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Carbon Border Adjustment Mechanism and the Protection of the Competitiveness of EU Aluminium Producers

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Abstract

The European Union's decision makers placed in their agendas a very sensitive subject which was repeatedly tried in the past, that is to impose a carbon border tax. The advocates of such a measure use a mix of arguments, combining the urgency of fighting climate change through public policies with the need to protect the competitiveness of strategic sectors of the EU industry affected by the carbon leakage phenomenon. One of these sectors is that of aluminium production, which has felt the mounting pressure of the costs of indirect emissions reflected by the rising price of electricity in the last three years. Based on public statements and on studies prepared by both government institutions and academics, it seems that the EU wants to implement a carbon border adjustment mechanism (CBAM), and this should be in line with the WTO rules. Using a machine learning program, the author conducted a quantitative content analysis of the financial reports during 2018-2020 of five European aluminium producers. The author drew a number of conclusions regarding the correlations between the price increases of ETS certificates and the price of electricity reflected in the cost of production. Considering that CBAM will, in fact, be an extension of the ETS system applied to imported aluminium products, the author proposed a formula to measure the effectiveness of CBAM in order to achieve the proposed objectives of the European Parliament and European Commission, namely to protect the competitiveness of European companies and, at the same time, to help reduce the direct and indirect carbon emissions from the production process. The author considered the insufficiency of some of the necessary data, the still existing statistical asymmetries and some recent developments that may influence the results he has reached. Some of these methodological asymmetries will be addressed in future research.

Keywords: Carbon Border Tax Adjustment, ETS, electricity price, aluminium production.

JEL Classification: F10, F14, F18.

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1. Introduction

Achieving sustainable economic development in a carbon neutral economy is a paramount objective for the European Union. The most important stepstone in this new paradigm is to preserve the most relevant competitive advantages of some strategic economic sectors while mitigating the climate change effects. One of these competitive advantages is referring to production costs.

EU wants to be a global leader in the fight against climate change effects and, in order to achieve this objective, it is trying to shape a green narrative based on a carbon-free economic development.

This fundamental redesign is based on a net-zero primary energy mix and the main tool to achieve this is the EU-ETS system. This regulatory and institutional tool is a cap-on-trade-mechanism applied to several economic sectors, such as the power and heat generation, energy-intensive activities, and the commercial aviation.

The ETS system is applied on two levels. The first level is that of direct GHG emission. Direct GHG emissions are generated on site during the production process. The economic sectors identified by the EC as being exposed to the risk of carbon leakage receive 100% of their allocation for free. Regarding the indirect emissions, these sectors benefit from a 75% offset, which does not apply to non-efficient technologies. Indirect GHG emissions are a consequence of the production processes but occur initially at sources owned by another entity. This is the case of type of purchased electricity used in the production process, generated by coal or natural gas fired power plants.

The EU-ETS system is designed to persuade the economic operators to improve their energy efficiency or to use new technologies with a lower impact on the environmental equilibriums. In some very specific circumstances, if the carbon emissions produced exceed the cap specified by the EU-ETS Directive, they must buy auctioned ETS certificates to offset the amount of their carbon footprint.

In order to accelerate the transition to a carbon neutral economy, the European Union has reduced the number of ETS certificates that are allocated free of charge. This has led to a steep rise of the ETS prices. The industrial associations indicated that this exponential increase of the ETS prices was reflected in a sustained increase in production costs, especially for the amount of the purchased power needed for the industrial processes. The energy-intensive sectors are the most exposed in this situation, because they lose their competitive advantage through the cost of production to the detriment of non-EU competitors from economic blocs that do not have an environmental policy as consistent as the European Union. One of these sectors is that of aluminium production.

To mitigate this impact, aluminium producers have little room for manoeuvre on the short term. China, however, which has the largest aluminium production capacity in the world (approximately 56%), exploits that competitive advantage by supplying coal-based electricity to their local aluminium producers at a much lower price compared to the power prices in EU (European Commission 2020, 2021).

