

Elżbieta Kawecka-Wyrzykowska

ORCID: 0000-0002-6655-874X

SGH Warsaw School of Economics

ekawec@sgh.waw.pl

Carbon Border Adjustment Mechanism (CBAM): Geographical and commodity scope in Polish imports

Date of submission: 29.03.2023; date of acceptance: 25.02.2024

JEL classification: F14, F18, Q50, Q56, Q58

Keywords: carbon leakage, CBAM, Carbon Border Adjustment Mechanism, climate changes, eco-taxes

Abstract

The Carbon Border Adjustment Mechanism (CBAM) is a new instrument of the EU's European Green Deal policy. It is intended to contribute to the reduction of greenhouse gas emissions in the world. The CBAM provides for a levy (tax) to be imposed on energy-intensive imports which heavily pollute the environment. The aim of the study was to provide a quantitative assessment of the commodity and geographical coverage of the CBAM in Polish imports. Several indicators were calculated to assess the possible negative impact of CBAM. These indicators can be interpreted as rough measures of the effects of the tax. They were compared with similar indicators calculated by other authors for the whole EU.

This paper is a continuation of earlier studies of other researchers who analyzed CBAM coverage and possible implications, while adopting assumptions other than those finally included in the CBAM Regulation.

The key findings and main conclusions are as follows: Negative effects of the CBAM will be concentrated on several product groups: steel products, chemicals, polymers, and aluminum. These products accounted for as much as 96% of Poland's external import subject to the levy. The scale of the final effects of the tax will depend mainly on the level of ETS allowance prices and the intensity of adjustments made by domestic companies and foreign partners. The study ends with two conclusions: First, manufacturers have several years to prepare a strategy to limit the negative effects of the levy (it will be charged as of 2026), but they should start the adjustments as soon as possible. Second, the carbon footprint of a product (as low as possible) is becoming an increasingly important factor in the manufacturers' international competitiveness.

The method of descriptive analysis as well as statistical methods were used.

1. Introduction

One of the most urgent global problems is climate change, its negative effects are already felt by many countries and are rapidly spreading to the entire globe. It is primarily (though not only) about the rapidly progressing climate warming, caused to a large extent by the emission of greenhouse gases (GHG) resulting from human activity. The EU is implementing a program to reach climate neutrality in 2050. The program provides for a radical reduction in greenhouse gas emissions, so that in 2050 these emissions would not be higher than those that nature is able to neutralize itself (e.g., thanks to more trees absorbing CO₂). An important instrument of this policy is currently the EU ETS (Emissions Trading System), which offers companies the possibility to purchase allowances for additional GHG emissions, above the limit of free allowances granted to them. The cost of allowances is passed on by producers to the prices of their products. In most non-EU countries, a system similar to the ETS is not in place or is being developed, so suppliers of carbon-intensive products from these countries do not incur such charges. This makes them more competitive than the EU producers.

Due to the rising costs of GHG emission allowances, some producers move the production of high-emission components outside the EU, to countries with lower levels of climate protection (without the cost of ETS) and, as a result, lower production costs. This phenomenon is called carbon leakage to other countries and means that the level of GHG emissions on a global scale does not decrease, but only changes the place of their generation (European Commission, 2021a). The new instrument to prevent carbon leakage and to reduce GHG emissions, introduced recently in the EU, is the carbon border adjustment mechanism (CBAM).

This mechanism provides for an import levy (tax) designed to offset the cost of purchased emission allowances under the ETS, incurred by EU producers (Regulation, 2023/956). Thus, the new tax is to level the conditions of competition in the EU single market (European Commission, 2021b, 14–15). CBAM is therefore an important instrument of the EU climate policy, consistently being implemented since 2019 under the European Green Deal and strengthened on the basis of the gradually implemented package “Ready for 55” (Kawecka-Wyrzykowska, 2022). At the same time, the CBAM is to level the conditions of competition of the EU industry in relation to suppliers from countries that do not have such strict climate and environmental regulations as the European Union (European Commission, 2021b, 14–15). The third goal of the CBAM, apart from reducing the risk of GHG leakage and improving the competitiveness of the EU industry, is to persuade foreign partners to introduce regulations similar to the ETS.¹ In this way, the decarbonization effect would be much stronger on the scale of the global economy. The

¹ The incentive for the partners to introduce provisions similar to the ETS should be the desire to avoid the deterioration of the price competitiveness of their products offered on the EU market, as the costs of GHG emissions incurred abroad will be deducted from the cost of ETS allowances.

amount of the tax will depend on the GHG emissions content of production (carbon footprint) and the difference between the EU ETS price and any carbon price paid in the production country (outside the EU). The EU importers will be allowed to deduct carbon footprint costs if the supplying country uses a system similar to the EU ETS. The new levy will be collected from 2026,² but the CBAM started operating in October 2023. In the first, transitional phase, importers are only required to report emissions on a quarterly basis. The border carbon levy will be imposed on selected goods, the production of which generates high GHG emissions, as a result of which they are most exposed to the risk of pollution leakage (see their list in Table 1).

