

Unveiling the Drivers of Brazil's Ecological Footprint: The Role of Global Value Chain Participation

Camila do Carmo Hermida *

Postgraduate Program in Economic, Federal University of Alagoas, Alagoas, Brazil

Alexandra Maria Rios Cabral

Faculty of Economics, Administration, and Accounting, Federal University of Alagoas, Alagoas, Brazil

Francielly de Fátima Almeida

Pecege, MBA, Luiz de Queiroz College of Agriculture, University of São Paulo, São Paulo, Brazil

Juliana Costa Ribeiro Prates

Postgraduate Program in Controllershship and Accounting, Federal University of Minas Gerais, Belo Horizonte, Brazil

Abstract

This study investigates the determinants of Brazil's ecological footprint, with a focus on globalization and participation in global value chains (GVCs). Using annual data from 1990 to 2020 and employing the Autoregressive Distributed Lag (ARDL) methodology, we analyze the short- and long-run effects of economic growth, energy composition, trade openness, GVC participation, and environmental policy stringency. The results reveal that economic growth significantly increases Brazil's ecological footprint, consistent with the scale effect hypothesis, where greater output leads to intensified environmental pressures. In contrast, renewable energy consumption and stringent environmental policies show a robust and statistically significant negative relationship with the ecological footprint, underscoring their crucial role in mitigating environmental degradation. Furthermore, trade openness and backward participation in GVCs are associated with reductions in environmental impact, suggesting that engagement in global production networks can foster technological upgrading and efficiency gains. Conversely, forward GVC participation exacerbates environmental pressure, reflecting Brazil's specialization in resource-intensive and extractive sectors. Notably, renewable energy use emerges as the most influential factor in reducing the ecological footprint, followed by environmental governance. These findings emphasize the importance of designing strategic trade policies, promoting green technologies, and enhancing institutional frameworks to ensure that economic globalization contributes to environmental sustainability, especially in emerging economies seeking balance growth and ecological preservation.

Keywords

Globalization, International Trade, Sustainability, Production Fragmentation, Renewable Energy.

Funding

This research was supported by the Foundation for the Support of Research in the State of Alagoas – FAPEAL [grant number: APQ:2022031000044].