This vicious circle triggered the carbon leakage phenomenon, with industrial islands forming outside the EU. This means a shift in production capacities to geographical areas with not too many rigorous climate targets. To mitigate these risks, the European Commission (EC) and the European Parliament (EP) consider that the optimal option is to implement a carbon border adjustment mechanism (CBAM).

Some Member States, especially France, have had similar initiatives in the past, but were abandoned either due to lack of political consensus or because there was not enough administrative will to impose such a system as long as the ETS price was not punitive enough for polluting production capacities. In this specific stage, the experts from the EC took the lead, followed shortly by the representatives of the EP. A first draft of the CBAM should be released, according to public statements, in the first half of the year.

2. Problem Statement

The author started the analysis considering the hypothesis that the design of the CBAM will be, in fact, an extension of the ETS system in order to tax the carbon content of the same types of imported products that are currently produced in the European Union and fall under this mechanism. In order to be applied, a CBAM must find a common ground for international trade flows, competitiveness, and climate objectives.

Otherwise, as Aichele and Felbermayr (2015) mentioned, a CBAM might have the air of green protectionism and could be costly if noncommittedly countries resort to retaliation.

2.1 Recent Attempt to Implement a Carbon Border Tax in the EU

The need to tax the carbon content of imported goods foreshadowed fourteen years ago, when the contracting parties to the Kyoto Agreement feared that their energy-intensive industries would lose their competitive advantages to the detriment of the industries located in countries not participating to this Agreement (McLure, 2010). In the EU, the frontrunner of such a mechanism has been France, since 2009, but the idea of a carbon border tax faced opposition from the EC and from some other EU member countries such as Sweden which, at that time, held the EU's six-month rotating presidency. Sweden claimed that such a measure will put in danger the chances of reaching a consensus at COP15 – the summit, in the end, was a failure – and EC President Jose Manuel Barroso emphasized that this initiative will not work without the backing of USA and China (Euractiv, 2009). The environment commissioner Stavros Dimas was not too thrilled, either, with the carbon border tax, who mentioned that this is not a proper tool to determine the developing nations to embark on a climate deal (Chaffin and Harvey, 2009).

2.2 Some Relevant Differences between a Carbon Border Tax and a Carbon Border Adjustment Mechanism

Although EU decision makers initially used the term of carbon border tax (Leyen, 2019), recently, the European Council President mentioned the term of carbon border adjusted mechanism. EU officials stated that either the carbon border tax or the CBAM should be in line with an improved emission trading system (Claire and Louise, 2020). This might mean that the EU-ETS system will be applied to imported products to the same extent as it is applied to products made in EU (Aylor et al., 2020).

However, there are some differences between a carbon border tax and a carbon border adjustment mechanism. In order to explain how a carbon border tax would be operationalized, this levy was compared with the value added tax framework (Stiglitz, 2009). From another methodological perspective, Metcalf E. Gilbert (2014) emphasizes that there is a suggestive difference between a carbon border tax and a carbon border adjustment mechanism based on a cap-and-trade-system, which is similar to the EU-ETS model. In the case of a carbon border tax, the tax code will be used, either the origin-based or the destination-based. The focus will be either where the carbon emissions are produced or where the consumption of the imported goods with carbon content takes place. In the case of the VAT system model, adjustments can be obtained with tax credits or with the help of the exchange rate. However, the difference between similar products with different levels of carbon content, in such a system, cannot be adjusted like this. This is the reason why a carbon adjustment mechanism based on a cap-and-trade-system might work better, due to the fact that imports might benefit from a number of free allowances and a cap on emissions, while exports might benefit from using rebates to adjust these kinds of differences. The disadvantage of a carbon border tax would be that it will trigger significant compliance and administrative costs and will not be cost-effective (McLure, 2010). However, Dong and Walley (2012) consider that, while a CBAM has a positive effect on carbon leakage by reducing the imports with carbon content of committed countries, the negative effect is that countries that are not committed to such a mechanism will see their imports soar.

2.3 Key Takeaways for a Carbon Border Adjustment Mechanism to Be Compatible with the Regulatory Conduct of WTO

European Union decision makers expressed commitment that the framework of the CBAM will be created considering the regulatory framework of the international trading system. According to GATT (1970), a border adjustment mechanism regards "*any fiscal measures which put into effect, in whole or in part, the destination principle*".

