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KAZAKHSTAN'S CARBON TAX: ECONOMIC FOUNDATIONS AND EUROPEAN CARBON BORDER ADJUSTMENT MECHANISM IMPACT

The decarbonization of the global economy poses a threat to Kazakhstan's sustainable growth. Particularly vulnerable are Kazakhstan's export-oriented industries, especially in anticipation of the European Union's implementation of the Carbon Border Adjustment Mechanism (CBAM). To mitigate these risks, it is imperative to intensify efforts in implementing environmental taxation in Kazakhstan through the establishment of a carbon price. The research paper aims to comprehensively examine the necessity and feasibility of introducing a carbon tax in Kazakhstan, with a specific focus on its response to the CBAM. The study employs a mixed-methods approach, including a literature review and a comparative analysis of global carbon taxation, to fulfill its research objectives. Through this investigation, we aim to shed light on the potential impacts of such a policy intervention and contribute to a deeper understanding of its implications for Kazakhstan's economy. Key findings underscore a compelling rationale for the introduction of a carbon tax in Kazakhstan, emphasizing the imminent influence of the CBAM on the country's economy. Furthermore, the study highlights the alignment of carbon taxation with sustainable economic development, emphasizing its crucial role in fostering environmental responsibility.

Key words: Carbon Tax, Carbon Border Adjustment Mechanism, Ecological Taxation, Economic Sustainability, Climate Commitments.

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Қазақстандағы көміртек салығы: экономикалық негіздемесі және еуропалық трансшекаралық көміртек салығының әсері

Жаһандық экономиканың декарбонизациясы Қазақстан экономикасының тұрақты өсуіне қауіп төндіреді. Қазақстанның экспортқа бағытталған өнеркәсіптері, әсіресе, еуропалық трансшекаралық көміртегі реттеу механизмін (СВАМ) енгізгеннен кейін тәуекелге ұшырауы мүмкін. Сондықтан Қазақстанда көміртек салығын пайдалана отырып, экологиялық салық салуды енгізу қажеттілігі өзекті мәселе болып отыр. Зерттеу жұмысының басты мақсаты Қазақстанда көміртек салығын енгізу мүмкіндігін, атап айтқанда, СВАМ-ға жауап ретінде енгізу қажеттілігін жан-жақты зерттеу болды. Зерттеу көміртек салығының экономикалық негіздерін анықтауға, оның Қазақстан экономикасы үшін салдарын айқындауға бағытталған. Зерттеу мақсаттарына қол жеткізу үшін әдебиеттерге шолу жасалды, және салыстырмалы талдау жасауға мүмкіндік берген аралас тәсілдер қолданылды. Зерттеудің қазіргі уақыттағы өзектілігін Қазақстанның орнықтылығы мен экономикалық өсуін қамтамасыз ету қажеттілігі айқындайды. Мақалада Қазақстанда көміртегі салығын енгізудің ғылыми-теориялық негіздемесі зерделеніп, Еуропалық Одақтың СВАМ саясатының Қазақстан экономикасына әлеуетті әсері айқындалып, осы бағытта белсенді саясат әрекетінің қажеттілігі атап көрсетілді. Сонымен қатар мақалада халықаралық міндеттемелерді орындай отырып, орнықты экономикалық дамуға жол ашатын, ұлттық климаттық мақсаттарға сәйкес келетін көміртек салығын салу қажеттілігінің дәлелдемелері көрсетілген.

Түйін сөздер: көміртегі салығы, шекаралық көміртегі реттеу механизмі, экологиялық салық салу, экономикалық тұрақтылық, климаттық міндеттемелер.

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Углеродный налог в Казахстане: экономическая основа и влияние европейского трансграничного углеродного налога

Декарбонизация мировой экономики представляет угрозу устойчивому росту Казахстана. Особенно уязвимыми являются экспортно-ориентированные отрасли Казахстана, в условиях внедрения Европейским Союзом Механизма трансграничного углеродного регулирования (СВАМ). Чтобы смягчить эти риски, необходимо активизировать усилия по внедрению экологического налогообложения в Казахстане с использованием углеродного налога. Целью исследования является всестороннее изучение необходимости и осуществимости введения углеродного налога в Казахстане, с особым акцентом на его реакцию на СВАМ. Для достижения этой цели в исследовании использовался смешанный подход, который включал обзор литературы и сравнительный анализ глобальной политики налогообложения выбросов углерода. Оригинальность исследования заключается во всестороннем анализе потенциального последствия налогообложения на выбросы углерода и СВАМ ЕС для экономики Казахстана. Результаты исследования дают научно-теоретическое обоснование введения налога на выбросы углерода в Казахстане, а также влияния на экономику страны внедрения Европейским Союзом Механизма трансграничного углеродного регулирования. Кроме того, в статье подчеркивается необходимость соответствия углеродного налогообложения устойчивому экономическому развитию Казахстана, которое играет решающую роль в повышении экологической ответственности в глобальном масштабе.

Ключевые слова: углеродный налог, механизм пограничной корректировки углерода, экологическое налогообложение, экономическая устойчивость, климатические обязательства.