The aim of this study is to identify products in Polish imports that are most exposed to the effects of the tax and the main countries from which such products are imported. The other aim is to calculate several indicators which can be interpreted as rough measures of the effects of the tax, e.g., the share of CBAM products in imports of relevant groups of products and in GDP. Indicators for Poland were compared with similar measures calculated by other authors for the whole EU. As a result, conclusions were drawn regarding the scope of possible negative effects of CBAM for Poland compared to other EU countries. The conclusions also address the issue of how Polish enterprises can adapt to the new tax in order to mitigate its negative effects.

2. Theoretical framework of the research

The carbon levy has a strong theoretical basis, mainly in the theory formulated by A.C. Pigou (1920).³ Pigou was the first economist to present the concept that the tax (since then called the Pigou tax) can be used to reduce the negative side effects (so-called externalities)⁴ of the activities of entities (Pigou 1920, 168). Pigou's contribution to the theory includes introducing a clear distinction between individual (private) and social costs of economic activity (Grądalski, 2002; Prandecki, 2007). Pigou stated that the actual social costs of economic activity are greater than the sum of the individual, "market" costs of production that are charged to the producer. The difference between them is the externality of economic activity. He pointed out that producers aim to maximize their marginal private profit, without incurring individual costs that they pass on to other entities (usually consumers). This cost is therefore externalized. The purpose of the tax proposed by Pigou is to

² In order to avoid double protection of EU industry, which would be incompatible with GATT/WTO rules, the length of the transition period and full introduction of CBAM are linked to the phasing out of free allowances under the ETS.

³ A few years ago, a carbon tax as a good answer to the threat of climate change was supported by a number of Nobel Prize winners, including M. Friedman, A. Laffer, W. Nordhaus.

⁴ The very concept of externalities was introduced to the theory by A. Marshall at the end of the 19th century.

internalize the costs of externalities (although Pigou did not use those terms), i.e., assigning them to a specific producer that caused the cost (and including them in the company's bill). In this way, the tax would reflect the real environmental cost of the activity.

A different approach to solving the problem of externalities was proposed by Coase. According to his theorem (Coase, 1960), when the activity of one entity negatively affects the other entity and external costs arise, the solution to the problem between the parties concerned is negotiation. The condition for its effectiveness is low transaction costs. This concept is often criticized, e.g., for the lack of precision and the defense of the free market, in a situation where a significant part of economists believe that externalities are an important cause of market failures (distort the "invisible hand" mechanism) and require the involvement of the state (e.g., in the form of ecological taxes). This concept has relatively little use in environmental protection, but it has revolutionized economics by drawing attention to the fact that government intervention is not always needed. Since the 1960s, economic theory has increasingly taken into account the issue of environmental protection costs (Zrałek, 2016). The environmental aspect gains value within various sub-areas of economics, such as environmental economics and ecological economics. It is also visible within the framework of already existing theories, as well as new economic ideas, including the theory of sustainable growth, the theory of prosperity, the concept of strong sustainability, etc.

An important addition to the idea of the Pigou tax is the theory of the double dividend formulated by Pearce (1991). It is also known as ecological tax reform (ETR). It provides for a change in the structure of taxation of factors of production. The gradual reduction of the tax burden on traditional factors — labor and capital — is to be accompanied by an increase in the tax burden on other resources, mainly energy. The result is two types of benefits: in the form of the so-called economic dividend resulting from the reduction of the cost of traditional taxes and the so-called environmental dividend, i.e. ecological benefits. In order to achieve such goals, a reform of the entire tax system is needed. The ETR has been to a large extent a response to the inefficiency of the existing tax systems, which do not encourage the economical use of natural resources, as well as to the growing perception of environmental external costs by societies (Kudełko and Pękala, 2008).

The very idea of the tax as an instrument for preventing the adverse effects of human activity has also been developed. The concept of green taxes and other instruments that burden entities with negative effects on the natural environment has emerged (Milne, 2007). Such taxes can work in two ways. One is a tax increase that discourages activities or commodities that are environmentally damaging. The second one is a tax decrease that encourages environment-friendly decisions. In both cases, the tax instruments should reflect the standard principles of tax theory, such as equity, economic efficiency, and administrative feasibility. In addition, green taxes should take into account the environmental impact of the

tax instrument. Examples of both types of green taxes are the CBAM concept and the reduction of CO₂ emissions.