The reference articles setting out the implementation framework for the border tax adjustments, according to GATT (1970), are Articles II and III for imports and Article XVI for exports, mentioning that other relevant articles include the

regulations of Articles I, VI and VII. This means that border tax adjustments are used to help balance national tax differences in order to level the fiscal playing field (Regina et al. 2008). Therefore, it is worth highlighting that, in order to be compatible with the WTO rules, a border adjustment mechanism must be applied in the same manner for similar domestic and imported products (Cendra, 2006), meaning that foreign goods must be treated no less favourably than comparable domestic goods (Monjon and Quirion, 2011), taking into account the principle of general most favoured nation treatment. In order to design a comprehensive CBAM framework, in 2020 EC launched a public consultation, emphasising the scope of the CBAM: taxing imports will reflect their carbon content in an accurate way and will curb the risk of carbon leakage, while the CBAM will act as an alternative system for the one of the ETS allowances granted today to energy-intensive producers given the rising costs of the power used in production due to the CO_2 ETS certificates price increases (European Commission, 2020). If maintained, this approach suggested by the EC raises some debatable topics. Due to the fact that the fiscal measures are not collected at the frontier, GATT mentions that it should be used the notion of "tax adjustments applied to goods entering into international trade" (General Agreement on Tariffs and Trade, 1970).

Relative to the current multilateral trade conduct, this attitude means that CBAM might not apply at the upstream level because, it might violate the principle of territoriality. CBAM might be applied at the downstream level, which means that imports of fossil energy carriers will not fall under the CBAM but, instead, the imported products obtained using oil, coal or natural gas will be charged for their carbon content. Another already fierce debate will arise regarding whether power imports will be treated as a good or as a service. EU Economy Commissioner Paolo Gentiloni said that electricity imports should be subject to any such mechanism (Hall, 2020). However, a working paper published by the experts from the WTO highlights the ambivalent manner in which power falls under the international trade rules. One might say that, due to its specificity and its dependence upon grids, power is less a good and more a service, or at least a combination between both. Some authors (Cottier et al., 2010) emphasise that the lack of a clear definition of energy in terms of goods and services, services relating to energy are not properly defined under the General Agreement of Trade in Services (GATS). For example, under the EU-ETS system, it is not the electricity per se that falls under the regulations, but the stationary production capacities based on coal, natural gas or heavy oil are the ones that must buy ETS certificates.

Regarding the arguments that support the need to implement a CBAM, there is a difference of approach between the European Commission and the European Parliament. While the Commission highlights the issue of carbon leakage, the European Parliament highlights the need to protect the environment, citing Article XX of the GATT (Geier, 2020). A similar approach can be found in a resolution approved by the EP in regard to the need of having a WTO-compatible EU carbon border adjustment mechanism. The text of this resolution states that "*EU had substantially reduced its domestic GHG emissions, the GHG emissions embedded*

in imports to the EU have been constantly rising, thereby undermining the Union's efforts to reduce its global GHG footprint" (European Parliament, 2021). However, invoking environmental aspects to target the carbon leakage problem is questioned in the literature, because Article XX cannot be invoked to offset competitive disadvantages for domestic industry (Monjon and Quirion, 2011). Moreover, Article 3.5 of the United Nations Framework Convention on Climate Change (1992) also states that measures taken to fight the climate change effects should not disguise restrictions on international trade.

3. Research Questions/Aims of the Research

The hypothesis from which the author started in this study was that there is a correlation between the electricity prices, CO_2 emissions and the price of ETS certificates. As the price of ETS certificates increased rapidly between 2018 and 2020, the dynamics of these correlations began to fundamentally influence the competitiveness of some EU key heavy industry, which led decision makers to propose the introduction of a CBAM. In this landscape, one of the impacted economic sectors is the aluminium production. Thus, the questions from which the author started to conduct the research are:

1. How much does the electricity price in the production cost weight?
2. What measures have been taken to alleviate the rising electricity prices?
3. How can the CBAM ensure a balance between the climate agenda and the competitiveness objectives of the European producers if this mechanism depends on the constant increase of ETS prices and on the reduction of the number of free allowances for direct and indirect emissions?