Introduction

Climate change stands as one of the most urgent global challenges, posing formidable obstacles to sustainable development, food security, and poverty reduction. The escalating anthropogenic pressure on ecosystems contributes to their gradual degradation, potentially leading to irreversible ecological crisis (Koźluk, 2014; European Environment Agency, 2005; Porter & Van der Linde, 2002; GOV.UK, 2012). Recognizing the severity of this issue, the United Nations has formulated three binding agreements – the United Nations Framework Agreement on Climate Change (UNFCCC) (United Nations, 1997), the Kyoto Protocol (United Nations, 1997), and the Paris Agreement (United Nations, 2015). These agreements compel member states to make commitments and achieve specific targets aimed at reducing greenhouse gas emissions.

Efforts to mitigate climate change necessitate the efficient utilization of resources, reduction of greenhouse gas emissions, and augmentation of carbon absorption. The Paris Agreement, introduced in 2015, encompasses a variety of tools such as green finance, green bonds, and environmental taxes.

Within the global ecological system, the Republic of Kazakhstan assumes a critical role in maintaining environmental stability in Central Asia. Spanning a vast territory from Europe to Asia, endowed with diverse climatic and natural conditions, and

rich in natural resources, Kazakhstan holds sway over the environmental stability of the entire region. However, the nation faces challenges; in 2019, it ranked 21st in carbon dioxide emissions and 11th in emissions per capita globally (Global Carbon Atlas). Moreover, it claimed the 5th spot in carbon intensity of GDP in 2019. The total greenhouse gas emissions in Kazakhstan reached approximately 351.2 million tons in 2020 (Government of the RK, 2006a). Environmental sustainability, as assessed by Yale and Columbia Universities, positions Kazakhstan at 70th place, considering indicators like the overall state of the ecological system, environmental pressure, public health's environmental aspects, and state policies in environmental regulation (Government of the RK, 2006b). This scenario necessitates an active national policy for sustainable development to achieve high rates of socioeconomic progress and improve the quality of life for its citizens.

Amidst threats to sustainable development and economic challenges stemming from global climate change, countries are compelled to transition their economies to a low-carbon basis. This shift demands fundamental changes in institutional and legal frameworks for environmental regulation. Kazakhstan, acknowledging its responsibility, ratified the Paris Agreement in 2016 and committed to achieving carbon neutrality by 2060 (Government of the RK, 2016; Government of the RK, 2006b).

While Kazakhstan strives to align with global climate goals, its main trading partners, including the European Union, the United States, and neighboring China, are actively pursuing decarbonization policies. The UE and the US aim for carbon neutrality by 2050, while China plans zero carbon emissions by 2060. This global trend toward decarbonization poses a potential threat to Kazakhstan's predominantly fossil fuel-focused economy. The impending implementation of the EU's Carbon Border Adjustment Mechanism, which taxes goods with a high carbon footprint from countries lacking decarbonization policies and with low carbon prices, heightens the vulnerability of Kazakhstan's export-oriented industries. To mitigate these risks and protect its industries, Kazakhstan must intensify efforts to introduce environmental taxation, including the implementation of a carbon tax and quotas for greenhouse gas emissions.

In this context, our focus lies in understanding the impact of global climate change and evolving international climate agreements on Kazakhstan's economic sustainability, particularly in the context of significant carbon emissions and a reliance on fossil fuel industries.

The primary goal of this research is to evaluate the necessity and feasibility of introducing a carbon tax in Kazakhstan. To achieve this, our specific objectives are as follows:

- assess the current state of Kazakhstan's environmental sustainability, considering carbon emissions, carbon intensity of GDP, and global rankings;
- analyze the potential economic risks posed by the UE's CBAM to Kazakhstan's export-oriented industries;
- evaluate the feasibility and necessity of implementing environmental taxation, including a carbon tax and quotas for greenhouse gas emissions, as a proactive measure to protect Kazakhstan's economy.

To address these objectives, our research employs a mixed-methods approach. This encompasses a comprehensive literature review, a comparative analysis of global carbon taxation policies, and an examination of Kazakhstan's specific economic and environmental indicators. The qualitative aspects involve an in-depth analysis of global climate agreements and their implications, while the quantitative aspects entail the examination of specific environmental metrics and economic data.

Our central hypothesis posits that the introduction of a carbon tax in Kazakhstan is not only necessary but also feasible. Such a measure would serve as

a strategic step to align with global climate goals, protect the economy from potential CBAM-related risks, and promote sustainable development.

This research holds paramount importance in addressing the urgent need for Kazakhstan to adapt to global climate initiatives. By exploring the introduction of a carbon tax, the study aims to provide policymakers and stakeholders with insights to formulate effective strategies for sustainable economic development. Ultimately, our goal is to ensure the long-term environmental and economic stability of the Republic of Kazakhstan.

Literature Review

Carbon taxation operates on the foundation of economic principles aimed at addressing the market failure known as the "tragedy of the commons" in the context of carbon emissions. The fundamental idea revolves around internalizing the externalities—negative impacts on society that are not factored into market prices—associated with carbon emissions. By assigning a price to carbon emissions, carbon taxation seeks to rectify this market failure and align economic activities with their true environmental costs. Several key economic theories and principles underlie the concept of carbon taxation as an effective policy tool.

Drawing from the Pigouvian tax concept proposed by British economist Arthur Pigou (1920), carbon taxation embodies the principle of imposing taxes to correct externalities. In the context of carbon emissions, a Pigouvian carbon tax sets a price that reflects the social cost of carbon, internalizing the external costs of pollution and encouraging individuals and firms to consider the full societal impacts of their actions.

