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A Carbon Border Adjustment Mechanism for the European Union

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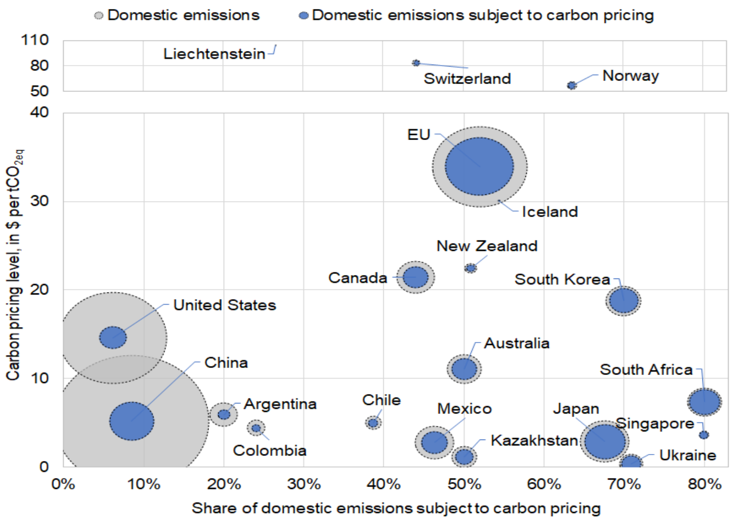
- To achieve carbon neutrality by 2050, the European Union (EU) recently raised its greenhouse gas emissions reduction target for 2030 and plans to strengthen its climate policy instruments, starting with its carbon pricing policy via the Emissions Trading System (EU ETS).
- As a result, the divergence with third countries level of carbon pricing (see graph) is expected to widen, posing an increased risk of carbon leakage for the EU. This phenomenon occurs when emissions in third countries increase after a country or region adopts more ambitious climate policies. This undermines the effectiveness of climate policies.
- *Ex ante* modelling estimate carbon leakage to be in the range of 5-30%: in other words, for every 10 tonnes of emission reductions in the country or region implementing more ambitious climate policies, emissions in the rest of the world increase by 0.5-3 tonnes. Whilst it has proven difficult to detect carbon leakage empirically at EU level, in part because of low carbon prices in the past, more recent data suggest that carbon leakage is already taking place.
- In June 2021, the European Commission will put forward its proposal for an EU carbon border adjustment mechanism (CBAM). Under this mechanism, EU carbon pricing would apply to imported goods in the same way as for emission-intensive goods produced in the EU. The aim is to tackle carbon leakage more effectively than existing instruments, within a framework compatible with World Trade Organisation (WTO) rules.
- The EU CBAM must address a number of legal, technical, economic and political challenges. France has put forward proposals on how to tackle these challenges, favouring a gradual approach based on a system of allowances that mirrors the EU ETS and which accounts for the climate policies and levels of development in third countries.

State of carbon pricing in 2020



Source: DG Trésor using World Bank data (2020). Carbon Pricing Dashboard.
Note: Carbon price levels and domestic emissions coverage are given as at 1 November 2020. For the EU, the ETS is included on a weighted basis, as well as carbon taxes in effect in Member States, including France. Carbon price levels and domestic emissions coverage for China, Canada, United States and Japan take account of local and regional initiatives.

1. The ambition of climate policies vary across countries

1.1 Important disparities exist in the ambition of short-term climate commitments

Under the Paris Agreement[1], almost all States have committed to limit the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue effort to limit the temperature increase to 1.5°C. To reach this target, carbon neutrality[2] must be attained in the second half of this century. At present, almost 130 economies have officially adopted, announced, or are envisaging, carbon neutrality as a target.[3] However, current trends for greenhouse gas emissions continue to be at odds with this long-term ambition (see Box 1).

At present, national emissions reduction strategies fall short of the stated global ambition.[4] According to the United Nations Environment Programme (UNEP), all combined short- and medium-term efforts to be voluntarily undertaken by economies towards their Nationally Determined Contribution (NDC) are considered wholly inadequate towards achieving targets set under the Paris Agreement, and may result in a temperature increase of at least 3°C by the end of the century,[5] leading to significant adverse effects.[6]

In response, a number of countries and regions have recently raised their targets and introduced new climate policies. Following the European Green Deal put forward by the European Commission in December 2019,[7] the EU has revised its net greenhouse gas emissions target for 2030 to 55% below 1990 levels, up from 40%.[8] The new target sets Europe on course for carbon neutrality by 2050,[9] in line with the EU's commitments under the Paris Agreement.

