

Policy Analysis Focus 23-1
Impact of Carbon Pricing on Economy and Trade¹

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I. Introduction

Concern has been voiced that achievements towards reducing global greenhouse gas (GHG) emissions under the Paris Agreement have fallen far short of the targets. Carbon pricing currently covers less than a quarter of global GHG emissions. In the meantime, the European Union (EU) has agreed to introduce a carbon border adjustment mechanism (CBAM) in 2023. In addition to the impact of the EU CBAM on emissions reductions, its impact on economy and trade has been a matter of concern, not just for the EU but also for the EU's trade partners, including both developed and developing countries.

This article examines the relative significance of the impact of a few carbon pricing instruments by means of simulation studies using a Computable General Equilibrium (CGE) model,² and investigates the impact of three groups of regions taking initiatives: the EU; the EU and the Organisation for Economic Co-operation and Development (OECD) countries; and the world, as well as the impact of a variety of policies including a carbon tax, a CBAM and moreover, trade liberalization.

II. Impact of carbon tax on economy

Global carbon dioxide (CO₂) emissions have continued to increase, largely as a result of persistent increases in developing countries including China and India; those increases more than offset decreases in developed countries including Japan, the United States (US) and the EU. Carbon pricing instruments including a carbon tax and an

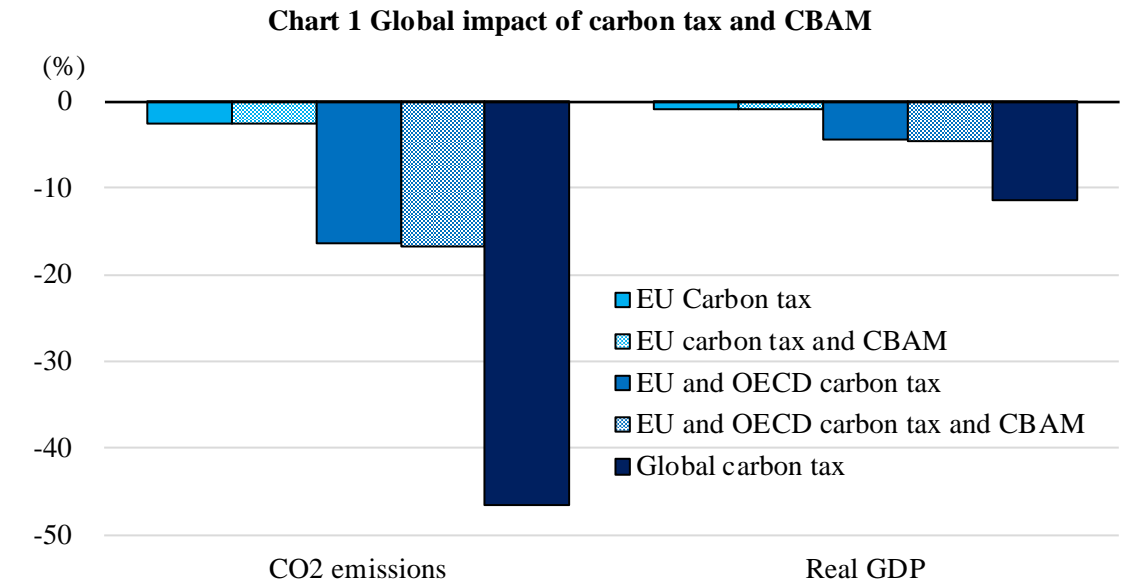
¹ This is a non-technical summary of Kawasaki, K. (2023), "Development of CO₂ Emissions and Impact of Carbon Pricing," GRIPS Discussion Paper 22-13, GRIPS, March 2023. The views expressed in this article are the author's own and do not represent those of GRIPS Alliance or other organizations to which the author belongs.

² Based on the Global Trade Analysis Project (GTAP) Data Base 10 (in which the reference year is 2014); the GTAP-E model is solved using GEMPACK software.

emissions trading system (ETS) have been introduced in a number of countries, but only six countries (Finland, Liechtenstein, Norway, Sweden, Switzerland, and Uruguay) have carbon tax rates equivalent to or above the EU ETS price (which is around 86.5 US dollars (USD) per tonne (t) CO₂ equivalent). In this study carbon tax rate is assumed to be 100 USD / t CO₂.

The impact of carbon pricing in the EU³ and OECD countries would be limited compared with that of a global initiative, as is shown in Chart 1. It is indicated that a carbon tax would be effective for substantially reducing global CO₂ emissions once introduced in a strong enough form worldwide, in particular if it included developing countries. CO₂ emissions would primarily be reduced in regions where carbon pricing was in place. On the other hand, the impact of a CBAM would be minor compared with that of a carbon tax. It is suggested that carbon pricing at home would be more efficient for reduction of CO₂ emissions than carbon pricing at the border, which would affect trade partners abroad.

That said, the adverse impact of a wider carbon tax on economy would be serious, although the magnitudes of the contractions of economy would be much smaller than the



Source: Based on Kawasaki (2023).

³ The EU CBAM would initially be applied to EU imports of five commodities (cement, iron and steel, aluminum, fertilizers, electricity) except those from European Economic Area (EEA) members and Switzerland, depending on the EU ETS price. However, it is assumed here that the CBAM would be extended to apply to all goods and services and to all regions without exception, at the equivalent price of carbon tax. The global average CBAM rate in goods and services is calculated to be close to that of tariff rates in goods, with variation among sectors.