Carbon taxation leverages market-based incentives to drive emission reductions where they can be achieved most efficiently. By assigning a monetary value to carbon emissions, firms and individuals are incentivized to seek cost-effective ways to reduce their carbon footprint, fostering innovation and the adoption of cleaner technologies (Beaufils et al., 2023).

Lin & Li (2011) revealed that carbon taxes have the potential to drive substantial emissions reductions by providing a clear economic incentive for businesses and individuals to transition to low-carbon activities.

The potential benefits of carbon taxation in reducing emissions are further underscored by the research of Metcalf et al. (2020). Metcalf's study provides empirical evidence that carbon taxes can

lead to significant emission reductions, particularly in sectors with higher carbon intensity. The study highlights the importance of well-designed carbon pricing policies in inducing behavioral changes and influencing consumption patterns, ultimately resulting in substantial environmental gains.

Carattini & Sen (2019) and Bistline et al. (2021) conclude that carbon taxes can play a crucial role in achieving stringent climate targets, especially when accompanied by complementary policies. Sun et al. (2023) emphasized that the prospect of higher costs associated with carbon emissions encourages businesses to explore and implement environmentally friendly alternatives. Additionally, the work of Chang et al. (2023) examined the impact of carbon taxes on technology diffusion and found that such policies can accelerate the transition to cleaner technologies, leading to long-term sustainability benefits.

Further insight into the role of carbon taxation in incentivizing clean technologies can be gleaned from the work of Stavins (2019). Their analysis demonstrates that carbon taxes not only stimulate technological innovation but also provide a stable price signal that encourages long-term investments in research and development of low-carbon solutions. This long-term perspective is essential for fostering a transition to a sustainable energy future.

Also, some studies demonstrate how carbon taxation serves as a multifaceted tool, promoting clean technologies, incentivizing responsible corporate practices, and driving sustainable development (Li et al., 2018; Zhou & Zhang, 2020; Le et al., 2020).

The adoption of carbon pricing mechanisms is substantiated by compelling environmental imperatives that encompass emission reduction, safeguarding ecosystems, incentivizing clean technologies, and improving public health. These imperatives underscore the pivotal role of carbon pricing in driving sustainable and resilient pathways towards achieving climate goals.

EU's Carbon Adjustment Mechanism (CBAM) and its Potential Influence on Kazakhstan's Economy

The EU's CBAM represents a pioneering policy approach to address climate change and economic considerations. Its key features and goals are informed by a comprehensive understanding of the challenges posed by carbon leakage and the need to ensure a level playing field for European industries.

The European Commission's proposal for CBAM (2021) outlines a phased approach to its implementation. CBAM aims to place a carbon price on certain imported goods based on their embedded

carbon emissions. It is achieved through an obligation on importers to purchase emissions allowances corresponding to the carbon content of their imports. The mechanism encompasses a gradual phase-in period to allow businesses time to adjust. It is designed to be compatible with the World Trade Organization rules, incorporating principles of non-discrimination and proportionality.

The scope of the CBAM covers select sectors, initially focusing on energy-intensive industries such as cement, aluminium, steel, fertilizers, and electricity (Beaufils et al., 2023). The scope aims to ensure compliance with the EU's climate targets while reducing the danger of carbon leakage. Direct and indirect emissions from manufacturing imported goods are intended to be included in the CBAM.

The primary goal of the CBAM is to prevent carbon leakage and ensure a fair, competitive environment for European industries (Perdana & Vilelle, 2022; Evans et al., 2021; Mörsdorf, 2022). The CBAM seeks to encourage trade partners to adopt comparable climate policies by placing a carbon cost on imports. It can lower the danger that carbon-intensive companies may relocate to areas with lax environmental rules. Additionally, CBAM aims to contribute to the EU's emission reduction targets, fostering a more sustainable global supply chain.

In essence, the EU's CBAM is a comprehensive policy tool to address carbon leakage, ensure fair competition, and align international trade with the EU's ambitious climate objectives. Its design, scope, and intended outcomes reflect a proactive and strategic approach to tackling climate change globally.

Implementing a Carbon Border Adjustment Mechanism (CBAM) by the European Union (EU) has sparked extensive scholarly discussion on its potential implications for international trade, competitiveness, and efforts to reduce carbon emissions. Fuentes et al. (2020) highlight that CBAM could lead to trade diversion, as non-EU countries might redirect their exports away from the EU to avoid the carbon cost. Moreover, Bellora, C., & Fontagné (2020) underscore that CBAM could prompt trading partners to adopt their carbon pricing mechanisms to ensure market access, potentially leading to a global diffusion of carbon pricing policies.

Keen et al. (2022) suggest that well-designed CBAMs, accompanied by appropriate revenue recycling measures, can mitigate potential adverse effects on competitiveness. Furthermore, Combet et al. (2021) argue that CBAM can create a level playing field for domestic and foreign producers,

reducing the risk of carbon leakage and preserving competitiveness.

Zachmann and McWilliams (2020) propose that CBAM could induce trading partners to adopt more ambitious climate policies, leading to enhanced international cooperation in emissions reduction. Moreover, Böhringer et al. (2018) explore the impact of CBAM on emissions reduction in the poorest nations, emphasizing the need for careful policy calibration to ensure equitable outcomes.

Böhringer et al. (2018) examine the equity considerations of CBAM, emphasizing the importance of designing mechanisms that avoid disproportionate burdens on low-income households. They advocate using CBAM revenues to fund targeted measures that alleviate potential negative impacts on vulnerable populations. Additionally, Mörsdorf (2022) discussed the role of CBAM in addressing global inequality and social justice by promoting climate finance and technology transfer to developing countries.

