

The role of R&D Investment in the Decarbonization of the Steel Sector

Topic: Navigating the Green Transition: Macroeconomic Impacts, Policy Discontinuity, and the Financing of Industrial Decarbonization

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The transition to green steel is often described as economically infeasible because low-emission production routes require large upfront investments, involve substantial technological uncertainty, and appear to generate lower private returns than carbon-intensive technologies. However, this assessment is commonly based on a partial representation of the transition process, in which the research and development effort required to make green steel technologically viable is treated only as an additional cost. As a result, standard feasibility analyses tend to neglect that R&D is itself a productive activity that generates returns, stimulates demand, and creates positive macroeconomic and sectoral effects. This paper evaluates the economic effects of the R&D investments required to decarbonize the steel sector, with particular attention to the benefits generated by the innovation process itself. The analysis is conducted using FIDELIO, a multi-regional dynamic computable general equilibrium model calibrated on the FIGARO tables. We model green R&D as a distinct investment component with its own rate of return and assess its effects on gross operating surplus, sectoral output, aggregate investment, and GDP. By explicitly incorporating the returns associated with innovation, the paper shows how conventional assessments may overstate the infeasibility of the transition to green steel and understate the economic gains generated during the development and diffusion of low-emission steel technologies.

Keywords: Green steel, Industrial decarbonization, Research and development, FIDELIO, Steel sector, CGE modelling