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La Lettre du CEPII

Brussels and Washington realigned on climate

Cecilia Bellora & Lionel Fontagné*

On March 10, 2021, the European Parliament adopted a resolution on the border carbon adjustment mechanism that the European Commission committed to setting up. How would this adjustment work and what would be its consequences? By reducing the incentive to displace production of high-emitting products to countries with little or no carbon tax, the carbon adjustment mechanism would reduce "carbon leakage" but increase the price of carbon in the European Union (EU). Therefore, European industries that use as inputs goods subject either to the carbon tax or to the carbon adjustment are at risk of a loss of competitiveness. However, the main challenge in addressing climate change is the participation of the major emitting countries in the effort to abate greenhouse-gas emissions. While the European mechanism could help the EU in strengthening its emission-reduction targets, it is above all the compliance of the United States with the commitments made in the Paris Agreement that will make it possible to save one year's worth of global emissions by 2035, pending a more concrete commitment from China.

The European Commission, as part of its Green Deal for Europe, has strengthened its climate commitments to reduce the EU's greenhouse-gas (GHG) emissions by 55% in 2030 compared to 1990, and to become carbon-neutral by 2050.[1] To this end, in September 2020, it announced its intention to complement the European carbon market, set up in 2005, with a carbon border adjustment mechanism (CBAM). The European Parliament adopted a resolution on this subject in early March 2021, and the mechanism is expected to be finalized in the coming months. It aims to impose a carbon price on imported products whose carbon content has not been taxed by the exporting country. At the time the European Commission first announced this mechanism, the Trump administration withdrew the US from the Paris Agreement. What will be the consequences for global emissions of the return of the United States to the agreement, decided by President Joe Biden, and what will be the effects of the CBAM in this new context?

Climate change is a global problem: even an ambitious European policy cannot solve it alone

In the absence of international coordination, the tension between ambitious commitments to reduce global GHG emissions and support for an open multilateral trading system is becoming a major issue for economic policies. The challenge is to make GHG taxation acceptable to citizens and bearable by business. In the long term, the benefits of reducing GHGs are immense for each country, but none has sufficient individual incentives to act in the right direction. The climate is a global public good. Its preservation justifies a global policy. For various reasons, this is currently out of reach.[2] Therefore, in the absence of a coordinated international approach, the central tool of European policy is an emission trading scheme (ETS).[3] EU member states and a few other countries[4] participate in this market;

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1. European Commission (2019). The European Green Deal.
2. For more details, refer to the briefing for the European Parliament: Bellora, C., & Fontagné, L. (2020). Possible carbon adjustment policies: An overview. *Rapport d'étude CEPII* (1).
3. The ETS covers the emissions of the following GHGs: carbon dioxide (CO_2), nitrous oxide (N2O) and fluorocarbons (PFCs). For the sake of simplicity, we refer to "carbon tax".
4. Norway, Liechtenstein and Iceland participate in the ETS. The UK left it following Brexit.

it covers the emissions of more than 10,000 industrial installations (steel industry, cement industry, fossil-fuel electricity generation, airlines within the European area), which are responsible for 40% of European emissions.[5] An emission cap, decreasing over time, is set to reach the EU target; industries receive or buy emission allowances up to this cap, which they can trade on the market thus created.

Unfortunately, a European policy cannot solve a global problem, even if highly ambitious. The EU accounts for less than 10% of global emissions (3.6 Gt CO_2eq in 2020), while the inaction of countries not committed to reducing their GHG emissions reduces the effectiveness of its policy, due to carbon leakage. This leakage can be direct, when the GHG-intensive production moves to countries where the climatic constraint is milder or even absent; or indirect, because in the presence of a carbon tax EU member states reduce their demand for fossil energy, which leads to a drop in energy prices on international markets and an increase in demand by non-constrained countries.

In this context, what would be the effects of a taxation mechanism aimed at neutralizing the environmental and economic impacts caused by the differences in carbon prices between countries? Given that the key factor to mitigate climate change remains the participation of high-emitting countries, how does the return of the United States to the Paris Agreement change the situation?