The method may spur innovation in carbon-efficient production techniques, according to Wang et al. (2018). They stress that CBAM can encourage technological adoption and R&D in exporting and importing nations. Furthermore, Sun et al. (2023) evaluate the effects of CBAM on technical spillovers and carbon leakage, emphasizing the potential for knowledge transfer and innovation diffusion.

According to the research, CBAM's impact on global commerce, competitiveness, and carbon reduction efforts are complicated and dependent on several variables, such as policy design, international cooperation, and economic dynamics. The ongoing study will offer helpful insights into CBAM's role in influencing the future of global trade and climate action as the EU implements it and its effects become apparent.

As a significant economic force in Central Asia, Kazakhstan maintains close commercial and trading ties with several international organizations, notably the European Union. Its complex resource-based economy, exemplified by energy-intensive sectors like oil, gas, and mining, illustrates its twin responsibilities as a major contributor to global carbon emissions and a major supplier of commodities. Kazakhstan's economic policies should be carefully considered because they impact outside of its borders due to its connection to international markets.

The effectiveness, difficulties, and opportunities linked with carbon taxing become more prominent due to debate progress as Kazakhstan moves toward a greener and more resilient economy. Even if the available research fills in some significant

research gaps, some critical questions still need to be answered, particularly in light of Kazakhstan's response to the European Union's Carbon Border Adjustment Mechanism (CBAM). There needs to be more information on how the EU's CBAM might impact exports from Kazakhstan to Europe. A thorough analysis is required to comprehend the industries and sectors most susceptible to trade disruptions, the potential effects of price differences on competitiveness, and the modifications Kazakhstan exporters might need to make to be viable in the face of CBAM-related difficulties.

Methodology

This section outlines the methodology employed to examine the effects of the EU Carbon Border Adjustment Mechanism (CBAM) on Kazakhstan's economy and the potential implementation of carbon taxes. The study design incorporates various approaches and relies on established theoretical frameworks and empirical data to yield comprehensive findings.

The primary research question guiding this study is: "What are the potential effects of the EU CBAM on Kazakhstan's economy, and how feasible is the introduction of carbon taxes in response?" To address this question, a hypothesis is put forward:

H1: The implementation of carbon tax in Kazakhstan, in response to the EU CBAM, is a viable strategy to mitigate economic risks and align with global climate goals.

The research unfolds in the following stages: Literature Review, Data Collection, Comparative Analysis, Scenario Analysis, Policy Analysis, Conclusion.

To establish a foundational understanding of carbon taxation, carbon pricing mechanisms, and the EU CBAM, a thorough literature analysis was conducted. This review encompassed academic and policy literature, synthesizing information and identifying areas for further exploration. Utilizing insights from trade, policy integration, and environmental economics theories, a conceptual framework was developed to clarify connections and theoretical underpinnings.

A comparative analysis was conducted to compare Kazakhstan's economic structure and trade connections with nations that have implemented carbon pricing schemes or have been affected by the EU CBAM. This approach facilitated the identification of potential pitfalls and provided context for research findings. Scenario analysis involved the creation of fictitious scenarios to

explore a range of potential outcomes, including modifications to trade patterns, sector responses, and adjustments to carbon emissions. Furthermore, a policy analysis assessed the alignment of the EU CBAM and proposed carbon taxes with Kazakhstan's climate goals, economic development plans, and international commitments.

Data collection

Pertinent and reliable datasets were gathered from reputable sources, including the official websites of the European Commissions, the Bureau of National Statistics of the Republic of Kazakhstan, international organizations such as the World Bank, World Energy and Climate Statistics, research institutions, and industry reports. This data collection phase was crucial in informing the subsequent analysis and included economic indicators (GDP, trade balance, sectoral contributions), trade statistics, sector-specific information, and EU trade statistics.

Limitations and Future Directions

Acknowledging potential limitations, including data availability constraints, model presumptions, and potential biases, the study recommends future research focus on quantitative and qualitative evaluations, in-depth sectoral analysis, and the social and distributive effects of carbon taxes.

The methodology outlined above establishes the foundation for a robust analysis of the potential impact of the EU CBAM and the introduction of carbon taxation in Kazakhstan.

Results and Discussion

CBAM is part of the Fit for 55 program, which aims to reduce carbon emissions by 55 per cent by 2030 compared to 1990 in the EU (European Commission, 2022). The EU nations intend to use CBAM to combat so-called carbon leakage, which occurs when companies look for a reason to migrate to nations with less stringent environmental regulations than the EU. CBAM will be used in five industries: cement, fertilizers, iron and steel, aluminium and electricity. These industries were chosen due to the high risk of carbon leakage. The following discussion considers introducing such regulations for hydrogen and indirect CO₂ emissions.

CBAM will be based on certificates. Exporting companies will need to purchase certificates that will reflect the amount of carbon emissions in the production of this product. Based on these data, the price of these certificates is then calculated. Actual border taxation will begin in 2026, and from October 2023, exporters will only be required to report

emissions. It is believed that the CBAM mechanism is aimed at encouraging importing countries to fight climate change.