Box 1: Domestic emissions and carbon footprint vary greatly across countries

The five largest emitters, namely China (26%), the United States (13%), the EU (9%, including the United Kingdom), India (7%) and Russia (5%) together accounted for over 60% of global emissions over the period 2010-2019.[a] Changes in domestic emissions varied widely over the period 1990-2019: whilst they fell by approximately 25% in the EU, they increased by 8% in the United States and more than tripled in China.

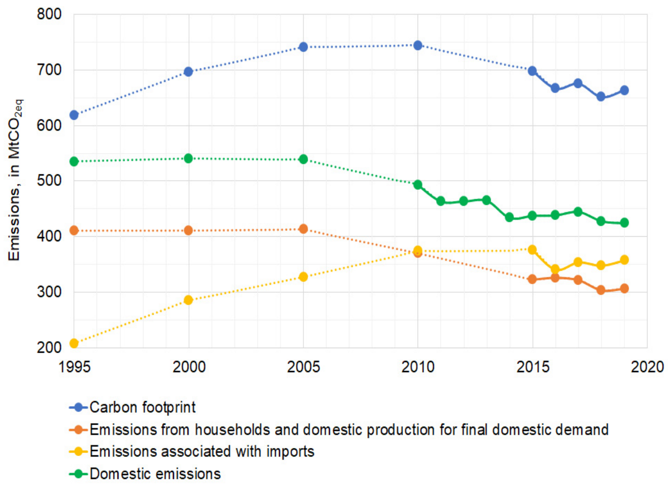
The standard metric of a country's domestic emissions (*i.e.* emissions from households and domestic production) does not include emissions associated with imported goods. However, fragmented value chains and the growth of international trade – now twice its 2000 level[b] – have resulted in increasing numbers of goods being partly or entirely produced in other countries. Most developed economies, including the EU, are net importers of emissions, mostly from developing countries.[c]

a. United Nations Environment Programme (2020), *Op. cit*. See also Secretariat of the United Nations Framework Convention on Climate Change (2021), Nationally determined contributions under the Paris Agreement.
b. World Trade Organization (2020). *International trade and market access data*.
c. Yamano N. et J. Guilhoto (2020), "CO_2 emissions embodied in international trade and domestic final demand: Methodology and results using the OECD Inter-Country Input-Output Database", OECD Science, *Technology and Industry Working Papers*, 2020(11), 1-57.

(1) The Paris Agreement was adopted on 23 December 2015 following the Paris Climate Change Conference (COP21) and entered into force on 4 November 2016. It has so far been ratified by 190 states (including France) and the European Union.
(2) Carbon neutrality, or net zero emissions, represents the state of equilibrium between anthropogenic greenhouse gas emissions, *i.e.* emissions arising from human activity, and the absorption of these emissions by natural (*e.g.* forests, oceans and soils) and artificial (*e.g.* carbon capture and storage technologies) carbon sinks.
(3) United Nations Environment Programme (2020), *2020 report on the divergence between the required and forecast level of reductions in emissions*.
(4) Stephenson, S. R., Oculi, N., Bauer, A., & Carhuayano, S. (2019), Convergence and divergence of UNFCCC nationally determined contributions. Annals of the American Association of Geographers, 109(4), 1240-1261.
(5) United Nations Environment Programme (2020), *Op. cit.*
(6) Carantino B., Lancesseur N., Nakaa M. et M. Valdenaire (2020), "The economic impact of climate change", *Trésor-Economics* no. 262.
(7) European Commission Communication COM (2019) 640 final: The European Green Deal, 11 December 2019.
(8) European Council conclusions, 10-11 December 2020.
(9) Target enshrined in the proposed *European Climate Law*, approved by the European Parliament on 14 March 2019 and by the European Council in its conclusions of 12-13 December 2019.

Measuring the carbon footprint allows to take account of this development. The carbon footprint of a country or region corresponds to all emissions from final domestic demand, excluding emissions associated with exports. Between 1995 and 2015, the EU's carbon footprint fell more slowly than domestic emissions (–8% and –13% respectively), mostly due to the increase in emissions linked to imports (27%).[d] Although domestic emissions in France fell by about 20% between 1995 and 2019, carbon footprint grew by 7% over the same period, owing to the 72% increase in emissions from imports. In 2010, emissions associated with imports overtook emissions from households and domestic production for final domestic demand (see Figure 1).[e]

Chart 1: Carbon footprint and domestic emissions in France, and their components



Source: DG Trésor using data from Commissariat Général au Développement Durable (2020). Chiffres clés du climat France, Europe et Monde - Édition 2021.

