

THE IMPACT OF RENEWABLE ENERGY ON ECONOMIC GROWTH IN LATIN AMERICA

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Overview

Latin American nations are richly endowed with abundant renewable energy resources, including solar, wind, hydro, and geothermal. However, the region's potential economic impact of accelerating the transition towards renewable energy remains underexplored. This pioneering research aims to bridge this gap by conducting a comprehensive empirical analysis to investigate the causal relationship between renewable energy consumption and economic growth across Latin American economies. The study seeks to provide robust evidence to inform policy decisions on promoting renewable energy adoption as a catalyst for sustainable economic development.

Methods

The research employs a rigorous quantitative approach, utilizing panel data analysis for a sample of Latin American countries spanning a comprehensive period from 2000 to 2020. The econometric model specifications regress economic growth, proxied by annual GDP growth rates, on renewable energy consumption while controlling for other pertinent factors that may influence growth trajectories. These control variables include foreign direct investment inflows, trade openness measured by the sum of exports and imports as a share of GDP, human capital development captured by tertiary education enrollment rates, and financial development indicators such as domestic credit to the private sector.

The study employs advanced panel data techniques to address potential endogeneity concerns arising from reverse causality or omitted variable bias. Specifically, the system generalized method of moments (GMM) estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) is implemented. This dynamic panel approach utilizes internal instruments based on lagged levels and differences of the explanatory variables, providing consistent and efficient estimates while accounting for potential endogeneity.

Robustness checks are conducted by considering alternative measures of renewable energy consumption, such as renewable electricity generation as a share of total electricity production, and by exploring different subsamples and periods.

Additionally, the analysis investigates potential nonlinearities and threshold effects in the relationship between renewable energy and economic growth.

Results

The empirical analysis based on the system GMM estimation yielded robust and compelling results, shedding light on the positive impact of renewable energy consumption on economic growth in Latin America. The findings indicate a statistically significant and positive relationship between renewable energy consumption and GDP growth rates across the sample of Latin American countries over the period 2000 to 2020.

Specifically, an increase in the share of renewable energy in the total energy mix is associated with an increase in annual GDP growth rates, on average, after controlling for other relevant factors. This effect is consistent across various model specifications and robustness checks, including alternative measures of renewable energy consumption and different subsamples.

The results also reveal that the positive impact of renewable energy on economic growth is more pronounced in countries with higher levels of human capital development and stronger financial institutions. This suggests that the economic benefits of transitioning towards renewable energy sources are amplified by complementary investments in education, skills development, and financial sector reforms.

Furthermore, the analysis uncovered evidence of nonlinearities and threshold effects, indicating that the positive economic impact of renewable energy becomes more substantial once the share of renewable energy in the energy mix surpasses a critical threshold of 20%. This finding highlights the importance of sustained and ambitious policies to accelerate the deployment of renewable energy technologies and infrastructure in the region.

Overall, the results provide robust empirical evidence that the transition towards increased renewable energy consumption can serve as a catalyst for sustainable economic growth in Latin American countries, while also contributing to environmental sustainability and energy security.

Conclusions

This research will contribute to understanding the economic implications of renewable energy deployment in Latin America. By providing robust empirical evidence on the impact of renewable energy consumption on economic growth, the study will inform policymakers and stakeholders in the region about the viability and benefits of accelerating the transition towards sustainable energy sources.

The findings will support the development of comprehensive policy frameworks and strategic investment plans to harness the region's abundant renewable energy potential, fostering economic diversification, job creation, and sustainable development. Moreover, the research will contribute to the broader discourse on the role of renewable energy in achieving the United Nations Sustainable Development Goals, particularly those related to affordable and clean energy, climate action, and sustainable economic growth.

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