Because CBAM is anticipated to raise trade flows and costs for EU trading partners, it may impact the dynamics and structure of international commerce and the competitiveness of exporting nations. Table 1 lists the major trading partners of the EU member states. Therefore, this system will impact Russia, China, the UK, Turkey, Ukraine, India, South Korea, and the USA. Norway and Switzerland are exempt from CBAM as members of the ETS (Emission Trading System).

Table 1 – Countries with the largest share of exports to EU countries (on average from 2015 to 2019)

№	The name of the country	Share of exports of goods covered by the CBAM mechanism in percent
1	Russia	16.7
2	China	10.1
3	United Kingdom	8.5
4	Norway	7.3
5	Turkey	6.8
6	Switzerland	5.5
7	Ukraine	5.2
8	India	4.2
9	South Korea	4.1
10	USA	3.0

Note: compiled by the authors according to Kardish et al. (2021).

Although these nations are the biggest exporters of CBAM goods to the EU, this does not necessarily mean that CBAM will harm all the countries mentioned above. China, for instance, is the table's second-largest exporter to the EU. However, due to the small overall percentage of EU exports in the Chinese economy, China has little dependency on EU exports. As a result, China's exposure to the new CBAM mechanism is lessened by its minimal reliance on exports to the EU.

The data above suggests that studying a country's export dependency on the EU is necessary to determine how CBAM will affect that nation. Accordingly, some economists think that nations whose part of exports to the EU is significant in this country's total share of exports will be the most vulnerable to implementing the CBAM mechanism

(Kardish et al., 2021). These nations include Latin America, Africa, Central Asia, and Kazakhstan. According to the National Bureau of Statistics of

Kazakhstan for 2022 (Figure 1), for instance, the proportion of Kazakhstan's exports to EU nations is close to 40% of the country's overall exports.

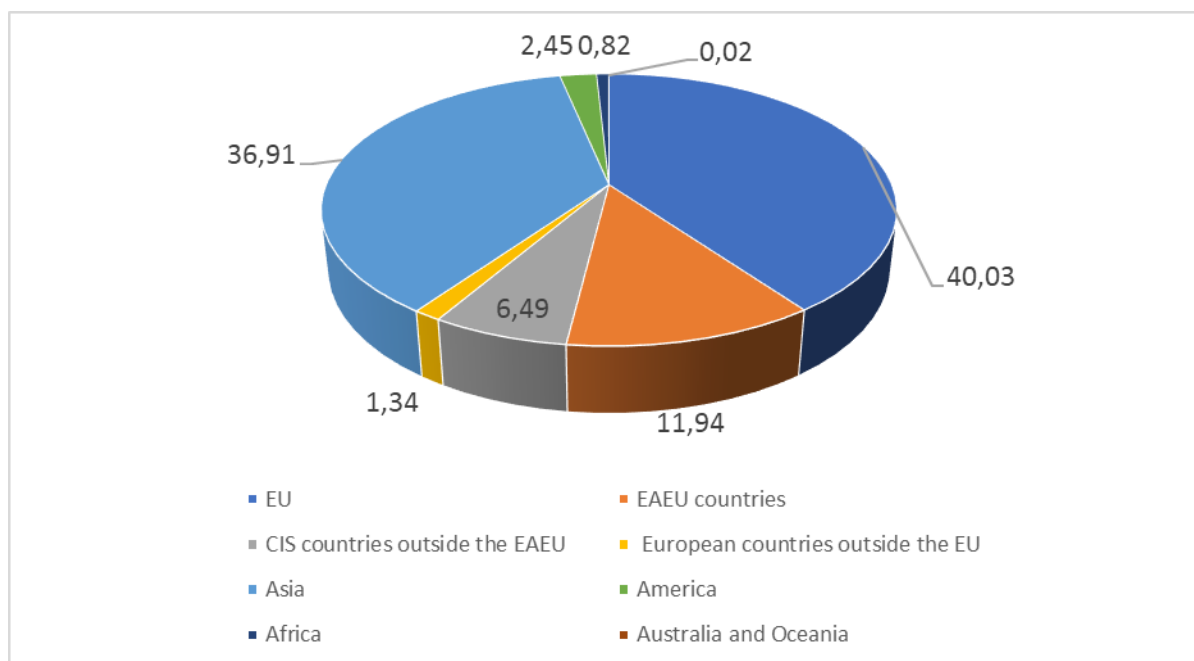


Figure 1 – The breakdown of Kazakhstan's exports by countries and regions for 2022, in per cent
Note: compiled by the authors according to National Bureau of Statistics of Kazakhstan (2022).

Cement, fertilizer, iron and steel, and aluminium are among the goods for which the CBAM is applicable; Table 2's data reveals that their combined share of Kazakhstan's exports to EU nations, which amounts to 2.53% of all exports, is not particularly significant. It should be highlighted that the iron and steel goods group,

which accounts for 1.6% of exports, holds the lion's share. Therefore, introducing this mechanism at this early stage should have a minimal impact on the development of these industries in Kazakhstan because the proportion of items for which CBAM is proposed to be applied is a negligible share of all exports to the EU nations.

Table 2 – Indicators of export of CABM goods from Kazakhstan to the EU countries

Product group name	The volume of exports to the EU countries, in million euros	Share in total exports from Kazakhstan to EU countries, in percent
Fertilizers	32.53	0.11
Iron and Steel	477.73	1.6
Aluminum	244.6	0.82
Total by groups of CABM products	754.86	2.53
Total exports from Kazakhstan to the EU	29 822.06	100

Note: 1) Cement and electricity were not supplied to EU countries according to 2022
2) Compiled by the authors according to EU Trade Statistics data: European Commission (2023).