Note: Emissions and carbon footprint relate to the three main greenhouse gases, namely carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Dotted lines give an indicative straight-line trajectory between measurement points.

d. Wood R., Neuhoff K., Moran D., Simas M., Grubb M. et K. Stadler (2020), "The structure, drivers and policy implications of the European carbon footprint", *Climate Policy*, 20(sup1), S39-S57.

e. High Council on Climate (2020), *Tackling France's carbon footprint*.

1.2 In practice, climate policies differ considerably among countries

Climate policies vary greatly between countries, underlined by differences in the coverage and levels of carbon prices. Carbon pricing aims to integrate negative externalities from greenhouse gas emissions into the decision-making of economic agents and create incentives to invest in the decarbonisation of economic activity.

At present, there are around 60 carbon pricing initiatives covering emitting activities. Together, these initiatives cover 22% of global emissions[10], through carbon taxes or emissions trading schemes (ETS).[11] More than three-quarters of global emissions are not therefore subject to carbon pricing. Furthermore, significant disparities exist between countries in terms of domestic emissions coverage and carbon price levels. Prices ranged from $1 to $123 per tCO_{2eq} in 2020 and over 75% of covered emissions are priced below $10 per tCO_{2eq}[12] despite carbon prices ranging between $40 and $80 per tCO_{2eq} in 2020 and $50 and $100 per tCO_{2eq} by 2030 are needed to meet objectives under the Paris Agreement.[13]

To date, the EU is one of the few economies having a carbon price level coherent with this path. In 2005, the EU launched its ETS that covers around 45% of its domestic emissions, from 11,000 energy-intensive industrial installations and power plants, as well as a portion of the aviation sector (intra-European flights). Between 2005 and 2019, the EU ETS has contributed to a 35% reduction in emissions from the sectors

(10) World Bank (2020), *State and Trends of Carbon Pricing 2020*.

(11) A carbon tax is a price-based instrument. It sets a price for one tonne of greenhouse gas emissions, which is payable at the time of production or consumption of the products subject to the tax. As a result, it reduces emissions associated with these products based on the sensitivity of demand to changes in price (*i.e.* the price elasticity of demand). On the other hand, an ETS is a quantity-based instrument relying on the cap-and-trade principle. It sets a cap on the level of emissions by installations covered by the instrument. This cap is gradually reduced over time in order to limit total potential greenhouse gas emissions and this instrument therefore ensures emission reductions in line with a set pathway. Within the cap, participants covered by an ETS receive or purchase emission allowances that they can trade with each other. Emission allowances must then be surrendered in numbers consistent with their verified emissions. Under an ETS, the carbon price is determined by a market dynamic of of supply and demand which, in theory, ensures cost-effective emission reductions.

(12) Institute for Climate Economics (2020), *Global Carbon Account in 2020*.

(13) Carbon Pricing Leadership Coalition (2017), *Report of the High-Level Commission on Carbon Prices*.

covered.[14] Although the price of emission allowances passed the symbolic €40 per tCO_{2eq} mark in February 2021, the EU is preparing to strengthen the ETS to reach its new climate target for 2030. This will be accompanied by a review of Member States' targets for reducing emissions in non-ETS sectors. Within this framework, France has also implemented carbon pricing, incorporated in the price of some fossil fuels.[15]

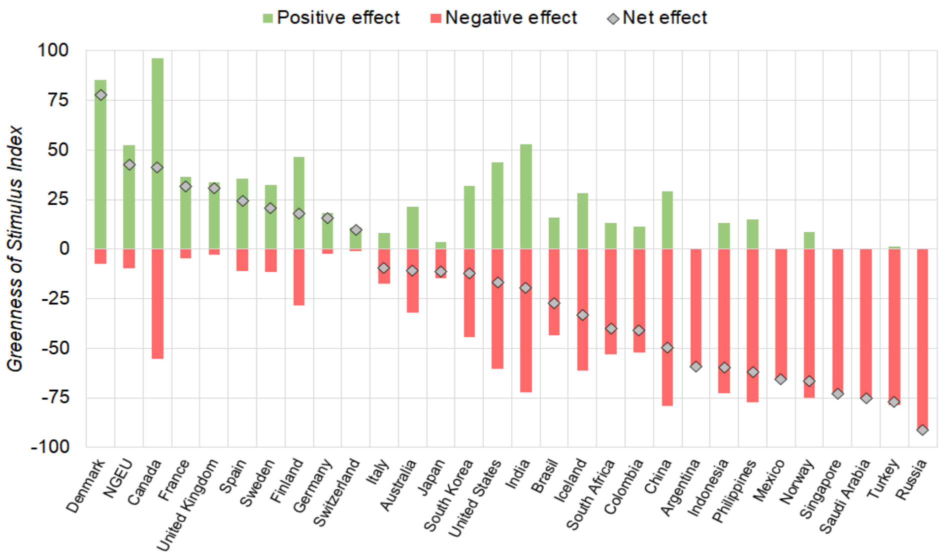
The recovery plans deployed in the wake of the Covid-19 pandemic also reflect the divergence in climate ambition among countries (see Box 2).

