that NMB policies have the most significant impact on countries with lower energy efficiency improvements, leading to a 0.226% improvement in energy efficiency for a 1% increase in NMB policy stringency. MB instruments, on the other hand, have a more pronounced impact in countries with higher energy efficiency improvements, resulting in a decrease in energy efficiency ranging from 0.089% to 0.123% for a 1% increase in MB policy stringency. However, NMB policies still demonstrate a stronger impact on energy efficiency across all quantiles. The findings suggest that policymakers in countries with low energy efficiency improvements should prioritize NMB interventions such as mandatory emission limits and standards on some detrimental molecules to effectively address energy efficiency. In contrast, policymakers seeking to set MB policies, including carbon pricing, energy taxes, and tradable permits, should focus on countries with higher energy efficiency improvements to further accelerate gains in energy efficiency. At last, while not showing heterogeneous effects, TS policies still have an aggregate-level impact, indicating the importance of innovation, grants and research and development funding in energy efficiency strategies.

Besides, the decomposition of the ODEX index into four economic sectors, industry, households, services, and transportation, reveals that MB policies substantially impact the residential and industrial sectors, while NMB policies have a stronger effect in the industrial sector. TS policies significantly affect the services and industrial sectors, underscoring the need for technological advancements in these areas.

Conclusions

In conclusion, this study underscores the importance of customized policy interventions, accounting for energy efficiency levels and sector-specific contexts. By prioritizing NMB policies, enhancing market-based mechanisms where effective, and supporting technological advancements, policymakers can achieve sustained improvements in energy efficiency. Future research should expand to more countries and longer time periods to capture the early stages of environmental policy development and its immediate impact on energy efficiency, for a comprehensive understanding of the link between environmental regulations and energy efficiency improvements.