«Modeling the effects of carbon regulation for Russia using a computable general equilibrium model GTAP-E»

The climate agenda is important for the Russian economy, as the decline in global demand for traditional energy sources in the long term will significantly affect the structure of the economy and budget policy. Climate issues are also relevant for many developing countries, thus it requires cooperation between countries to achieve a greater effect on reducing emissions.

In recent years, the policy of introducing a cross-border carbon regulation by EU (EU CBAM) on imports of several goods has been actively discussed. This paper estimates the impact of EU CBAM on Russia and the EAEU countries. We provide estimations of the impact on GDP, industry output and trade flows. We use the computable general equilibrium model GTAP-E[[1]](#footnote-1) (Energy) developed by the international GTAP project to evaluate the effects. The model includes information on emissions from the use of energy products in the production, which allows us to study the impact of carbon regulation on the economy. There are a few cross-country studies in the literature on the impact of the EU CBAM for several countries[[2]](#footnote-2) , but the current work focuses on the EAEU countries.

Concerning methodology, the data were aggregated into 18 regions and 17 sectors. Among the regions, the EU, North America, China, Russia, Armenia, Belarus, Kazakhstan, Kyrgyzstan, and several other groups of countries were included. We aggregated 17 sectors: CBAM sectors (chemical industry, rubber and plastic products, ferrous metals, non-ferrous metals, metal products, mineral products, electricity), energy products (coal, gas, oil and petroleum products) and a number of other industries. We assume that carbon tax equals 82 US dollars in 2014 prices. Estimates were made for CBAM Stage 1 (Scope 1) for the period 2026-2030, when only direct emissions from production are considered. The results showed that the introduction of Scope 1 has a small impact on the economy of Russia and the EAEU countries.

In terms of GDP, the largest losses are observed for Kyrgyzstan (-0.04%), Belarus (-0.03%) and Armenia (-0.02%). For Kyrgyzstan, the largest decrease is observed in the chemical industry (-7.8%). In Armenia, the decline in output is also concentrated mainly in the ferrous metals sector (-6.8%) and non-ferrous metals (-1.2%). In Belarus electric power industry, ferrous metals and mineral products experience decline in output.

For Russia and Kazakhstan, there is a smaller decrease in real GDP relative to other EAEU countries, because exports of the oil and gas industry are growing (the decrease in real GDP for both countries was less than -0.01%). The chemical industry and ferrous metals in Russia have high emission intensities, so these industries are experiencing the most decrease in output (-2.9% and -1.2%). However, the non-ferrous metals benefited from CBAM, as it has a lower emission intensity compared to other countries. In Kazakhstan, ferrous and non-ferrous metals industries experience the greatest decrease in output, equal to -2.4% and -1.4%, respectively. Kazakhstan is characterized by high emission intensities compared to other regions; therefore, the application of carbon regulation is important for this country.

It should be noted that GTAP industries are broader than the commodity groups specified in the EU CBAM, so in part these effects may be overstated. Nevertheless, the analysis identifies the most vulnerable industries to the carbon regulation. The output of the ferrous metals industry is decreasing in all economies of the EAEU.

Since CBAM is designed to compensate unequal position of the European firms under inner carbon regulation compared to firms from other countries, after the introduction of CBAM, barriers for several energy-intensive goods increase, resulting in increased production of ferrous metals, electricity, and mineral products. According to these findings, to increase production, the EU needs to increase exports of energy products, so their exports from Russia and Kazakhstan are growing. Under current conditions of the ban on the import of gas and oil, the opportunities to increase the production of energy-intensive goods reduces, so the positive effect of CBAM for the EU will be lower.

The electricity industry has the highest levels of intensity in terms of emissions for most countries. The paper[[3]](#footnote-3) notes that the effect on Russia's GDP from the introduction of CBAM for direct emissions was -0.2% and for the case of considering all indirect emissions from intermediate goods -0.6% of GDP. Therefore, the transition to alternative energy sources is important for Russia. In the current situation, the possibilities of energy transition are reduced by EU sanctions on the supply of technologies and investments. Currently, Russia advocates sanctions elimination on low-carbon technologies[[4]](#footnote-4).

The introduction of an emission trading system (ETS) is also a possible measure in the long term. Therefore, as the next step we plan to model the ETS using the GTAP-E-POWER model, which allows to consider the transition to renewable energy sources. In Russia, a pilot project on Sakhalin on emission trading is planned[[5]](#footnote-5). ETS mechanism was introduced in Kazakhstan since 2014. This experience is useful for the implementation of carbon policy in the EAEU. However, it is important to develop cooperation with other countries that work on carbon regulation[[6]](#footnote-6). For example, China introduced an emission trading system in 2021. Thus, despite the current uncertainty, it is important for Russia in the long term to develop measures to reduce emissions and cooperate with other countries to achieve the goals of the Paris Agreement.

1. McDougall, R., & Golub, A. (2009). *GTAP-E: A Revised Energy-Environmental Version of the GTAP Model* (GTAP Research Memorandum No. 15). Purdue University, IN: Global Trade Analysis Project (GTAP). [↑](#footnote-ref-1)
2. J. He and S. Li, "The impact of EU’s Carbon Border Adjustment Mechanism on Chinas economy (the 25th Annual Conference on Global Economic Analysis).," in *Global Trade Analysis Project*, Purdue University, 2022.;

Durant, "A European Union Carbon Border Adjustment Mechanism: Implications for developing countries," in *UNCTAD*, 2021.; [↑](#footnote-ref-2)
3. H. Xiaobei, Z. Fan and M. Jun, "The Global Impact of a Carbon Border Adjustment Mechanism: A Quantitative Assessment," in *Task Force on Climate, Development and the IMF*, 2022. [↑](#footnote-ref-3)
4. https://www.interfax.ru/world/870368 [↑](#footnote-ref-4)
5. http://www.consultant.ru/law/hotdocs/76787.html/ [↑](#footnote-ref-5)
6. https://www.rbc.ru/economics/15/07/2022/62d001cf9a7947fed6e2dc0e [↑](#footnote-ref-6)