3. Research methodology

Reliable analysis and assessment of the possible impact of the carbon border levy require a complicated research apparatus.⁵ Also, detailed data is required and that is not readily available. For these reasons, this article uses a simplified approach to the analysis of the possible impacts of the introduction of the border levy for Poland. The value of the CBAM imports was calculated, and the goods and partners subject to the levy to a relatively greatest extent were identified. The obtained values were used as the basis for drawing conclusions as to the scale of the effects of the application of the levy, in terms of goods as well as geography (main goods and suppliers to Poland exposed to the effects of the levy). A similar approach has been used by other authors (Darvell, 2022; Dumitru et al., 2021). Calculations were made on the basis of data on the value of Poland's imports in 2021, taken from the Central Statistical Office database. According to the CBAM Regulation, imports by country of origin will be the basis for calculating the value of the tax and this concept was adopted in this study.⁶

Data for 2021 was used for the calculations. This year seems to be the most representative, although trade statistics for 2022 are already available. Data for 2021 reflect the overcoming of the great freeze of economies (and trade) introduced in 2020 in the aftermath of COVID-19. At the same time, they are not burdened with price distortions visible in 2022, mainly as a result of the war in Ukraine. The analysis includes goods from outside the EU (alternatively: extra-EU import), because only such goods will be covered by the tax.⁷ Where they were compared with global imports (extra-EU imports to Poland plus intra-EU acquisitions), this was clearly stated. The list of goods subject to border levy includes products agreed upon by the Council and the European Parliament at the end of 2022 (there are seven groups, see Table 1).

⁵ Such calculations for the entire EU, with particular emphasis on Poland, were made, among others, by Pyrka et al. (2020). They are not referred to here due to significant methodological differences with other studies, discussed later in this section.

⁶ For all taxable products analyzed here, imports by country of origin were slightly higher than by country of dispatch. The only exceptions were cement and electricity, but the differences in the value of imports were small.

⁷ Due to the fact that the levy is not yet collected, the term "import of goods subject to the border levy" is understood as the hypothetical value of import of CBAM goods, calculated on the basis of historical data from 2021.

4. Research results

4.1. Value and structure of imports subject to the CBAM in Poland — results of own research

Table 1 shows that in 2021, Poland's imports of CBAM goods amounted to almost EUR 12.8 billion (C.2 item in Table 1). This accounted for 9.6% of imports to Poland from outside the EU (item C.3) and 4.4% of total imports to Poland. At the same time, the analyzed products accounted for slightly less than 1/3 of total imports of these products (29.6%, item C.4). In other words, the vast majority of the products in question came from EU suppliers and will not be affected by the imposition of the CBAM (70.4%, item C.8). The situation was, however, different in the case of individual groups of products.

The imports of products subject to CBAM are dominated by four groups: polymers, steel products, aluminum, and chemicals (a total of EUR 12.3 billion — column 2, i.e., about 96% of extra-EU imports covered by the levy — column 5).⁸ From the point of view of the effects of the levy, the share of these products in the total imports of a given group from outside the EU is more important (column 4). The higher it is, the greater the effects of the levy will probably be.⁹ The share understood in this way (share of CBAM products in import of a given group of goods) was the largest in the case of aluminum and chemicals, as it amounted to approx. 49% and 43%, respectively, of total imports of these products from outside the EU (column 4). The effects of imposing a levy on these goods can therefore be relatively large for the recipients of both product groups. The share of imports subject to the CBAM (and possible scope of effects) was also high for fertilizers — almost 50% of their external imports to Poland was covered by the CBAM. However, the scale of these imports was much smaller: slightly more than 3% of extra-EU imports of CBAM goods, while the corresponding shares for aluminum and chemicals were 16% and 14% (items B.3, B.5, B.6, column 5). Also in the case of cement and electricity, the effects of introducing a carbon border tax should not be severe due to small imports of these products, in particular imports from outside the EU. Polymers and steel products are products that weighed the most in all imports subject to the levy: the share of both items was similar and amounted to approximately 33% of each of these imports (items B.7 and B.4, column 5). At the

⁸ In this part of the analysis, we assume that all imports from outside the EU are actually subject to the tax. We therefore omit (due to the lack of reliable data) countries that apply a GHG reduction system similar to the ETS in the EU.

⁹ From the point of view of the presented conclusions, it would be more correct to calculate the share of imports from outside the EU in the total consumption of a given product. In the vast majority of cases, the analyzed goods are most likely produced in Poland, and imports from outside the EU only supplement this production. Such an approach was prevented by the lack of comparable data for the import and consumption of the analyzed products.