The CBAM *modus operandi*

The tool chosen by the European Commission, to be added to the ETS, aims to compensate for the difference between the carbon price applied to imported products and the one applied to European products. At this stage, based on the Commission's announcements and an initial report by the European Parliament,[6] a *modus operandi* is emerging: the approach would consist of taxing imported products covered by the ETS on their direct and indirect carbon content (i.e. on all upstream stages, particularly energy production), as revealed by European producers, to the extent of the difference between the price of carbon in the exporting country (at the end of the value chain) and that in the EU.

However, several questions remain. First, how should the revenue from the border adjustment be used? The environmental exception under World Trade Organization (WTO) rules probably does not allow the revenues generated to be used to fund the EU budget indiscriminately. These funds should be directed towards financing decarbonization projects in the EU or, more effectively but politically difficult, in developing countries. Second, should the European exporters be compensated for the carbon tax they pay? They are indeed competing on third markets with products that are not, or only slightly, taxed. However, rebating to them the cost of the allowances they had to acquire on the ETS would remove the incentive to reduce the emissions generated by exported production.

Quantifying the economic and environmental impacts of the European CBAM

To assess the expected consequences of the European CBAM – with and without restitution to exporters and, above all, with or without the presence of the United States in the Paris Agreement – we use CEPII's MIRAGE-e computable general equilibrium model.[7] This model, by accounting for the interconnection between markets and sectors, makes it possible to evaluate leakage effects, to trace the carbon emitted along value chains, and to transform GHG emission cap constraints into carbon prices.

In the baseline situation we consider, the EU meets its commitments under the Paris Agreement and complements the EU ETS by taxing emissions from non-covered domestic activities, so that its total GHG emission reduction commitments are met. On this basis, several CBAM scenarios are analyzed.

First, we consider the implementation of a European CBAM, assuming that the United States is absent from the Paris Agreement. The European mechanism here takes the form of a border tax (and not the acquisition of allowances on the ETS market by importers, for the sake of operational simplicity), applied to the products covered by the ETS. The carbon content considered for taxation is the average European content, and not that of the exporting countries. This avoids the different tax bases among the EU's trading partners and thus makes the system "WTO-compatible".[8] The tax rate is calculated as the difference between the ETS carbon price and the carbon price applied in the exporting country (equal to zero in the absence of carbon taxation).[9] The revenues of the tax are not earmarked, as foreseen in the initial proposal of the European Commission.

In a second scenario, we consider a rebate to companies operating in the EU of the value of the emission allowances they have acquired in the ETS for the production they export,[10] with the US still outside the Paris Agreement. More precisely, the rebate covers only 50% of the value of the allowances, to maintain an incentive to reduce emissions. While such a scenario contradicts the polluter pays principle sought by the ETS, it has the advantage of revealing the effects the rebate has in the various sectors of the economy. A third scenario combines this rebate with the CBAM.

5. The remaining 60% are also covered by European commitments, but their reduction must be achieved through other taxation or incentive mechanisms.
6. European Parliament (2021). Towards a WTO-compatible EU carbon border adjustment mechanism. At the time of writing, the content of the resolution adopted on March 10 by the European Parliament was not publicly available.
7. Dynamic and multisectoral model, calibrated on the GTAP9 database (base year 2011). The simulated policies are implemented in 2020. The simulation horizon is 2035. The trajectory of the projected world economy is consistent with that produced by the CEPII's MAGE model (Econmap database).
8. For this reason of compatibility with the WTO, we consider that there will no longer be any free distribution of carbon credits within the ETS, even if this seems to be coming back into the discussion between European bodies.
9. If the exporter's carbon price is higher than the ETS price, the CBAM does not concern its products.
10. In our simulations, this refund is not applied to electricity producers for reasons inherent to the data used. Furthermore, EU electricity exports to the rest of the world are minimal, except to the UK.

The CBAM changes the conditions of competition and hits downstream sectors in Europe

In the long term, what would have been the environmental and economic consequences of implementing a CBAM in the absence of the United States in the Paris Agreement? This is not an abstract question: this situation prevailed when the CBAM was announced by the European Commission and when it was first examined by the European Parliament.

By definition, the CBAM has no impact on European emissions: they are already capped; compliance with the cap is ensured by the ETS and by complementary measures for sectors not covered by the ETS. The impact of the CBAM on US GHG emissions is negligible. The US is a large country and its exports to the EU represent only a very small share of its production. All in all, global emissions fall marginally.

