MAKING THE EU CARBON BORDER ADJUSTMENT MECHANISM ACCEPTABLE AND CLIMATE FRIENDLY FOR LEAST DEVELOPED COUNTRIES

Sigit Perdana, LEURE-Ecole Polytechnique Fédérale de Lausanne, +41 21 693 73 27, sigit.perdana@epfl.ch
Marc Vielle, LEURE-Ecole Polytechnique Fédérale de Lausanne, +41 21 693 20 31, marc.vielle@epfl.ch

Overview

As part of the new policy initiative of the European Green Deal, the European Union (EU) Commission has initiated the Carbon Border Adjustment Mechanism (CBAM) to reduce the risk of carbon leakage and to ensure competitive prices in the European market (European Commission, 2019). CBAM is proposed, amongst various policy measures, to support a new defined emissions reduction target of 55% from the 1990 level in 2040 and reach carbon neutrality by 2050. The implementation of CBAM however, has raised several concerns. As the mechanism aims to minimize leakage through equal fairness in global mitigation, imposing carbon tariffs on the EU's imports of energy-intensive goods could curtail the export of EU trading partners. This might be detrimental, especially to the Least Developed Countries (LDCs), for their high exposures and vulnerability risks. This paper assesses and quantifies the implication of EU-CBAM and analyses eight complementary measures to mitigate the impacts on LDCs. Scenario developments are constructed by projecting the EU's new climate targets relative to the reference scenario of the EU's current policies.

Methods

This study uses the latest modification of GEMINI-E3 based on the study of Bernard and Vielle (2008). The model incorporates a multi-country, multi-sector, recursive dynamic computable general equilibrium model with backward-looking (adaptive) expectations. The current version is built on the GTAP 10 database (Aguiar et al., 2019) with the year 2014 as reference. For analytical purposes, the regional aggregation of this version covers the EU, the US, China and the rests of the world, which is represented by 8 countries and regions. Scenario design for reference case uses a more updated complementary climate-development of CD-Links policies database (McCollum et al. 2018, Roelfsema et al. 2020), with harmonized assumptions detailed in our previous work of Giarola et al. (2021) and Sognaes et al. (2021). The baseline or reference scenario is constructed based on the EU's current policies. While the EU Fit 55 target and climate neutrality in 2050 are integrated in climate policy scenario with the introduction of CBAM as a policy instrument to mitigate leakage (Perdana and Vielle, 2021). The analysis then expands on eight developed-CBAM scenarios with exemptions and revenue redistributions on targeted countries/ regions. Magnitudes on leakage changes, sectoral competitiveness, and welfare are quantified following our previous work on Li et al. (2021), then being compared to a pure CBAM implementation.

Results

- Our simulations prove that EU CBAM reduces leakage by one-third by 2040, but does not substantially improve the productions of Energy Intensive Industries (EIIs) of the EU. It is also detrimental to LDCs for declines in EIIs, leading to a significant welfare loss.

- An exemption LDCs from the EU CBAM improves their welfare, yet it should be traded off against a significant increase in leakage and costs for the EU.

- Other seven complementary measures with revenue redistribution scenarios also improve LDCs' welfare, while implications on leakage reduction vary. Scenarios specializing in the redistribution to promote clean energy or

improve energy efficiency substantially reduce leakage and significantly improve LDCs' welfare with limited costs for the EU.

Conclusions

In keeping the price incentive and worldwide political acceptability of the CBAM, complementary measures have to focus on rules that promote energy efficiency improvement of renewable energy sources in LDCs. These measures can mitigate CO2 emissions domestically and reduce the leakage rate. Therefore, policy recommendations for CBAM complementary measures should be directed towards redistribute a climate-friendly transformation pathway in LDCs.

References

Aguiar, A., Chepeliev, M., Corong, E., McDougall, R., and van der Mensbrugghe, D., 2019. The GTAP Database: Version 10. *Journal of Global Economic Analysis*, 4(1):1–27.

Bernard, A. and Vielle, M., 2008. GEMINI-E3, a general equilibrium model of international–national interactions between economy, energy and the environment. *Computational Management Science,* 5(3), pp.173-206.

Giarola, S., Mittal, S., Vielle, M., Perdana, S., Campagnolo, L., Delpiazzo, E., Bui, H., Kraavi, A.A., Kolpakov, A., Sognnaes, I. and Peters, G., 2021. Challenges in the harmonisation of global integrated assessment models: A comprehensive methodology to reduce model response heterogeneity. *Science of the Total Environment*, *783*, p.146861.

Li, R., Perdana, S. and Vielle, M., 2021. Potential integration of Chinese and European emissions trading market: welfare distribution analysis. *Mitigation and Adaptation Strategies for Global Change*, 26(5), pp.1-28.

McCollum, D.L., Zhou, W., Bertram, C., De Boer, H.S., Bosetti, V., Busch, S., Després, J., Drouet, L., Emmerling, J., Fay, M. and Fricko, O., 2018. Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy*, *3*(7), pp.589-599.

Perdana, S. and Vielle, M., 2021. Carbon Border Adjustment Mechanism in the Transition to Net-Zero Emissions: Collective Implementation and Distributional Impacts. Submitted to *Energy Economics*. Available at SSRN: http://dx.doi.org/10.2139/ssrn.3960474

Roelfsema, M., van Soest, H.L., Harmsen, M., van Vuuren, D.P., Bertram, C., den Elzen, M., Höhne, N., Iacobuta, G., Krey, V., Kriegler, E. and Luderer, G., 2020. Taking stock of national climate policies to evaluate implementation of the Paris Agreement. *Nature Communications*, *11*(1), pp.1-12.

Sognnaes, I., Gambhir, A., van de Ven, D.J., Nikas, A., Anger-Kraavi, A., Bui, H., Campagnolo, L., Delpiazzo, E., Doukas, H., Giarola, S., Grant N., Hawkes, A., Korbele A., Kolpakov, A., Mittal, S., Moreno, J., Perdana S., Rogelj, J., Vielle, M. and Peter G., 2021. A multi-model analysis of long-term emissions and warming implications of current mitigation efforts. *Nature Climate Change*, *11*(12), pp.1055-1062.