Climate policy in a world with fragmented international trade: evidence from JRC-GEM-E3

Topic: Input-Output Modelling: Trade and Global Value Chains policies (4)
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1. Research Question

The international trade system of the 2010s was a highly globalised one. Nonetheless, it is unclear whether this system will persist in the years to come. Increasing political uncertainties, rising trade tensions and changes in industrial policy raise the prospect of a shift towards a more fragmented global economy. As documented by the World Trade Organization (WTO), recent years saw the development of policies aimed at re-shoring production, the emergence of new challenges for the rules-based trade order as well as an increase in average tariff levels.

These changes in trade policy may affect traditional fossil fuel-related energy trade, but crucially also trade in clean energy technologies. Concretely, this article answers the following questions:

- Are there strong interactions between climate/energy policy and trade policy when looking at socioeconomic indicators such as GDP?
- Does the degree of trade openness influence how countries reach their climate targets and their transition towards a 1.5Â°C- compatible pathway?

2. Method Used

JRC-GEM-E3 - a global, multi-sectoral, multi-regional, recursive-dynamic CGE model - is used to evaluate climate policy impacts in two stylized trade policy environments: a globalized system with current levels of trade openness, and a fragmented system characterized by increased trade barriers and stronger domestic production. These trade regimes are analysed in combination with the standard climate policy scenarios from the European Commissionâ€™s Global Energy and Climate Outlook (GECO), namely the Reference (current policies) and the 1.5Â°C scenarios.

In the â€œglobalisationâ€• version of the world economy, there are no explicit assumptions on changes in trade policy and the base year GTAP import tariffs are maintained throughout the projection period, meaning that trade openness implicitly remains similar as in the base year (2017). The fragmented version of the global economy, however, adapts this structure by introducing higher import tariffs; increasing average baseline tariff levels by 25 percentage points between all global regions (excluding intraâ€‘EU trade) from 2025 onward. This modelling approach follows methodologies used in the literature (Arriola et al., 2020; Fujimori et al., 2017), providing a stylised representation of a world with reduced trade connectivity.

3. Data Used

JRC-GEM-E3 relies GTAP11-Power data for its base year (2017). This is combined with energy data coming from the POLES-JRC model, which is also used for the model calibration and projection from 2017 to 2050.

The Reference scenario incorporates current climate and energy policies in all major economies (G20 plus additional countries), based on a database that is compiled internally in the context of the Global Energy and Climate Outlook.

4. Novelty of the Research

This article provides insights into the interaction between trade policy and climate targets, as well as into the importance of baseline assumptions for international trade when carrying out modelling exercises. This is relevant in the current context of uncertainty about the future direction of trade and industrial policy. Moreover, this analysis contributes to the understanding of different SSP scenarios, particularly SSP2 (Middle of the Road) and SSP3 (Regional Rivalry) (Fujimori et al., 2017; Riahi et

al., 2017).

5. Findings

Trade fragmentation may reduce emissions but does so inefficiently, causing larger GDP losses than emissions reductions. Fragmentation also hampers deep decarbonisation because it encourages increased domestic production in regions that are less efficient, and have more emission-intensive production. Energy trade flows are more shaped by climate policy, while manufacturing trade remains largely shaped by trade policies.

6. References

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