Table 1. Poland's import, including CBAM products, in 2021 (EUR million and %)¹⁰

Products	Total import (EUR mln)	Extra-EU import				Intra-EU import		
		Value (EUR mln)	% share of CBAM products in total extra- EU import	% share of CBAM products in a given group of goods	% share of CBAM products in total import subject to the levy	Value (EUR mln)	% share of products in total intra- EU import	% share of products in a given group of goods
A. Total import	1	2 = 1 - 6	3 = 2 : A.2	4 = 2 : 1	5 = (2 : C.2)	6	7 = 6 : A.6	8 = 6 : 1
	289,606	132,983	100	45.9	—	156,623	100.0	54.1
B. CBAM products								
B.1. Cement	121	32	0.0	26.6	0.3	89	0.1	73.4
B.2. Electricity	891	47	0.0	5.3	0.4	844	0.5	94.7
B.3. Fertilizers	851	418	0.3	49.2	3.3	433	0.3	50.8
B.4. Steel and products	15,222	4,305	3.2	28.3	33.5	10,916	7.0	71.7
B.5. Aluminum	4,102	2,019	1.5	49.2	15.7	2,083	1.3	50.8
B.6. Chemicals	4,096	1,741	1.3	42.5	13.6	2,355	1.5	57.5
B.7. Polymers	18,078	4,269	3.2	23.6	33.2	13,809	8.8	76.4
C. Sum (B.1.–B.7)	43,361	12,831	9.6	29.6	100.0	30,530	19.5	70.4
D. Other import	246,245	120,152	90.4	48.8	—	126,094	80.5	51.2

Note: other imports — other products within the analyzed groups that are not subject to the levy (e.g., the levy applies only to Portland cement, not to other types of cement); it is the difference between total imports and the sum.

Source: own elaboration based on Central Statistical Office data, 2022.

¹⁰ For the purposes of this subsection, statistical data was collected and compiled by Dr. Lukasz Ambroziak.

same time, these goods accounted for about $\frac{1}{3}$ each of the import of a given product group: approximately 24% and 28%, respectively (item B.7 and B.4, column 4). For these reasons, Polish recipients of polymers and steel products are most exposed to price increases following the full implementation of CBAM Regulation.

Figure 1 shows which countries the goods subject to the levy originated from. In 2021, these were first of all Russia and China, accounting for 19% and 17% of all such imports, respectively. The shares of Ukraine, South Korea, and Turkey were also relatively high, respectively 12%, 7%, and 5% of Poland's external imports. Together, imports from these countries accounted for 96.4% of imports of goods covered by CBAM. Let us remember that these data reflect the situation in Polish trade in 2021. Russia's invasion of Ukraine caused significant shifts in the geographical and commodity structure of Polish imports and in 2023 the above proportions were certainly different.

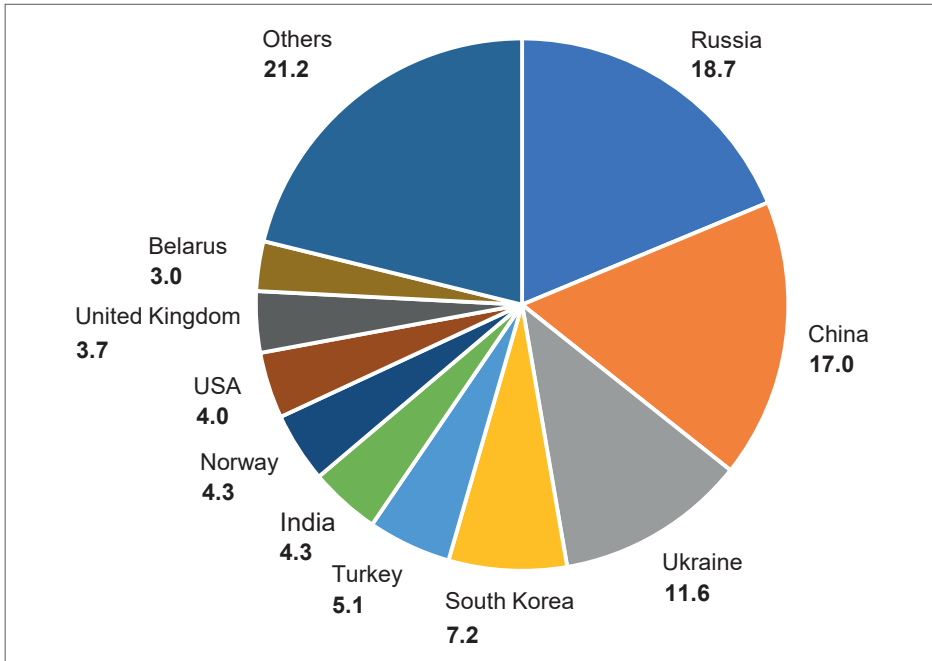


Figure 1. Countries that weigh the most in Polish imports covered by the border levy (share in Polish extra-EU imports covered by the levy in 2021, in %)

Note: imports from Norway, as a member of the European Economic Area, are exempt from the levy.

Source: own elaboration based on Central Statistical Office data, 2022.

The above indicators refer to countries which are Poland's significant trading partners and the scale of imports subject to the levy discussed here will have relatively the greatest impact on Polish importers and final recipients of these goods.

However, the picture of the possible effects of the levy from the point of view of foreign suppliers is different. Figure 2 shows that the share of CBAM goods was very high in 2021 total exports of several countries to Poland. Among them were Iceland, Moldova, and the United Arab Emirates (UAE), for which the share fluctuated around 60%. From the Polish perspective, they were tiny suppliers of goods in question. Let us note that for Iceland’s exporters to Poland the levy will not matter, because the country participates in the EU ETS and thus is not subject to this levy.¹¹ Also in the exports of Egypt, Belarus, Serbia, and South Africa, the share of goods subject to the levy was high, as it exceeded 20% of their total export to Poland. In turn, the share of CBAM goods in imports from such countries as China, USA, Vietnam, and Japan was relatively low (less than 10%).