However, adopting CBAM in low-income nations can have detrimental socioeconomic effects, such as a rise in unemployment and a fall in the income level of the population, even though the share of a nation's exports to the EU may be minimal (Brandi et al., 2020). Albania, Bahrain, Bosnia and Herzegovina, Moldova, Montenegro, Mozambique, North Macedonia, Serbia, and Ukraine are among these nations.

As a result, implementing this mechanism for various goods may make Kazakhstan's economy vulnerable, which could later manifest as a decline in the average income level for the population and an increase in unemployment.

In addition, another important indicator for assessing a country's vulnerability to CBAM is the economy's carbon intensity. It is necessary to note the high carbon intensity of the economy of Kazakhstan, which will also affect the competitiveness of Kazakhstan's exported goods since the cost of CBAM certificates will depend on the volume of emissions incurred in producing these goods. Thus, if two countries export the same volume of CBAM products to the EU, the difference between the car-

bon intensity of their industries can become a decisive factor in pricing and affect the price competitiveness of products.

A study by Indra Overland and Rakhat Sabyrbekov (2022) named Ukraine, Iran, Kazakhstan, Bosnia and Herzegovina, and Vietnam the most carbon-intensive economies in 2019. In addition, Ukraine, Bosnia, and Herzegovina are the countries most dependent on exports to the EU.

Figure 2 shows that during the past 20 years, the carbon intensity of products has decreased globally. However, Russia, Kazakhstan, Iran and Ukraine still have high scores. It should be noted that there is a significant decrease in the carbon intensity of products in Uzbekistan from 1.579 in 2000 to 0.376 in 2022. Kuwait has the highest carbon intensity score (0.627). This country has shown an increase in carbon intensity since 2015. Thus, with high carbon intensity indicators, Kazakhstan may be uncompetitive in foreign trade by expanding the range of goods covered by the CBAM. Currently, this risk is absent, as the share of exports of goods covered by CBAM is only 2.53% compared to total exports to EU countries.

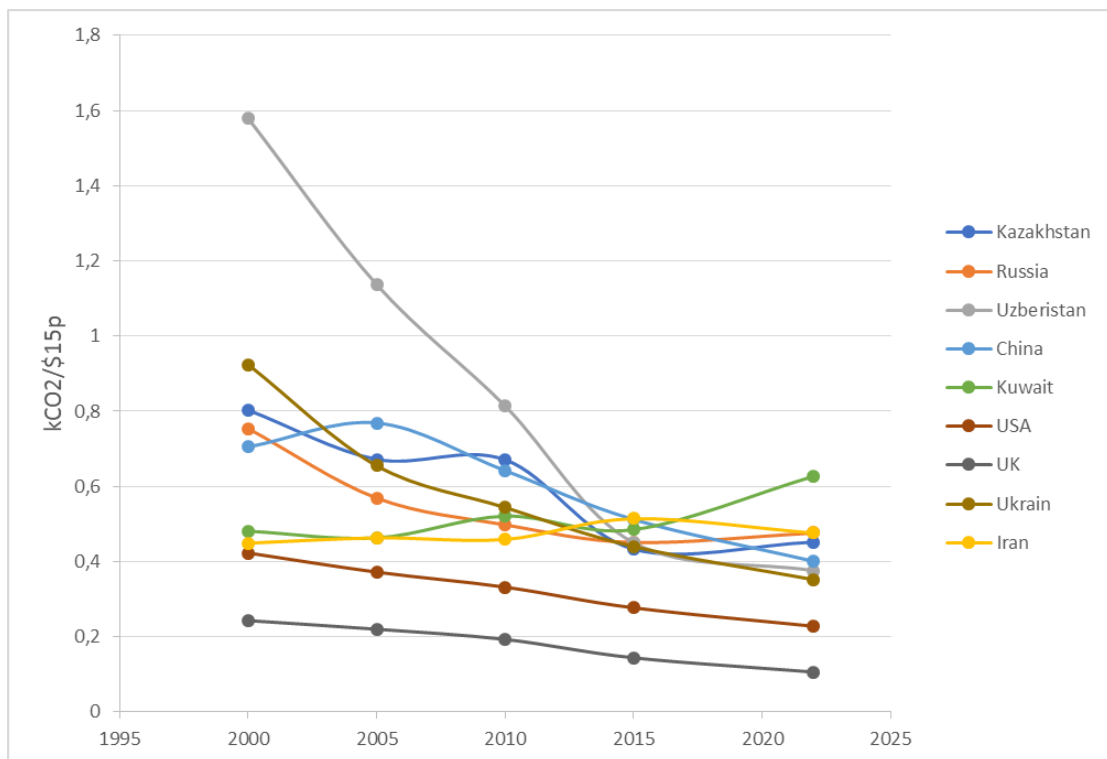


Figure 2 – Carbon intensity in countries with the highest and lowest rates
Note: Compiled by the authors according to CO2 intensity (2023).

Thus, even if a country is exposed to CBAM due to carbon dioxide (CO₂) emissions from the manufacturing process, the carbon intensity of the export compared to other exporting countries is a critical factor. A country's products may be subject to a tax burden depending on their carbon content. However, exports can remain competitive provided their carbon intensity is lower than that of goods imported by other EU trading partners.