On the other hand, the CBAM has visible effects on EU trade. US exports to the European market fall by 0.8%, those from India by 0.9% and those from sub-Saharan Africa, which is not committed to the Paris Agreement, by 0.6%.[11] The CBAM modifies the relative prices of European imports. Exporters with a more restrictive climate policy are less affected by the mechanism than their competitors, and increase their exports to the EU. This is the case for Japan and Canada, whose exports increase by 0.8% and 0.7% respectively. China, which is opposed to the European mechanism, is not affected however – not because of its climate policy, but because of a composition effect: losses on products covered by the CBAM are offset by gains in exports to the EU in other sectors. The conditions of competition are eventually affected. Chinese products outside the scope of the ETS incorporate carbon-based intermediate consumption (for example, the automotive industry uses steel, which is not taxed if it is of Chinese origin) but are not themselves targeted by the CBAM, whereas competing European products pay a higher price for their intermediate consumption (carbon tax on European steel due to the ETS or CBAM on imported Chinese steel) and therefore become less competitive.

Contrary to its objective of restoring a level playing-field between partners, the CBAM reduces European exports by 1.5%, due to the increase in the cost of intermediate consumptions that are imported (direct effect of the CBAM) and the increase in the price of the carbon emission allowances (+12.6%) for those produced in the EU. Ultimately, European consumers pay more for products with a high carbon content, and total consumption falls by 0.2% in volume.

To restore a level playing-field with their competitors on third markets, European exporters could benefit from a rebate – up to 50% in the case we consider – of the value of the ETS allowances. In third markets where producers are taxed by local policies for the carbon they emit without benefiting from a local CBAM, this would even give European exporters a competitive advantage. To understand the mechanisms at work, we begin by analyzing the impacts of a partial rebate, without a CBAM. This policy would lead to an increase in European exports by 4% (other energy-intensive manufactured products +25%, chemicals +20% and metals +19%). This refund is tantamount to an export subsidy for carbon products, while emissions are capped because of the commitments taken under the Paris Agreement. Therefore, to maintain emissions at their cap level, the price of carbon must increase in the ETS (+4%). As a result of this increase, European industries not covered by the EU ETS, and located downstream of the sectors benefiting from the subsidy, see the cost of their carbon-intensive intermediate inputs increase, without benefiting from the rebate, and hence a drop in their exports (in particular -3% for the main exported sectors, i.e. other manufactured products, vehicles and textiles). The rebate – despite the absence of visible impact in terms of GDP – is therefore neither environmentally nor economically effective.

In a scenario where the CBAM is combined with a partial rebate, EU exports, which fell by 1.5% when only the CBAM was implemented, fall by only 0.1%, the effect of the subsidy offsetting the loss in competitiveness. The macroeconomic effect of the combination of these two distortions, a tax and a subsidy, is negative, with a fall by 0.1% in EU GDP in 2035, the CBAM causing most of this fall. But in the end, this policy does not (by definition) reduce European emissions and only marginally affects global emissions (-0.4%).

The return of the United States to the Paris Agreement

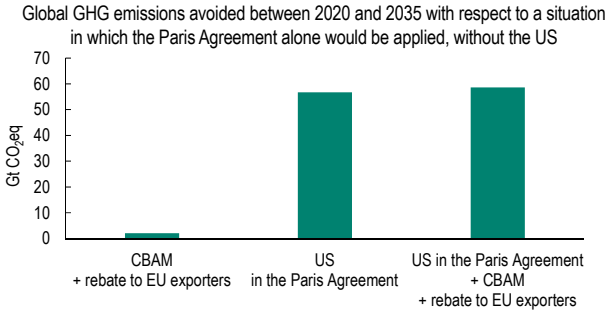
What difference does the return of the US to the Paris Agreement make? To answer this question, we examine both the results of the scenario in which only the Paris Agreement is implemented, and the results of the scenario in which the EU introduces a CBAM combining a tax and a rebate with the US back in the Paris Agreement.[12]

The impact of the EU policy on global GHG emissions is unchanged by the presence of the US in the Paris Agreement (-0.4%). The negative impact on European GDP due to distortions is also unchanged (-0.1%), as the presence of the US only marginally affects the mechanisms described above.

