



THE EFFECT OF CARBON PRICING ON FIRM EMISSIONS: EVIDENCE FROM SWEDISH CO₂ TAX

BACKGROUND AND RESEARCH AIM



Climate change, driven by human activities, stands as a critical challenge requiring immediate policy actions. Many economists have argued that the primary policy measure to address climate change is the implementation of a global carbon tax, alongside subsidies to encourage green innovation. While a global agreement on carbon taxation remains difficult to achieve, numerous countries, among them the EU, have adopted local or regional carbon pricing mechanisms. The effectiveness of these carbon pricing schemes in reducing CO₂ emissions from firms has been debated, with mixed evidence emerging from various studies. This inconsistency partly stems from the diverse nature of carbon pricing schemes and the reliance on aggregated data for analysis, which overlooks firm-level variations in emission reduction capabilities and costs.

This research delves into the impact of carbon pricing on CO₂ emissions from manufacturing firms in Sweden, presenting an extensive firm-level analysis covering the period from 1990 to 2015. Sweden, with its pioneering stance on carbon taxation since 1991, offers a unique context for examining the nuances of carbon pricing. The study aims to shed light on three key aspects: the elasticity of carbon pricing in the manufacturing sector, the heterogeneity of this elasticity across different firms and subsectors, and the overall effectiveness of carbon pricing in reducing emissions.

RESEARCH METHODS

To study the impact of carbon pricing on CO₂ emissions across Swedish manufacturing firms and sectors over the period 1990–2015, firm level data, was assembled from various sources, including plant-and firm-level CO₂ emissions, accounting variables, number of employees, and sector classifications. Emission intensities, i.e. the emissions per Swedish krona of sales, were calculated for firms with CO₂ emissions data, covering nearly all of the manufacturing sector's emissions. The study also estimated the effective and marginal carbon tax rates applied to these emissions, taking into account exemptions and the EU Emissions Trading System (ETS).

The analysis sorts manufacturing subsectors based on their CO₂ emissions intensity in 1990, prior to the introduction of the carbon tax. This classification is used to examine how emissions have evolved, emphasizing the role of carbon pricing in reducing emission intensities through changes in tax regimes. The study employs a regression analysis, requiring firms to have data across multiple years, and utilizes a difference-in-differences approach to assess short-term effects of carbon pricing on firm-level emission intensities.

FINDINGS



The findings show that carbon pricing significantly influences firms' emission levels, with the marginal cost of emitting CO₂ serving as a critical factor in this dynamic. Further analysis reveals considerable variability in firms' responsiveness to carbon pricing, influenced by factors such as production technology, abatement costs, and competitive pressures. Notably, the study highlights the limited impact of carbon pricing on the highest-emitting firms due to production technologies that are very reliant on carbon emissions (e.g. steel production).

Furthermore, the study highlights that access to finance is of key importance for highly emitting sectors to reduce emissions in the face of a carbon tax. The findings suggest a meaningful reduction in CO₂ emissions across the broader manufacturing sector, attributed to the carbon tax.

IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH



By examining short-term and long-term responses to carbon pricing and exploring the role of financial constraints in firms' ability to invest in emission reduction, this research contributes to a deeper understanding of the economic and environmental implications of carbon pricing. The significant decrease in CO₂ emissions from the Swedish manufacturing sector over the study period underscores the potential of carbon pricing, despite its challenges, to foster a more sustainable industrial landscape.

ACADEMIC REFERENCE

Martinsson, G., Sajtos, L., Strömberg, P. and Thomann, C. (2024) 'The Effect of Carbon Pricing on Firm Emissions: Evidence from the Swedish CO₂ Tax.' *The Review of Financial Studies*, 37(6), pp. 1848-1886.