Box 2: The different levels of climate ambition in economic recovery plans

The economic crisis and lockdown measures implemented during the Covid-19 pandemic led to a short-term reduction in global CO_2 emissions in 2020 of approximately 7% from their 2019 levels, much greater than the decline seen during the last financial crisis (estimated reduction of 1.2%).[a] The fall in global emissions risks being partly or fully offset by any rebound effect produced when emerging from the crisis. In this lies the rationale for recovery measures that accelerate the structural transition to a low-carbon economy.

The EU and in particular France have allocated a significant proportion of their recovery plans to the greening of their economies. However, according to the International Monetary Fund, climate-friendly measures (*e.g.* building renovation and energy efficiency gains, support for renewable energies, etc.) remain limited in most other countries, with few environmental counterparts have been taken on climate-unfriendly measures (*e.g.* support for the aviation, automobile and fossil fuel sectors, etc.)[b] (see Figure 2).

Chart 2: Rating of recovery and support measures according to their effect on climate



Source: DG Trésor using data from Vivid Economics (2021). Greenness of Stimulus Index.
Note: The measures are those announced as of 1 February 2021. NGEU refers to the EU recovery plan *Next Generation EU*. The Greenness of Stimulus Index rates the performance of the world's leading economies in their efforts to stimulate a recovery that exploits opportunities for sustainable growth, notably by protecting the climate and biodiversity while strengthening the resilience of the economy. This index is constructed on the basis of a rating of the climate and environmental impact of the measures of the recovery plans and their associated amount, weighted by the share of the sector to which each measure belongs in the economy of the country. The negative effect identified for France corresponds to the postponement by one year of the reduced tariff on non-road diesel, which will take place on 1 July 2021.

a. United Nations Environment Programme (2020), *Op. cit.*; International Energy Agency (2020), *Global Energy Review: CO_2 Emissions in 2020 – Understanding the impacts of COVID-19 on global CO_2 emissions*.
b. International Monetary Fund (2020), *Fiscal Monitor: Policies for the Recovery*.

(14) European Environment Agency (2020), The EU Emissions Trading Scheme in 2020: trends and projections.
(15) From an initial level of €7 per tCO_2 at its inception in 2014, the carbon component, incorporated in taxes on fossil fuels (TICPE, TICGN and TICC) in proportion to the level of CO_2 emissions of the energy source in question, has been set at €44.60 per tCO_2 since 2018.

2. Carbon leakage undermines the effectiveness and social acceptance of the EU's climate policies

2.1 The concept of carbon leakage

The divergence in climate policies can result in negative externalities, known as "carbon leakage".[16] In practice, carbon leakage can take two forms.[17]

"Direct" carbon leakage occurs as a result of a reallocation of production capacity in response to more stringent climate policies in a country or region. This may cause, on the one hand, some economic agents to relocate their production (in particular through their investments abroad) to countries or regions with lower climate constraints and may result, on the other hand, in a loss of market share on domestic and third-country markets to the benefit of foreign producers subject to less stringent climate policies (and which are potentially more emission-intensive).

"Indirect" leakage reflects the impact of the reduction in the price of fossil fuels on international markets. All things being equal, this reduction is explained by a fall in demand for fossil fuels in countries or regions implementing more ambitious climate policies (aside from the aforementioned effect of reallocation of production). The reduction in the price of fossil fuels thus stimulates their consumption in countries and regions not subject to such climate constraints.

As a result of carbon leakage, the reduction in emissions in a country or region implementing more stringent climate policies is at least partly offset by the increase in emissions in countries or regions with more relaxed climate constraints, which reduces the effectiveness of ambitious climate policies and ultimately leads to a sub-optimal distribution of global emission reductions efforts.

