

How to Boost Countries' Climate **Ambitions: Turning Gains from Emissions Trading into Gains for** Climate

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Professor Christoph Böhringer took part in the Trade and Environmental Transition workshop co-organized by the Globalization and the For a Successful Energy Transition Chairs on 25 April 2024. He presented his latest working paper, "How to Boost Countries' Climate Ambitions: Turning Gains from Emissions Trading into Gains for Climate". This policy brief presents a summary of this work co-authored with Carsten Helm and Laura Schürer, which shows how Nationally Determined Contributions can be used as a basis for emissions trading in a way that boosts countries' climate ambitions.

The global impact of carbon emissions and the possibility for any country to free-ride on international efforts to combat climate change heightens the importance of international coordination on emission reduction efforts. Establishing a global carbon price is considered economists by as the most efficient way to achieve global coordination on climate change. Indeed, such a price ensures that abatement prioritized in the most is

efficient places and sectors while removing the possibility of any leakage. However, many practical and political hurdles make this theoretical optimum unrealistic.

In the paper "How to Boost Countries' Climate Ambitions: Turning Gains from Emissions Trading into Gains for Climate" (Böhringer et al., 2023), the authors combine two ideas. First, Nationally Determined Contributions (NDCs).

implemented under the Paris Agreement, can serve as a basis for determining the minimum amount of emission reduction contributions that each country should deliver. Second. under certain conditions, the gains from trading emissions in an international carbon market can be reinvested into reducing emissions, thereby increasing the effectiveness of the global effort.

Emission reduction market and "hot air"

The benefits of trading are simple and compelling. А central

emissions authority allocates to each an emission reduction target. country a number of emission allowances or, equivalently,

These emissions allowances or emissions reductions can then be traded. A country with low abatement costs can benefit by emitting less than its allowance (abating more than its reduction target) and selling its excess allowance (emissions reductions) to another country with high abatement costs. International trade ensures that emissions reductions take place where they are least costly and that the global emission (or emissions reductions) target is met at minimum cost.

However, the sovereign status of each nation makes it unlikely that a central

authority would be able to impose an emission reduction target to each country. If the reductions emissions are set in a decentralised way, then countries with less climate concern will have an incentive to set lower emission reduction targets in order to sell more emissions reductions, often called "hot air". This problem was identified by Helm (2003). To overcome this problem, Böhringer et al. (2023) use the NDCs as an exogenously fixed minimum value for emission reduction targets. Indeed, NDCs were

determined by each country under the Paris Agreement without planning for a potential market mechanism. Thus, no country would have had an incentive to set a lower NDC in order to sell more emissions reductions. Furthermore, the Paris Agreement stipulates that NDCs can only be changed if they are replaced by a more stringent target. This ensures that no country will be able to artificially lower its NDC to take advantage from the trading mechanism.

How to use the gains from trade

Suppose now that each country has an emission reduction target equal to its NDC. The central auestion of the article is how the gains from trade, stemming from the introduction of the market mechanism, can be used to increase abatement. The authors compare four scenarios: (1) without trade (notrade). (2) with trade but no reuse of the gains (trade), (3) with trade and a constant climate budget per country (gains), (4) with trade and a constant willingness to pay per country (strategic).

In the notrade scenario, each country meets its NDC by reducing emissions on its own territory. This is the benchmark scenario. In the trade scenario, trade is allowed, making it possible to meet the global target at a lower total cost and with no increase in costs for any country. Countries keep the gains from trade for themselves. One of the reasons why the trade scenario is potentially verv beneficial is that developed countries have high abatement targets, but few low-cost abatement opportunities (as visible for the EU and the US in figure 2a). Conversely, developing countries (especially India and China) have low abatement targets and do not make use of their large amounts of lowcost abatement possibilities. Allowing trade gives developed countries access to these lowcost abatement possibilities. In the gains scenario, the gains from trade are reinvested in climate change mitigation. If all the total gains from trade

are used to pay for more abatement, the level of global ambition can substantially be raised. This is equivalent to countries keeping the budget they invest in climate change mitigation constant, equal to the budget in the *notrade* scenario, but using it more efficiently as trade is allowed.

