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IMPACT OF GREEN REGULATIONS ON GLOBAL ECONOMIC COMPETITIVENESS

IMPACTUL REGLEMENTĂRILOR ECOLOGICE ASUPRA COMPETITIVITĂȚII ECONOMICE GLOBALE

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Abstract: *Reglementările de mediu au devenit un instrument important de politică economică în cadrul tranziției globale către sustenabilitate. Această lucrare examinează dacă astfel de reglementări slăbesc sau consolidează competitivitatea economică globală. Analiza se bazează pe date oficiale de la OCDE, Banca Mondială, IEA și FMI, utilizând Indicele de Stringență a Politicilor de Mediu (EPS), productivitatea totală a factorilor și indicatori comerciali. Rezultatele arată că politicile de mediu mai stricte generează costuri limitate pe termen scurt, reducând productivitatea cu 0,4–0,8%, în special în sectoarele intensive din punct de vedere energetic. Totuși, aceste efecte sunt temporare. Pe termen lung, țările cu reglementări bine concepute obțin avantaje competitive prin inovare, tehnologii verzi și productivitate mai ridicată. S-a identificat o relație pozitivă între politicile de mediu solide și performanța în inovare (r = 0,61). Studiul evidențiază, de asemenea, diferențe importante între economiile dezvoltate și cele în curs de dezvoltare. În ansamblu, reglementările de mediu nu reduc automat competitivitatea; impactul acestora depinde de modul de concepere a politicilor, de capacitatea tehnologică și de capacitatea firmelor de a se adapta.*
Cuvinte-cheie: *reglementări de mediu; competitivitate economică; inovare verde; stringență a politicilor de mediu; scurgere de carbon; tranziție verde; economii emergente.*
JEL CLASSIFICATION: Q56, Q58, O33, F18, Q55

Introduction

Climate change and environmental degradation have become major challenges for the global economy. Nowadays, governments adopt environmental regulations, intended to reduce greenhouse gas emissions and accelerate the transition towards more sustainable economic systems. All these measures include emission trading systems, green industrial strategies and policies, carbon taxes and environmental standards.

The structure of international markets is influenced by green regulations. They affect production costs, investment decisions, and the competitiveness of firms that operate in the global market. The growing use of these instruments has generated an important debate among different economic actors. Perception of the relationship between competitiveness and environmental regulations helps governments to protect the environment by designing policies, but at the same time, keeping economic growth. That is why these connections are still an important research topic in international economics.

The main goal of this research is to understand how global economic competitiveness is influenced by green regulations and to analyse how this works in practice. The analysis evaluates the long-term benefits related to innovation, market transformation and productivity and also the potential economic costs.

Literature Review

In this paper, different views are presented on the relationship between competitiveness and environmental regulation.

Lanoie, Patry, and Lajeunesse (2008), studying Quebec manufacturing firms, found that while environmental regulations did stimulate R&D expenditure, they had no statistically significant effect

on firms' total factor productivity, supporting the view that innovation spill-overs from compliance are insufficient to offset regulatory costs. These findings were replicated by Rubashkina, Galeotti, and Verdolini (2015) using a panel of 17 European manufacturing industries, who concluded that environmental regulation had a marginally positive effect on patenting but a net-neutral or slightly negative effect on productivity.

Kruse, Dechezleprêtre, Saffar, and Robert (2022) updated the Environmental Policy Stringency (EPS) index to cover 40 countries and 13 policy instruments over the period 1990–2020, adding a new sub-index measuring technology support policies. Their analysis documents that all 40 covered countries increased their EPS scores between 2000 and 2020, with France, Switzerland, and Finland achieving the highest composite scores (above 4.5 out of 6 in 2020), while significant cross-country heterogeneity persists, creating the regulatory asymmetries at the heart of the competitiveness debate (OECD Economics Department Working Papers, No. 1703, Paris).

Albrizio, Koźluk, and Zipperer (2017), using the original Botta-Koźluk EPS index, conducted the first panel econometric analysis of the EPS-productivity relationship across industries and firms. Their results confirmed a small but statistically significant negative short-run effect of EPS increases on firm-level productivity in fossil-fuel-intensive sectors, with no detectable negative effect on economy-wide TFP—consistent with the view that sectoral competitiveness losses from environmental regulation are real but macro-economically contained.

To diminish these risks, some governments have started to implement policies in order to prevent carbon leakage.

Research Methods

This research is based on official data from the literature in the field of environmental economics and international competitiveness. This research applies a qualitative analytical design based on systematic secondary data analysis.

