Exploring the Macroeconomic Impacts of Public Green Measures on Greenhouse Gas Emission Reductions: A Qualitative Comparative Analysis

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Abstract

Reducing greenhouse gas (GHG) emissions remains a critical challenge in the face of climate change. While public green measures hold promise, the complexity of interactions between policies and outcomes often leads to inconclusive or oversimplified findings. This study explores how different combinations of public green measures contribute to GHG emission reductions across 22 EU countries, focusing on the period encompassing both significant economic disruptions and recovery phases in recent years. Using Qualitative Comparative Analysis (QCA), the research identifies specific combinations of measures, such as tax reductions, subsidies, and training programs that lead to favourable outcomes in emission management.

The findings challenge conventional economic models by illustrating that no single policy is universally effective. Instead, the specific combinations of measures, tailored to national contexts, drive emission reductions. The analysis reveals that certain measures are present in the selected combinations, while in others they are absent or insignificant in reducing GHG emissions. For example, tax reduction and subsidies (excluding R&D subsidies) are in two combinations of measures which lead to emission reduction present, but in one combination absent. For example, tax reductions and subsidies (excluding R&D subsidies) are included in two combinations that achieve emission reductions but are missing in one combination. This underscores that outcomes are determined by the interplay of multiple conditions rather than any single policy measure. Moreover, the analysis of necessary conditions confirms that none of the measures studied is indispensable—no single condition is essential for the outcome to occur.

Importantly, the study highlights the asymmetric and non-linear nature of policy impacts, underscoring the need for a holistic understanding of macroeconomic interdependencies. This research contributes to applied macroeconomics by offering policymakers insights into designing multi-faceted and context-sensitive green financial strategies. It also underscores the value of QCA as a methodological tool for analysing the complex causal relationships that traditional linear models often overlook. The results have practical implications for crafting more effective, evidence-based economic policies aimed at achieving sustainable development goals.