This state of affairs is because carbon pricing in products imported into the EU increases the share of developed countries in exports of CBAM products while reducing the share of developing countries. A United Nations Conference on Trade and Development (UNCTAD, 2021) research paper shows that by adjusting the carbon cap based on \$88 per metric ton of carbon content, developed country exports to the EU will increase across all sectors covered by CBAM, while how exports from developing countries, especially from Bosnia and Herzegovina, Central Asia, Egypt and South Africa, Russia, Serbia, Ukraine, will decrease significantly.

All of the above leads to intensifying work on introducing a carbon tax in Kazakhstan. Kazakhstan uses an alternative mechanism to the carbon tax,

the so-called “cap and trade” mechanism, or as it is called in the EU “Emission Trading System”.

Trading emission quotas is considered a market instrument of environmental policy. The basic operating tenet of the quota trading system is to limit the emissions of greenhouse gases by consumers of natural resources and to incentivize them to spend money on “clean” technology, technical capacity upgrades, and productive facilities that are more effective.

The European Emissions Trading System (ETS) approach developed the Republic of Kazakhstan's system for pricing greenhouse gas emissions. The first national plan for allocating quotas for greenhouse gas emissions went into effect in 2013. For the two years of 2014–2015, the second national plan for allocating greenhouse gas emission quotas was created. The Third Plan for 2016–2020 was approved, but in order to improve the legislation of the Republic of Kazakhstan in the field of greenhouse gas regulation, the Kazakhstan Emissions Trading System was suspended for the period 2016–2018. So, since 2013, emissions trading has been organized by the National Plan and the total trading volume and the average price of 1 ton of CO₂ are shown in Table 3.

Table 3 – Trading of quotas for greenhouse gas emissions in the Republic of Kazakhstan for the period 2014–2021

Trading period	Unit	2014	2015	2019	2020	2021
Amount of deals	number	35	40	3	6	39
Volume of transactions	thousand tons of CO ₂	1 271.29	1 983.92	1 202.21	1 591.0	4 560.4
Volume of transactions	million tenge	182.19	754.64	519.10	810.92	2 281.19
Average price for 1 ton of CO ₂	tenge	301	830	363	510	500,2

Note: compiled by authors according to National Bureau of Statistics of Kazakhstan (2022)

According to Table 3, the average price for 2021 was 500.2 tenge per 1 ton of CO₂ emissions, which is just over 1 euro. It should be noted that in the EU, the target level of the carbon tax is 50 euros per ton. If we assume that the CABM certificates will consider the amount of tax paid in the country of origin of the goods, then the difference will be approximately 49 euros per ton. Thus, 49 euros will be transferred to the EU budget, and only 1 euro will be sent to the budget of Kazakhstan. Therefore, gradually increasing the average price for carbon emissions gradually and introducing a carbon tax is necessary.

The growing importance of environmental taxation and the introduction of environmental taxes in many countries is considered the main direction of environmental regulation. The leading scientific problem for the greening of taxation in Kazakhstan is the need for current tax instruments and the systematic application of environmental principles in taxation. In Kazakhstan, there are tax payments related to environmental protection. According to Table 4, more than 70% of tax collections fall on energy taxes. Also, the share of all environmental taxes for 2021 is about 2.7% of the share of the country's GDP (Figure 3). In addition, it should

be noted that they are not effective. They do not stimulate a reduction in the consumption of carbon-containing products. Introducing a special environ-

mental tax, such as a carbon tax, will stimulate a reduction in the consumption of carbon-containing products.

Table 4 – Environmental taxes of the Republic of Kazakhstan

Type of environmental tax	2016		2017		2018		2019		2020		2021	
	billion tenge	%	billion tenge	%	billion tenge	%	billion tenge	%	billion tenge	%	billion tenge	%
Energy taxes	849.05	73.9	1213.03	74.2	1654.23	77.0	1706.40	74.8	881.69	63.4	1592.13	70.2
Transport taxes	50.5	4.4	64.33	3.9	72.06	3.4	78.32	3.4	63.44	4.6	77.64	3.4
Pollution taxes	67.22	5.8	72.53	4.4	87.13	4.1	100.81	4.4	85.59	6.2	110.93	4.9
Resource taxes	182.37	15.9	284.61	17.4	335.14	15.6	394.42	17.3	359.19	25.8	487.89	21.5
Total environmental taxes	1149.13	100	1634.51	100	2148.55	100	2279.95	100	1389.91	100	2268.59	100

Note: compiled by authors according to National Bureau of Statistics of Kazakhstan (2022).

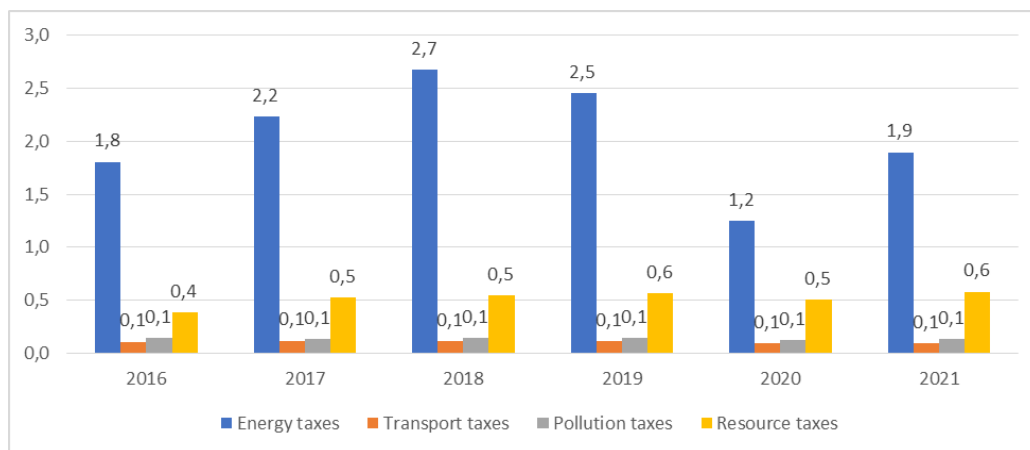


Figure 3 – The share of environmental taxes in the country's GDP, in per cent

Note: compiled by authors according to National Bureau of Statistics of Kazakhstan (2022).