4. Research Methods

The author used open coding in Atlast.ti – a machine learning programme – to conduct a quantitative analysis of the content published by five EU aluminium producing companies in their financial reports. The selected companies are Alro (Romania - Eastern Europe), Amag (Austria - Central Europe), Impol (Poland - Central Europe), Constellium (France - Western Europe) and Trimet (Germany - Western Europe). The monitored period was 2018-2020.

The aim of this quantitative analysis was to evaluate how companies relate to the increase of the electricity prices, respectively of the ETS certificates, and what the decisions were taken in order to mitigate these market effects. The author used for open coding the following keywords: 1. Energy efficiency; 2. CO_2 emissions; 3. Solar; 4. Wind; 5. Hydropower; 6. Coal; 7. Natural gas; 8. Market context. Based on the findings, the author made a concept mapping for a graphical representation of the identified concepts. Based on the quantitative analysis and starting from the hypothesis that the border carbon adjustment mechanism will be applied to imported products in the same way ETS works in the internal market, the author proposed a formula to measure the effectiveness of CBAM.

5. Findings

Following the quantitative analysis, the author identified several answers addressed in the beginning of the research.

Regarding the share in the operational costs of the price of purchased electricity, it seems that it can reach up to 40%. The most exposed European companies to power price fluctuations seem to be those that purchase electricity from the day ahead market and operate in regions where the energy mix also includes coal production, as is the case of Romania.

These companies will be the most impacted by the rising ETS prices, a necessary requirement for CBAM to be effective in shifting the trend from imports of high to low-carbon products.

With regard to the measures taken to combat rising electricity prices, the monitored companies have taken or benefited from several measures:

- One of them was included in the support scheme provided by the European Commission to benefit from up to 75% of the free allowances related to the acquisition of ETS certificates for indirect emissions.
- Some of them have built their own electricity production capacities using solar energy to power aluminium production processes.
- Some of them purchase mainly green energy from the market, using forward contracts, while others benefit from fixed price commitments specified in long-term contracts.
- All of them have implemented energy efficiency solutions to reduce energy consumption.
- Some of them digitized their operations and invested in R&D.

Based on the findings, the author made a concept mapping to graphically illustrate the importance of the measures taken by the EU companies to protect their competitiveness and the effectiveness of these measures (Figure 1).

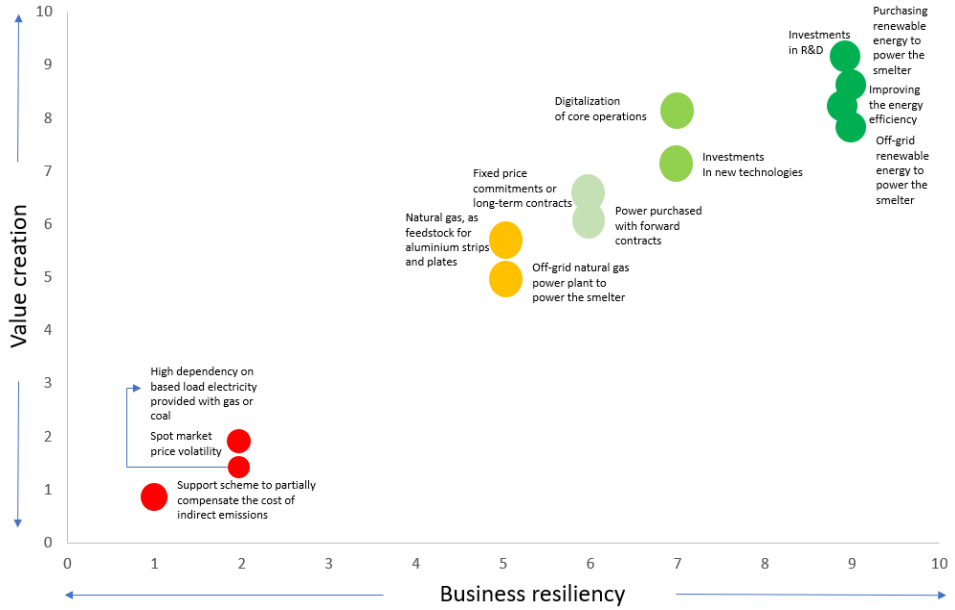
In order for CBAM to ensure the same level of playing field between EU aluminium producers and non-EU companies that sell in the European single market aluminium products with a high degree of carbon content, the price of ETS certificates needs to rise. However, to be effective, the CBAM must meet two objectives: 1. achieving the goals of the climate agenda and 2. protecting the competitiveness of EU producers.