The resultant decrease in output in sectors covered by ambitious climate policies induces in turn an increased dependence on imports that are potentially more emission-intensive, as well as job losses, which can undermine the social acceptance of measures implemented to transition towards a zero-carbon economy.

2.2 The risk of carbon leakage is increasing

There are two methods used to estimate the magnitude of carbon leakage: *ex ante* simulations from international trade models and *ex post* econometric analyses using empirical data (see Box 3).

Box 3: *Ex ante* and *ex post* models for estimating carbon leakage

Ex ante modelling evaluates the implementation of carbon pricing policies[a] in order to gauge their anticipated impact in comparison with counterfactuals. This usually involves the use of computable general equilibrium models. In these models, the economy is made up of various sectors and representative agents (*i.e.* consumers, producers, government), whose behaviour is based on cost-benefit analysis. This approach gives the aggregate effects on the economy, accounting for feedback effects and the knock-on effect on sectors not directly targeted. It also measures the magnitude of indirect carbon leakage.

Ex ante partial equilibrium models are also used in some instances. These focus on exposure to carbon leakage in specific sectors and the economic channels through which the competitiveness of sectors is affected. These models cannot capture indirect carbon leakage, or simulate general price adjustments.

a. In most *ex ante* analyses, the carbon price level results from the emission reductions target or the elasticity of substitution between production factors (linked to the abatement cost). The introduction of carbon pricing by a country or region is, however, an exogenous political decision.

(16) The concept of carbon leakage (also known as "pollution leakage" or "pollution haven hypothesis") emerged from research into the relationship between pollution and international trade, in the context of the North American Free Trade Agreement (NAFTA). See Antweiler, W., Copeland, B. R., & Taylor, M. S. (2001), Is free trade good for the environment?, *American Economic Review*, 91(4), 877-908; Kuik, O., & Gerlagh, R. (2003), Trade liberalization and carbon leakage, *The Energy Journal*, 24(3).

(17) Organisation for Economic Co-operation and Development (2020), *Climate Policy Leadership in an Interconnected World: What Role for Border Carbon Adjustments?*

Ex ante models are sensitive by nature to their underlying assumptions and to the calibration of parameters related to the implementation of climate policy targets, and/or the responses of third countries and third regions; caution must therefore be exercised when interpreting their outputs.[b]

A second approach consists of an *ex post* econometric analysis of carbon leakage using empirical data over a past period. One strand of *ex post* studies looks at the extent to which more ambitious climate policies may cause individual producers to reallocate their investment to countries or regions with less stringent climate policies. Another strand of studies uses a macroeconomic approach, which involves simulating the implementation of more ambitious climate policies to identify the carbon leakage linked to differences in the level of climate policy ambition in third countries and regions.

b. Reinaud, J. (2008), Issues behind competitiveness and carbon leakage, *Focus on Heavy Industry*, *Paris: IEA. IEA Information Paper*, 2.

Ex ante studies identify a significant risk of carbon leakage as a result of adopting more stringent climate policies – such as carbon pricing – by some of the most climate-ambitious countries and/or regions, in the absence of accompanying measures. Estimates give an effect of between 5% and 30%[18]: in other words, for every 10 tonnes of greenhouse gas emissions reduced in the country or region that adopts a more ambitious climate policy, emissions in the rest of the world increase by 0.5-3 tonnes.

Some *ex post* studies address air quality regulations and show, for example, that in the context of the *Clean Air Act Amendments* in the United States, the value of the foreign assets of US multinationals increased by almost 5%, and the value of their production abroad by 9%, between 1966 and 1999.[19] Another study highlights a transfer of emissions through international trade flows from countries committed to reducing emissions under the Kyoto Protocol to third countries. This implies a deteriorating carbon footprint for the former countries and the occurrence of carbon leakage.[20]

However, at EU level, *ex post* studies carried out in the early 2010s found little evidence of carbon leakage.[21] This can be explained by the fact that these studies focused solely on the first years of functioning of the EU ETS, a period characterised both by relatively low carbon prices, under €10 per tCO_{2eq} between 2011 and 2018,[22] as well as by a large-scale allocation of free emission allowances that limited the constraints faced by installations covered by the EU ETS.[23]

A more recent study that looked at more recent years of functioning of the EU ETS clearly highlighted the existence of carbon leakage.[24] This finding should be viewed in the context of an increased ambition for the EU ETS, particularly under Phase 3 (2013-2020). Between 2000 and 2018, the carbon content of imported products increased at a higher rate than that of equivalent European products from sectors covered by the EU ETS, which may indicate the occurrence of