The main objective of environmental taxesis to encourage entrepreneurs to consider their environmental costs as consumers of natural resources. It, in turn, will increase the tax burden due to environmental taxes and fees. Thus, the ecological function of taxes will operate, which makes it possible to regulate the consumption of natural resources.

The «polluter pays» principle, the preventative principle, the precautionary principle, and the principle of common but differentiated responsibility should be the core tenets of environmental taxes (Falcão, 2020).

According to the polluter pays principle, the polluter should not pass on pollution costs to society. A carbon tax can internalize the environmental

costs of pollution by forcing the polluter to pay a tax directly proportional to the content of pollutants in the product consumed, produced or extracted (United Nations, 2021).

The precautionary principle states that preventive measures should be established when there is a risk of future long-term environmental harm that cannot be fully assessed during the decision-making process. A country's application of environmental taxation means that it recognizes the risk of long-term environmental damage in the future if emissions are not reduced or eliminated.

The principle of common but differentiated responsibilities suggests that all countries, but with different levels of participation, should be held re-

sponsible for environmental degradation. The level of participation should consider the country's socio-economic development. Moreover, introducing a carbon tax should be reflected in the applied rate. Thus, less developed countries can impose lower tax rates.

One of the crucial problems of Kazakhstan's fiscal policy in environmental regulation is the need for a legislative framework for applying economic methods of environmental regulation. Another critical issue is the use of tax revenues from environmental taxes. Foreign practice shows the need to form a target environmental fund for the subsequent use of all revenues from environmental taxes for environmental activities. Also, the collected funds could be used to create green investments by introducing derivative financial instruments (SIV - Special Investment Vehicles), which would be used to finance the development and implementation of environmental technologies.

In addition, it is necessary to develop benefits and preferences for those taxpayers who will reduce environmental damage during production. Thus, stimulating and compensatory functions of taxation will be applied.

Establishing environmental taxation based on the current tax system is the fundamental issue with establishing environmental taxation in Kazakhstan. It necessitates the integration of environmental taxation with tax law. There is no such thing as an "environmental tax" in Kazakhstan's law. Given the global trend of taxation systems shifting toward environmental considerations, it is necessary to further the environmental orientation of Kazakhstan's current tax system. Thus, the taxation system of the Republic of Kazakhstan is at the stage of the formation of a national environmentally-oriented tax system. Forming an environmental tax system in Kazakhstan will contribute to developing public financial resources for environmental protection. It will also stimulate the environmentally oriented behaviour of taxpayers. The main goal of introducing an environmental tax system in Kazakhstan is the formation of tax instruments for environmental regulation. Based on international agreements and the experience of foreign countries, Kazakhstan needs to develop its national system of environmental regulation using financial instruments.

Conclusions

The global imperative to combat climate change has underscored the significance of policy measures that align economic activities with environmental sustainability. As nations strive to reduce carbon emissions and transition towards a low-carbon fu-

ture, the implementation of carbon pricing mechanisms has emerged as a pivotal strategy. This study delved into the compelling case for introducing a carbon tax in Kazakhstan, particularly in the wake of the European Union's Carbon Border Adjustment Mechanism (CBAM). The research journey encompassed a meticulous exploration of economic foundations, policy alignment, and the potential impacts of such an endeavor.

The synthesis of extensive literature underscored carbon taxation's prominence as a potent instrument within climate mitigation strategies. Its capacity to internalize externalities associated with carbon emissions was evident, paving the way for effective behavioral shifts towards cleaner alternatives. The conceptual framework also provided a solid basis for examining the complex interactions between carbon taxes, EU CBAM, and Kazakhstan's economy. It was informed by environmental economics, trade, and policy integration theories.

In the context of the EU CBAM, this research highlighted the intricate dance between policy, economics, and environmental goals. It elucidated the EU CBAM's potential influence on Kazakhstan's economy, underlining the necessity of proactive strategies to navigate potential challenges and harness opportunities. The resounding call for policy alignment and the urgency to propel Kazakhstan towards a sustainable and resilient future were undeniable.

The study's culmination underscores that the proposition of introducing a carbon tax in Kazakhstan stands as a strategic response to the evolving landscape of global climate action. By aligning economic imperatives with environmental goals, Kazakhstan can embark on a path of responsible growth and contribute substantively to international climate commitments. The findings present a clarion call to policymakers, industries, and stakeholders, urging concerted efforts towards a harmonious coexistence of economic prosperity and ecological integrity. As Kazakhstan contemplates its carbon future, the proposition of a carbon tax materializes not merely as an economic instrument but as an emblematic commitment to forging a sustainable legacy for generations to come.

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