The carbon border levy, when it begins to be collected (in 2026), will result in a deterioration of the competitiveness of the products concerned. Their export to Poland (and to other EU countries) may decrease. A necessary condition for avoiding the levy is the existence in the exporting countries of an instrument similar to the EU ETS, which will encourage producers to reduce GHG emissions. In a few years only, it will be possible to assess to what extent this measure has achieved its goal.

The absolute value of the commodities discussed was usually modest and Polish recipients will probably be able to adjust to the levy relatively easily (e.g., by improving production efficiency and reducing the consumption of imported inputs per production unit). However, for the above-mentioned countries, the situation may be more difficult, in particular when Poland is an important market for them.

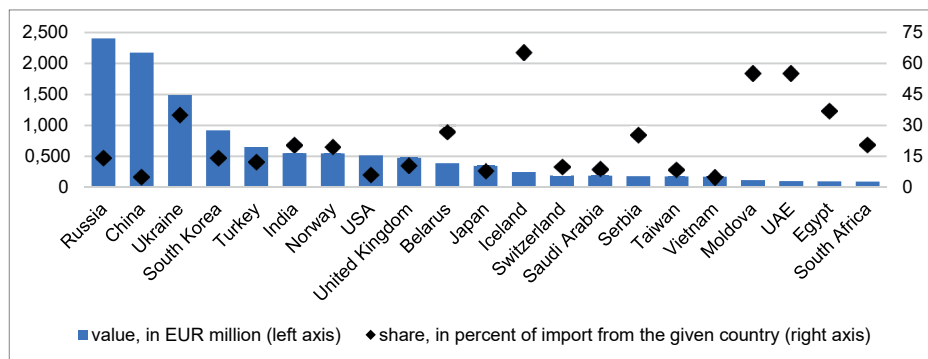


Figure 2. Countries in Polish imports most at risk of border duty in 2021: Share of CBAM products in total countries’ exports to Poland

The value means Polish import of CBAM goods from a given country.

Source: own elaboration based on Central Statistical Office data, 2022.

¹¹ Also, other European Economic Area members (Norway and Liechtenstein) participate in the EU ETS. Switzerland has also been connected to this system on the basis of a separate agreement.

Steel and its products, the largest group of products covered in 2021 by CBAM (33.5%, Table 1), came from many countries. The biggest suppliers were Ukraine and Russia (28% and 24% of imports of steel and steel products covered by CBAM). These products were also imported from China, India, South Korea, Belarus, and Turkey. The value of imports of polymers was almost identical (33.2% of imports of CBAM products). The largest suppliers were: China and South Korea (respectively 25% and 13% of imports of these goods). Chemical products originated mostly from China and Russia. In turn, in the imports of individual countries, the most important were: from China — polymers and chemicals (respectively 50% and 25% of imports of products from this country covered by the levy), from Ukraine — steel (82%), from South Korea — polymers (58%), from Turkey — polymers, steel and chemicals (37%; 31% and 30%), from India — steel (52%), from Vietnam — steel (51%), from the UAE — aluminum (70%).¹²

4.2. Import of goods subject to the levy in Poland against the background of the entire EU

From the point of view of the effects of the CBAM, it seems interesting to show the volume of imports subject to the levy in Poland against the background of the entire EU27. Calculations for the entire group were carried out by, among others, Darvell (2022). His results are comparable to the above calculations for Poland, because they were made according to a similar methodology (the same 2021 as the basis for the calculations and the same range of seven product groups).

The main conclusions from this comparison are as follows. EU27 imports of CBAM products from all non-EU countries accounted for 9.2% of total EU external imports (in 2021)¹³ (Darvell, 2022). In Poland's imports from outside the EU it was 9.6%, so not much more. This share in Poland's total imports (intra-EU plus extra-EU) reached 4.4%. In nominal terms, China was by far the largest supplier of CBAM products to the EU27, followed by the USA, Russia, and the United Kingdom, with a total of 55% of EU CBAM imports from ten major suppliers. Turkey, Japan, South Korea, India, Vietnam and Taiwan occupied further places with much lower supplies to the EU. In the case of Poland, these were Russia, China, Ukraine, South Korea and Turkey. These five partners accounted for 54% of all CBAM imports. In relative terms, the largest share of EU imports covered by the levy came from India (24% of imports from this country), followed by Turkey (around 16%) and South Korea (15%). Next on the list were: Vietnam, China, the USA, Japan, Russia, the UK, and Taiwan with shares ranging from 7% to 11% of the CBAM

¹² Own elaboration based on Central Statistical Office data (GUS, 2022).