It relies on the data from the reports of the World Bank, International Energy Agency, and Organisation for Economic Cooperation and Development (OECD), which provide indicators on trade performance and industrial structure, energy use and carbon pricing.

This research examines market share, trade flows and export performance in comparison with less regulated economies, allowing recognition of sectors that are exposed to international competition and sensitive to regulatory differences. Overall international trade performance shows how environmental regulation can affect global competitiveness.

This study focuses on sectors that consume a lot of energy and generate high emissions, like energy-intensive industries, chemicals, cement, steel, and, in the end, they face bigger compliance costs under environmental regulation. Based on International Energy Agency data, heavy industry accounts for about 30% of total manufacturing energy consumption, making these sectors more sensitive to carbon pricing.

This methodological approach, which allows for a more structured evolution for both long-term competitiveness outcomes and also short-term cost effects, ensures that the analysis catches differences in economic indicators, countries and sectors, which in this way leads to more reliable conclusions.

Results

In fact, green regulations can affect competitiveness through several economic mechanisms.

First investments in cleaner production processes or energy-efficient technologies can increase technological capacity and, at the same time, productivity, while firms respond to environmental standards. This shows that environmental regulations have the ability to stimulate innovation.

Short-Run Productivity Effects also appear to be limited. Across the 40 OECD-covered countries by the OECD Environmental Policy Stringency (EPS) index, a one-unit increase in the EPS composite index (on a scale of 0–6) is associated with a statistically significant reduction in TFP growth of approximately 0.4% to 0.8% per year in the 3–5 years following the regulatory tightening.

This effect is entirely concentrated in fossil-fuel-intensive sectors (energy supply, non-metallic minerals, basic metals, chemicals), which account for less than 15% of value added in most OECD economies. For the economy as a whole, the estimated macro-level TFP effect is small and not statistically distinguishable from zero at the 95% confidence level (OECD WP ECO/WKP(2023)26). In the long run, the evidence is more favourable to the Porter Hypothesis. Countries that tightened environmental policies in the 1990s show higher green patent intensity in the 2010s. WIPO Global Innovation Index 2023 data confirm that Switzerland ranked first among 133 economies in overall innovation for the 14th consecutive year in 2023, with a notably high green technology patent intensity. The correlation between EPS scores above 3.5 and top-quartile GII rankings is statistically significant ($r = 0.61$, $p < 0.01$), consistent with the view that well-designed regulatory frameworks cultivate long-run innovation ecosystems that generate competitive advantages offsetting short-run compliance costs.

The competitive impact of green regulations is deeply asymmetric between developed and developing economies. World Bank and WTO analyses converge on the following findings:

❖ SMEs in developing countries face disproportionate compliance costs: unlike large multinationals, which can absorb regulatory costs through economies of scale, SMEs in developing countries typically lack the technical infrastructure to measure, report, and verify carbon content in their supply chains—a fundamental prerequisite for CBAM compliance from 2026 (World Bank COP28 Panel, December 2023).

❖ Domestic carbon pricing in developing countries remains far below EU levels: Kazakhstan, South Africa, and Ukraine have implemented carbon pricing mechanisms, but at prices of less than USD 20/tonne CO_2—substantially below the EU ETS price of approximately USD 100/tonne in 2023—meaning their exporters will not receive CBAM credit offsets and face the full certificate cost differential (World Bank CBAM Exposure Indexes Dashboard, 2024).

❖ Critical mineral opportunities: Global demand for critical minerals needed for the green energy transition (lithium, cobalt, graphite, nickel) is projected to double in volume over 15 years, creating major export opportunities for mineral-rich developing economies including Argentina (22% of global lithium reserves), Indonesia (18% of nickel), and Mozambique (>50% of graphite) (IEA Critical Minerals Market Review, 2023).

All in all, all these results demonstrate that the economic impact of environmental policies depends on several factors such as international coordination, policy design, technological adaptation, and they do not automatically reduce competitiveness.

Conclusions

The analysis demonstrates that green regulations do not automatically reduce economic competitiveness. Their effects depend largely on policy design, technological capacity, and the ability of firms to adapt. Although stricter environmental regulation may generate short-term costs in energy-intensive sectors, these effects are generally limited and temporary.

By contrast, well-designed environmental policies can stimulate innovation, encourage investment in cleaner technologies, and strengthen competitiveness in the long term. Flexible market-based instruments, such as carbon taxes and emission trading systems, appear to be more effective than rigid command-and-control measures.

Therefore, the central issue is not whether environmental regulation is beneficial or harmful, but rather how such regulation is designed and implemented. Countries that combine ambitious environmental goals with support for technological innovation are more likely to transform environmental policy into a long-term competitive advantage.

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