However, the authors point out that the problem with the scenario gains is that it assumes that countries will reinvest all trade gains into climate change mitigation. This cooperative behavior cannot be taken for granted, as countries may prefer to keep the gains and invest them elsewhere. The scenario strategic avoids this problem. Instead of assuming that all gains are reinvested, the scenario strategic puts no



upper or lower limit on how much a given country invests in abatement, as long as its emission reduction contribution (ERC) is at least as high as its NDC determined under the Paris Agreement.

The main parameter that determines how much a country invests in emission reduction is the benefit to that country of having fewer emissions in the atmosphere. In the numerical simulations, each country's willingness to pay for abatement is assumed to be constant, i.e. independent of the overall level of emissions. In the strategic scenario, developed countries, with a high willingness to pay, can increase their ERC targets, knowing that they will be able to use, through trade, the lowcost abatement opportunities available elsewhere. Conversely, countries with a low willingness to pay will not necessarily reinvest their gains from trade to combat climate change, but will at least pay for achieving their NDCs. The overall effect is therefore uncertain and must be determined through data analysis.

Simulation results



Note: Box-Whisker plot shows the median (line), mean (cross), first and third quartile (box), and the whiskers showing the last datapoints within 1.5 times the interquartile range. Does indicate outliers.

In order to assess how beneficial the proposed system could be, the benefits and costs of abatement are calibrated. The marginal abatement curves are calibrated using the results of 9 different teams participating in the 36th Energy Modeling Forum (EMF36.

Böhringer et al., 2021). The marginal benefits of emission reduction are assumed constant for each country. They can be inferred from the Paris Agreement NDCs by assuming that NDCs are the welfare maximizing level of abatement in scenario *notrade*, with the marginal abatement cost curves already determined. The proposed calibration gives an order of magnitude of emission reduction in different scenarios, but the authors acknowledge that other calibration choices can be made to refine the results.



Figure 2.

Average marginal abatement cost curves and regional and global CO₂ prices. Global CO₂ emission reduction



(a) Average marginal abatement cost curves across the nine EMF36 models

Note: Box-Whisker plot shows the median (line), mean (cross), first and third quartile (box), and the whiskers showing the last datapoints within 1.5 times the interquartile range. Does indicate outliers.

In the scenario notrade, with the Paris Agreement NDCs, the mean global reduction compared to business as usual (BaU) is 10.3%. The scenario trade delivers the same emission reduction but at a lower cost. In scenario gains, the cost savings from emissions trading are spent on additional abatement and the global emissions reduction increases from 10.3% to 17.3% (compared to BaU). Finally, in scenario strategic, countries are given the freedom to fix ambition levels as long as they do not fall below the initial NDCs. This scenario results in a global emission reduction of 22.3% compared to BaU. This outcome is more favorable than simply reinvesting all the gains. Indeed, if countries have a constant marginal benefit from reducing emissions, with no preference as to where this reduction takes place, the most climate-minded countries will be able to exploit low-cost



global emissions. However, scenario strategic is still a long

69% – where a global planner

opportunities abroad to reduce way from the first-best solution determines the optimal level - a global emission reduction of of emission reduction in each country.

Conclusion

This paper proposes a new way of using emissions trading to increase the efficiency and ambition of global climate mitigation. The pre-existence of NDCs, thanks to the Paris Agreement, makes it possible to create a system that curbs the usual pitfall of free-riding often found in climate gametheory settings. Indeed, the

binding nature of NDCs makes it possible to use trade as a way for more climate-concerned countries to efficiently increase their ambition level without reducing the ambition level of less concerned countries. The simulation results of this proposed emission market are very encouraging. They show an increase of more than

20% in global CO, reduction compared to the businessas-usual scenario without an emission market. However. many practical hurdles could remain, not the least whether many countries would be politically able to invest massive amounts into foreign abatement without tangible returns for its population.

Reference

Boehringer C., Helm C. & Schürer L., 2023, How to Boost Countries' Climate Ambitions: Turning Gains from Emissions Trading into Gains for Climate, Working Paper.

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