¹³ Based on similar calculations for 2020, Hufbauer et al. (2021) came to the conclusion that Ukraine was also among EU partners with the largest share of CBAM goods, i.e., 16% of EU's imports from Ukraine.

imports from these countries to the UE (Darvell, 2022). These shares can be interpreted as measures of the impact of the border levy. They relate to important EU trading partners. This list does not include smaller suppliers for whom this ratio could be higher. As mentioned above, the Polish example, taking into account all trading partners, shows that the countries most exposed to the levy in 2021 were Moldova and the UAE: around 60% of supplies of each of those countries to Poland included CBAM products. In imports from Ukraine, the respective share amounted to 35%, from Belarus — 27%, from Serbia and India — 20% each, from Russia — 14%, and from China — 5%. In terms of goods, there is a very strong concentration of CBAM goods in EU imports. Three product groups: polymers, chemicals and steel products constituted a total of 87% of imports subject to the levy (respectively: 31%, 29% and 27% of all analyzed imports subject to CBAM).¹⁴ In the case of Poland, steel and steel products as well as polymers were also among the products significantly exposed to the effects of the border levy, constituting *ex aequo* each 33% of imports subject to the CBAM. The next two groups of goods, with a share lower by half, were chemicals and aluminum. These four groups accounted for as much as 96% of Poland's external import subject to the levy.

In addition to this comparison, let us add that among the EU27 countries, Bulgaria is most exposed to the effects of the levy: in this country, as much as 65% of external imports were covered by the border levy. Ireland and Greece did not have much smaller shares. In turn, the corresponding rate was between 40%–50% in Italy, Lithuania, Latvia and Belgium. In Poland it was around 25%.¹⁵ On the other hand, it was the lowest in Luxembourg and Austria — less than 10% (Dumitru et al., 2021).

The final impact of the levy on the economy of a given country will depend on various factors. First of all, it is a question of the share of CBAM imports in the production of particular groups of goods. The effects of the border levy on the economy would be small if even 100% of imports of steel elements to produce bicycles were covered by the levy, but these imports accounted for only a small portion of the value of the bicycles produced. In the case of the entire economy, the share of CBAM imports can be related to GDP and interpreted as an approximate measure of the cost of imposing the levy (Dumitru et al., 2021). Available calculations indicate that this indicator was below 0.5% of GDP for most EU members (before the COVID-19 pandemic). However, in several countries the situation was different. The rate was highest in Bulgaria (1.9% of GDP), followed by Lithuania and Latvia (1.1%–1.3% of their GDP), Sweden and Belgium (approx. 0.7%–0.8% of their GDP). In Poland, this share was calculated at around 0.4% (Dumitru et al., 2021). In turn, Chepeliev's calculations (although not fully comparable) indicate that from the point of view of foreign suppliers to the EU, the relatively largest

¹⁴ Own calculations based on Darvell (2022, 4).

¹⁵ This figure is much higher than the one calculated by this author (9.6%). An explanation is probably different statistics taken into account in both calculations.

negative impact of the levy would be on income per capita in Ukraine (a decrease of 0.4%) and in the rest of Europe (countries outside EU, decrease by 0.3%). In other countries of the world, this decrease was imperceptible — below 0.04% of income per capita (Chepeliev, 2021). In terms of goods, the largest costs would be borne by suppliers of steel products from India and Ukraine (decrease in imports by 5%–6%), as well as chemical products from India and Russia (by about 1.4% and 4.5%).¹⁶ The decline in imports of other products would be much lower. These data confirm that, on average, the negative effects of the levy should not be high. At the same time, however, it is obvious that average indicators are misleading and for specific goods (and suppliers) the scale of effects can be much larger.

At the end of this comparison of Poland's position against the background of the EU27 in terms of the scale of possible effects of introducing the border carbon levy, let us note that the presented calculation results do not give a full picture of the scope of the levy and its significance (Dumitru et al., 2021). First of all, they do not take into account the intensity of GHG emissions in imported goods, which varies, for example, depending on whether the energy used for production comes from renewable or non-renewable sources. This different intensity will translate into a different amount of the levy (cf. Section 1) and the import price. Moreover, the possible costs of emissions incurred abroad (by foreign suppliers) which would reduce the levy, import prices, etc. are not taken into account.¹⁷ This information will only be available when the entire carbon border adjustment mechanism, requiring such detailed information from importers, comes into force. Despite these limitations, the calculations give an overall picture of the possible effects of the introduction of CBAM.

5. Summary and conclusions

CBAM is a new instrument of the EU's European Green Deal policy. It is to contribute to the reduction of GHG emissions worldwide by limiting the risk of carbon leakage from the EU to other countries where climate protection requirements are lower; by reducing the intensity of emissions in the EU, as well as by persuading partners to introduce their own GHG emission reduction systems (to neutralize the negative effects of the EU levy on their exports). In the light of the research conducted, the levy seems to be a good instrument from the point of view of climate protection. It can be expected that in the EU and on a global scale, CBAM will contribute to a decrease in GHG emissions over the next few years, to the benefit

¹⁶ The estimated decrease in electricity imports was much higher (by 30%). However, this product is not representative here, mainly due to the low value of imports and their large fluctuations depending significantly on weather conditions.