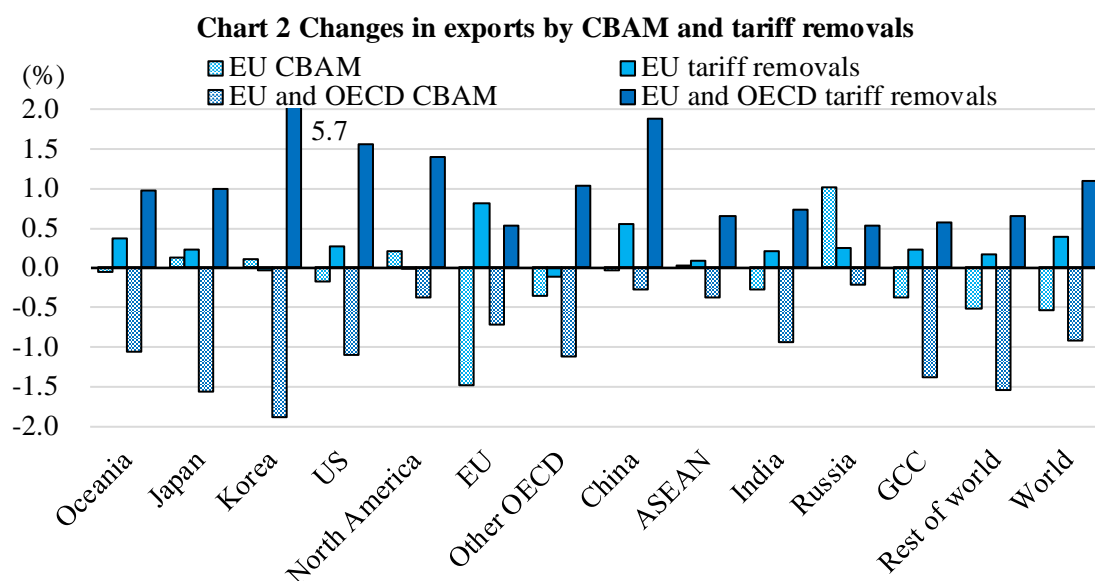
magnitudes of reductions of CO₂ emissions. On the other hand, the impact of a global carbon tax on real Gross Domestic Product (GDP) would be larger in developing countries than in developed countries. Meanwhile, world production would decrease the most in energy commodities including carbon commodities (coal; oil; gas; petroleum, coal products), and electricity; followed by other mineral products and metals; and motor vehicles and other machinery among manufacturing sectors. The impact of carbon pricing is suggested to vary by region and sector.

The above sizable adverse impact of carbon pricing on economy would not be acceptable in reality. It is indicated that the impact of carbon pricing on real GDP would be much larger than the magnitudes of possible carbon tax revenues. Efforts would continue to be made to reduce CO₂ emissions by means of ambitious, well-designed alternative climate change policy so as to avoid serious damage to production and income at macro level.

III. Impact of CBAM on trade

Once the EU introduces a CBAM, imports by the EU and then exports of the EU's trade partners would decrease due to higher price costs. Those stylized features could be seen in regional bilateral exports to the EU. Apart from energy commodities, exports from most regions would decrease in agriculture, forestry and fisheries; paper products; chemicals; and other mineral products, but those from a limited number of regions would decrease in motor vehicles and parts, other machinery, and other manufacturing. Meanwhile, EU internal exports would decrease in the second group of sectors above. Exports in metals from the non-OECD countries would decrease. It is suggested that the variety of impacts on exports would largely reflect differences in CBAM rates due to differences in the carbon content of products by region and by sector.

The magnitudes of changes in overall regional exports by sector, and total exports by region as well, would be smaller than that on a bilateral basis as a result of the general equilibrium mechanism of income and price effects, including trade creation and diversion effects among regions. That said, as is shown in Chart 2, exports under the EU CBAM would decrease the most in the EU, primarily resulting in a decrease of real GDP in the EU. On the other hand, if the application of a CBAM were extended to include the OECD countries, impact on the EU in terms of trade and real GDP would be mitigated. Meanwhile, imports, and then exports, would decrease universally, both in the OECD and non-OECD countries. Appropriate policy coordination among countries would be useful if an adverse impact of policy measures on economy and trade were expected.



Source: Based on Kawasaki (2023).

The impact of a CBAM on trade would also be smaller than that of a carbon tax. Meanwhile, the adverse impact of the EU and OECD CBAM would be offset to some extent by EU and OECD tariff removals as is shown in Chart 2. The EU would benefit from own unilateral trade liberalization, despite the fact that the EU would lose under the EU CBAM. World trade and real GDP would increase as a result of EU and OECD tariff removals more than they would decrease under a CBAM. On the other hand, global CO₂ emissions would also increase as a result of tariff removals; those increases would also be larger than the decreases under a CBAM, but far smaller than the decreases under a carbon tax. All in all, a balanced study of the impact of climate and trade policy on economy, trade and environment would be important.

IV. Concluding remarks

The impact of carbon tax on economy and trade would be sizable and much larger than the magnitudes of possible tax revenues, though that of a CBAM would be minor and could be offset by trade liberalization. Moreover, those impacts would vary among regions and sectors. It is expected that climate and trade policies would be well-designed and based on sound quantitative analysis. A study of the relative significance of the impact under alternative policy scenarios would surely be worthwhile.