In this regard, the author developed a calculation formula by which the effectiveness of CBAM can be tested.

$$CBAM\ x\frac{(DCO2e + ICO2e)}{Qh} \geq ETS\ x\frac{(DCO2e + ICO2e)}{Qh}$$

where:
CBAM = ETS
DCO2e = direct CO2 emissions
ICO2e = indirect CO2 emissions
Qh = number of hours of production cycles per ton of production

Figure 1. Concept mapping to illustrate the measures taken by the EU aluminium producers to mitigate the rise of electricity and ETS prices



Source: Author's own compilation.

6. Conclusions

The present research is limited to analysing the performance of only five companies in a single heavy industry production sector. The author intends to expand this research in the near future to capture all production sectors covered by the ETS and to include a significantly larger number of companies.

In the present research, the author wanted to capture the link between competitiveness and rising electricity prices, directly influenced in some areas by rising carbon prices, and the measures taken by companies to protect themselves against this phenomenon.

In theory, CBAM has two objectives: to persuade aluminium producers to use low or zero carbon energy sources during the production process and to preserve the competitiveness of EU aluminium producers. In order for CBAM to be effective in achieving the first objective, in a comparative view, the threshold of ETS certificates should substantially exceed the current level, in order to stimulate both European and non-European producers to become more efficient and use a zero-carbon source of energy during production.

Regarding the second objective, the production cost, which is influenced by the rising prices of ETS certificates, it will have to increase at least more slowly in the case of the EU producers compared with their non-EU competitors.

In the power market, both European and Chinese, there is a combination of two major technologies, one based on fossil resources and the other on zero-carbon

energy resources. On a free market, renewables (solar and wind) have zero marginal costs, while coal, nuclear and gas have positive marginal costs, reflected in the purchase price of the fuel. However, when renewable energy does not have a high penetration into the power mix, the market price signal is given by the marginal cost of the fossil fuel-based power. If the price of ETS increases and the fossil fuel power production retains its role to ensure the balance between supply and demand, the price of the other energy sources will increase as well, aligning with the price of coal and/or natural gas. As there is currently not a commercially available zero-carbon electricity storage solution (green hydrogen or zero-emission battery storage), the price of power will be influenced by the evolution of ETS price, which will be reflected in the production cost of the EU aluminium producers that are connected to the grid, due to a higher price for the amount of electricity purchased.

For example, while in 2018 the price on the European power market for non-household consumers was EUR 152 / MWh (Eurostat, 2018), in China, the lowest price for coal-based power was recorded in Xinjiang Province (EUR 27.41/MWh), while the highest price was recorded in Hunan (EUR 58.48/MWh). The average yearly price for power, in China, was EUR 43.85 /MWh (S&P Global Platts, 2019). China's aluminium production capacity is located in the regions of Xinjiang, Qinghai, Gansu, Heinan and Shandong, very close to power coal-based production. Many of the smelters are integrated with coal-fired generation power plants, not being fed from the grid, which means that the price paid is not even close to the one set by the free market mechanisms in Europe and represents, in the best case scenario, a technological cost. European production, during the production process of primary aluminium, uses mainly hydropower energy, bought from the free market, and uses natural gas in order to fuel the process of obtaining superior aluminium products. For the EU producers, the solutions to mitigate the power price increases are the related to investments in creating their own zero-carbon electricity generation capacities, in order to be as little as possible reliant from the power grid and to increase the energy efficiency of the smelters (World Aluminium, 2020) in a much more rapid pace compared to their non-EU competitors.

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