¹⁷ A system of reducing GHG emissions similar to the ETS is already used by about 45 countries around the world, emitting approx. 19% of global pollution and a levy similar to CBAM has been announced by Canada and Japan (Titievskaja et al., 2022).

of the climate and people. Polish (EU) importers of products with a high carbon footprint coming from outside the EU should be interested in making their production less carbon-intensive to avoid worsening their competitiveness (through the increase of energy efficiency, increased use of renewable energy, etc.). Such changes are not costless and the associated expenses will be passed on to consumers.

The assessment of the CBAM is different from the point of view of customers of products subject to this mechanism. The new levy poses a risk of increasing the prices of EU imports of the most emission-intensive products, with all possible negative effects for importing countries (increase in production costs of final goods basing on imported emission-intensive inputs, deterioration of price competitiveness of some products, decrease in employment and income, etc.). Negative effects appear also for non-EU partners (decrease in production and income of exporters of these products). Because of these implications, the size of the carbon footprint of the products (as low as possible) has become a new, important factor in the international competitive advantage of products.

The above-presented results of own and other authors' research suggest that the negative economic effects of the border levy will be moderate in Poland compared to the EU average. Several indicators of possible negative effects of CBAM for Poland were calculated and presented, including the percentage share of CBAM products in total non-EU imports, the percentage share of CBAM products in overall imports of a given group of products, and the percentage share of CBAM products in a country's GDP. In Poland, as well as in the entire EU, the share of goods covered by the levy (based on the import value and commodity structure in 2021) has been estimated at slightly more than 9% of total imports from outside the EU. Negative effects will be concentrated on a few product groups. In the whole EU imports, three groups of goods: polymers, chemical products and steel, accounted for $\frac{2}{3}$ of imports subject to the levy, based on the 2021 data. In the case of Poland, this concentration was even higher, because only steel products and polymers accounted for $\frac{2}{3}$ of CBAM imports. Three foreign suppliers to the EU mostly exposed to the cost of CBAM were India (24% share of CBAM products in total country's exports to the EU), Turkey (almost 16%), and South Korea (15%). In the case of Poland, the effects of introducing the levy may be much greater for some suppliers. The share of CBAM goods reached 55% in the case of imports from Moldova and the UAE. In imports from Ukraine, it amounted to 35%, and from Belarus to 27%. On average, the negative effects of the levy for Poland, as measured by the CBAM share in total imports or in GDP, seem to be modest. However, such an average share is misleading and for specific goods (and suppliers) the scale of effects, including price increases, may be much larger. Let us note, that the negative effects of the levy on prices will be weakened by the fact that the CBAM will be introduced within a few years, giving foreign suppliers and EU importers time to adjust. However, the parallel gradual withdrawal of free GHG emission allowances, announced with the adoption of the ETS, will have the opposite effect, intro-

ducing pressure on the increase of prices of allowances. At the same time, the levy combined with the elimination of free ETS allowances will provide a stronger price signal than before, encouraging high-emission entities to switch to low-emission production. Among the adverse effects of the levy, one should mention the increase in bureaucracy and the associated increase in costs, which will be a burden in particular for small and medium-sized enterprises.

The scale of the final effects of the levy will depend, on the one hand, on the price of ETS allowances, and on the other hand, on the intensity of adjustments and reactions of domestic companies and foreign partners (reactions of a regulatory nature at the national level, as well as specific adjustments at the level of companies producing and consuming products subject to the levy). More radical changes in the strategies of companies will be necessary, aimed at reducing the intensity of GHG emissions of manufactured products, shifting purchases to suppliers with less emissions, etc. Opportunities to meet these challenges are created by the rapidly growing broadly understood eco-market, including products manufactured using zero-emission (or low-emission) energy sources, e.g., buses powered by electricity generated from renewable energy sources, production of photovoltaics, new generation wind farms, chemical products, ecological food. Many specialists will also be needed to produce such products, as well as to service some of them (e.g., wind farms). There is also a growing demand for new production technologies enabling energy saving and reduction of fossil sources, which are scarce and their extraction and processing consumes often a lot of energy (e.g., aluminum). At the same time, the rapidly growing market of eco-products will allow for the expansion of a profitable scale of production. Companies that take actions in this area earlier can count on a better competitive position in relation to those that will continue high-emission production. An additional risk for the latter is the possibility of EU bans on placing high-emission products on the market. A good example is the regulation of 2023 which introduced a ban on registering new petrol and diesel cars from the beginning of 2035. In general, CBAM adjustments should not be treated only as a cost, but also as an opportunity to restructure operations and participate in the fast-growing market of renewable energy sources, green products and services. Producers have several years to prepare a strategy to limit the negative effects of the levy (it will be collected from 2026), but they should start adjustments as soon as it is possible.

