Climate policy, steel decarbonisation, and trade fragmentation: a coupled energy-macroeconomic analysis for Europe

Topic: Navigating the Green Transition: Macroeconomic Impacts, Policy Discontinuity, and the Financing of Industrial Decarbonization
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This paper examines the interaction between European Union (EU) climate ambition and recent trade policies affecting energy-intensive industries, with a particular focus on steel. It assesses the extent to which EU climate policy outcomes are influenced by current trade restrictions and evolving trade policy measures affecting energy-intensive industries. By coupling a high-resolution European energy system model with a global computable general equilibrium framework, the analysis captures both technological feasibility and economy-wide adjustment mechanisms along the transition pathway.
Two main results emerge. First, the paper quantifies economy-wide feedbacks associated with steel decarbonisation under EU climate policy. EU steel production declines, by around 10% on average by 2040, and exhibits a pronounced regional heterogeneity, whereas aggregate macroeconomic impacts remain limited, with EU-wide GDP losses below 0.5%. Second, the analysis shows that trade fragmentation plays a secondary role relative to domestic climate policy. While EU decarbonisation targets remain technically achievable, USA steel tariffs have only marginal additional effects on production, trade, and GDP, reflecting the limited exposure of EU steel-intensive sectors to the USA market and leaving transition pathways unchanged.
Overall, the results indicate that internal climate policy design, rather than external trade measures, is the primary driver of economic and industrial outcomes during the transition, largely reflecting the difference in scale and scope between a comprehensive structural transformation package and relatively limited protectionist measures. Even in the steel sector, where trade measures might be expected to play a more prominent role, production and competitiveness dynamics are shaped predominantly by the stringency and design of climate policy. While the aggregate macroeconomic impact of trade measures remains limited, effects are more pronounced in specific sectors such as steel and vary across countries, reflecting differences in industrial structure and trade exposure. From a policy perspective, this suggests that climate ambition should be accompanied by targeted industrial and regional support measures to ease adjustment pressures in exposed sectors and regions. In contexts where trade measures are unilateral and limited in scale, a careful assessment of the effective exposure of the domestic economy should precede any consideration of retaliatory actions.