The fundamental change is in the overall level of emissions as well as direct and indirect carbon leakages at the global level. Cumulatively, between 2020 and 2035, US commitments under the Paris Agreement avoid 57 Gt CO_2eq (Figure 1), corresponding to about one year of global emissions (in 2018, they were 55 Gt). Compliance by the US with its commitments is equally critical for carbon leakage (Table 1). Without this commitment, leakage to the US (accumulated between the implementation of the CBAM and 2035) would have amounted to 3,563 Mt CO_2eq, or almost one year

11. In particular for metals, gas, coal, chemicals and other energy-intensive manufactures, but the decline never exceeds 5% in these sectors. These are the variations with respect to a baseline without CBAM, in 2035, in volume (i.e. excluding any price effect).
12. We assume here that the US rejoins the Paris Agreement on the basis of its original commitments. Its new commitments will not be known until 22 April 2021.

Figure 1 – The return of the United States to the Paris Agreement is key to abating global emissions



Notes: CBAM: Carbon border carbon adjustment mechanism. In the scenarios mentioning "Rebate to EU exporters", EU exporters benefit from a rebate on the emission allowances they have bought on the EU ETS, worth 50% of the value of the allowances needed to produce the exported good.

Source: Authors' calculations based on MIRAGE-e simulations.

Table 1 – Global GHG leakage under different scenarios

Climate policy	GHG leakage ($MtCO_2eq$)		Variation in GHG leakage (%)*	
	Leakage to			
	countries other than the US	the US	countries other than the US	the US
United States not in the Paris Agreement				
Implementation of the Paris Agreement	10 808	3 563		
Paris Agreement + CBAM	8 994	3 538	-17	-1
Paris Agreement + rebate to EU exporters	10 754	3 549	0	0
Paris Agreement + CBAM + rebate to EU exporters	8 854	3 524	-18	-1
United States in the Paris Agreement				
Implementation of the Paris Agreement	11 464			
Paris Agreement + CBAM	9 687		-16	
Paris Agreement + rebate to EU exporters	11 408		0	
Paris Agreement + CBAM + rebate to EU exporters	9 548		-17	

* Compared to the scenario where the Paris Agreement alone is implemented.

Notes : When the US does not participate in the Paris Agreement, fulfilling the commitments taken under the agreement causes an estimated cumulative leakage of 10,808 Mt CO_2eq by 2035 in countries without climate policy and 3,563 Mt CO_2eq in the US. Implementing a CBAM reduces leakage by 17% in countries without climate policies and by 1% in the US.

Source : Authors' calculations, based on MIRAGE-e simulations.

of EU emissions. To this must be added the equivalent of three more years of leakage from other non-signatory states.

With the United States back in the Paris Agreement, a significant part of the leakage therefore *de facto* disappears, even if the leakage to the countries that remain outside the agreement increases by 6%. This latter increase is due to the participation of an additional large country in the effort to abate emissions, with the consequence of a more pronounced drop in the price of carbon energies for the countries that do not tax GES emissions.

Without the United States in the Paris Agreement, the CBAM with rebate would reduce leakage to 12,378 Mt CO_2eq. The compliance of the United States with its Paris Agreement commitments alone brings leakage below this level (11,464 Mt CO_2eq). In addition, the effect of the European CBAM including a rebate will reduce leakage by a further 17%.

The European CBAM allows the EU to be more ambitious in reducing GHG emissions by protecting its producers of ETS goods from carbon-intensive imports. The economic cost of this policy is limited for the EU, although it reduces the competitiveness of downstream industries. A rebate on carbon credits paid by exporters creates a distortion that increases the price of carbon for EU producers covered by the ETS. All downstream industries in turn see their competitiveness deteriorate, especially in the automotive sector. The return of the US to the Paris Agreement is good news for the EU, as it reduces the need for such refunds without increasing the cost of implementing the adjustment at the border; but it is especially good news for the world, as it substantially reduces global emissions. What matters most for climate protection is the contribution of high-emitting countries to the effort. As a consequence, the next two important steps would be the announcement of more ambitious commitments by the Biden administration to reduce US emissions, and the implementation of China's announcements regarding the carbon market.

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