In adapting to the effects of the levy, fast, clear, and reliable information about the EU regulation introducing the new tax (Regulation 2023/956, 2023), the range of goods it covers, necessary documents, etc. can be of great help. Industry associations, but also public institutions responsible for monitoring compliance with the new laws, have an important role to play in this regard. Given the rapid pace of negative climate changes, it is extremely important that all countries in the world strengthen their climate policies and do much more to protect the climate than they are doing now.

The consequence of the new levy will also be a wider implementation of the taxonomy, the aim of which is to improve environmental protection by redirecting capital from investments that harm the environment to more ecological solutions. These are EU guidelines (the first act on this matter was adopted in June 2020), for entrepreneurs, as well as for credit providers, indicating which types of economic activities comply with the requirements for a given activity as environmentally sustainable and should be preferred. Taxonomy rules specify what conditions must be met for a given economic activity to be considered environmentally friendly. Banks and other financial institutions, already do not want to grant investment loans in sectors that do not comply with the principles of sustainable development. Support for “green” activities is preferred. This factor is an additional argument for companies to start CBAM adjustments as quickly as possible. In this situation, the alignment of emission standards for products manufactured in the EU and imported may be a great opportunity for Polish and EU enterprises to start and develop environmentally friendly goods and services.

References

- Coase, R.H. (1960). The problem of social cost. *The Journal of Law & Economics*, 3, 1–44.
- Chepeliev, M. (2021). Possible implications of the European Carbon Border Adjustment Mechanism for Ukraine and other EU trading partners. *Energy Research Letters*, 2(1), 1–6. <https://doi.org/10.46557/001c.21527>.
- Darvell, A. (2022). *The EU's Carbon Border Adjustment Mechanism Moving Towards the Final Stage of Legislation Process*. Tokyo: Mitsui & Co. Global Strategic Studies Institute.
- Dumitru, A., Kölbl, B., Wijffelaars, M. (2021). *The Carbon Border Adjustment Mechanism Explained*. Retrieved March 10, 2023, from <https://www.rabobank.com/knowledge/d011297275-the-carbon-border-adjustment-mechanism-explained>.
- European Commission. (2021a). *Remarks by Executive Vice-President Timmermans* (2021, July 15). Retrieved March 1, 2023, from https://www.ec.europa.eu/commission/presscorner/detail/en/SPEECH_21_3724.
- European Commission. (2021b). *Commission Staff Working Document. Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council Establishing a Carbon Border Adjustment Mechanism*. Brussels, SWD (2021), 643 final, part 1/2.
- Grądalski, F. (2002). Teoretyczne podstawy proekologicznego systemu podatkowego. *Gospodarka Narodowa*, 197(10), 25–51.
- Hufbauer, G.C., Kim, J., Schott, J.J. (2021). Can EU Carbon Border Adjustment Measures propel WTO climate talks? *Peterson Institute for International Economics Policy Briefs*, 21–23, 1–13.
- Kawecka-Wyrzykowska, E. (2022). Proposal for the EU Carbon Border Adjustment Mechanism as an instrument of the European Green Deal: Possible implications for Poland. In A. Ambroziak (ed.), *European Union Report 2022* (11–38). Warsaw: SGH Publishing House.
- Kudelko, M., Pękala, E. (2008). Ekologiczna reforma podatkowa — wyzwania i ograniczenia. *Problemy Ekologii*, 12(1), 17–24.
- Milne, J. (2007). Green taxes and climate change: Theory and reality. *Journal for Institutional Comparisons*, 5(4), 8–12.

- Pearce, D. (1991). The role of carbon taxes in adjusting to global warming. *Economic Journal*, 101(407), 938–948.
- Pigou, A.C. (1920). *The Economics of Welfare*. London: MacMillan.
- Prandecki, K. (2007). Ochrona środowiska w teorii ekonomii. *Ekonomia i Środowisko*, 2(32), 21–35.
- Pyrka, M., Boratyński, J., Tobiasz, I., Jeszke, R., Sekuła, M. (2020). *The Effects of the Implementation of the Border Tax Adjustment in the Context of More Stringent EU Climate Policy Until 2030*. Warsaw: KOBiZE.
- Regulation 2023/956. (2023). Regulation (EU) no. 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a Carbon Border Adjustment Mechanism. *Official Journal of the European Union*, L 130/52, 52–104.
- Titievskaja, J., Simões, H.M., Dobрева, A. (2022). *EU Carbon Border Adjustment Mechanism: Implications for Climate and Competitiveness*. Brussels: European Parliamentary Research Service.
- Zrałek, J. (2016). Ekonomia ekologiczna: Rewizja teorii ekonomii w świetle koncepcji zrównoważonego rozwoju gospodarczego. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, 303, 68–83.