(18) These results are reflected in the meta-analysis by Branger and Quirion (2014) of 25 studies and 310 estimates that give a range of 5-25% and the more recent literature review by Carbone and Rivers (2017) of 54 studies and 291 estimates that give a range of 10-30%. See Pachauri, R. K., & Reisinger, A. (Eds.) (2008), *Climate Change 2007: Synthesis Report*. Intergovernmental Panel on Climate Change (IPCC); Branger, F., & Quirion, P. (2014), Would border carbon adjustments prevent carbon leakage and heavy industry competitiveness losses? Insights from a meta-analysis of recent economic studies, *Ecological Economics*, 99, 29-39; Larch, M., & Wanner, J. (2014), *Carbon Tariffs: An Analysis of the Trade, Welfare and Emission Effects; Carbone*, J. C., & Rivers, N. (2017), The impacts of unilateral climate policy on competitiveness: evidence from computable general equilibrium models, *Review of Environmental Economics and Policy*, 11(1), 24-42.

(19) These results were confirmed using more recent data after Hanna, R. (2010), US environmental regulation and FDI: evidence from a panel of US-based multinational firms, *American Economic Journal: Applied Economics*, 2(3), 158-89. See Saussay A., & Zugravu-Soilita, N. (2020), International production chains and the pollution offshoring hypothesis: an empirical investigation (not yet published).

(20) Aichele, R., & Felbermayr, G. (2015), *Op. cit*.

(21) Dechezleprêtre, A., Gennaioli, C., Martin, R., Stoerk, T. & Muûls, M. (2014), Searching for carbon leaks in multinational companies. Grantham Research Institute on Climate Change and the Environment. Branger, F., Quirion, P., & Chevallier, J. (2016), Carbon leakage and competitiveness of cement and steel industries under the EU ETS: much ado about nothing, *The Energy Journal*, 37(3) ; Naegele, H., & Zaklan, A. (2019), Does the EU ETS cause carbon leakage in European manufacturing?, *Journal of Environmental Economics and Management*, 93, 125-147.

(22) Ember Climate (2021), *Carbon Price Viewer*.

(23) The following studies identify an over-allocation of free allowances due to relaxed benchmarks and the 2008-09 economic downturn that led to a fall in production and associated emissions by installations covered by the EU ETS, and therefore a resultant fall in the demand for allowances. See Edenhofer, O. (Ed.) (2015), *Climate Change 2014: Mitigation of Climate Change* (Vol. 3). Intergovernmental Panel on Climate Change (IPCC); Ellis, J., Nachtigall, D., & Venmans, F. (2019), *Carbon pricing and competitiveness: Are they at odds?*, Organisation for Economic Co-operation and Development (2020), *Op. cit*.

(24) Kuusi, T., Björklund, M., Kaitila, V., Kokko, K., Lehmus, M., Mehling, M. & Wang, M. (2020), *Carbon Border Adjustment Mechanisms and Their Economic Impact on Finland and the EU*, Publication of the Finnish Government's analysis, assessment and research activities.

indirect carbon leakage. The authors estimate the rate of carbon leakage to be 20%, suggesting that this phenomenon is already at significant levels and at risk of increasing further in light of the EU's more ambitious climate target for 2030.

3. An EU carbon border adjustment mechanism would address the risk of carbon leakage more effectively

3.1 Existing instruments are not sufficient to address the increasing risk of carbon leakage

Under the EU ETS, some sectors are already considered to be exposed to a risk of carbon leakage.[25] They are identified according to their emissions intensity, which reflects the cost of the EU ETS, and their exposure to international trade, which determines the potential cost of competitiveness losses on internal and third markets.[26] In this respect, steel and cement sectors (which together account for 45% of emissions from sectors at risk of carbon leakage)[27] as well as chemicals (including fertilisers), aluminium, refining, paper and glass sectors, are deemed at risk of carbon leakage. These sectors currently receive 100% of free allowances in order to face competition from foreign producers, which are not subject to the same level of carbon pricing than in the EU.[28]

The existing framework limits the EU's climate ambitions. Firstly, most emission-intensive products imported into the EU are not subject to carbon pricing at least equivalent to that of the EU. Producers of imported products thus do not have as strong incentives to reduce emissions as their European counterparts. Secondly, the allocation of free allowances mechanically reduces the impact of carbon pricing as the market price of allowances is not fully passed through to the price of emission-intensive European products. This reduces the incentive to decarbonise production processes in these sectors and to substitute them with less emission-intensive products. Furthermore, sectors at risk of carbon leakage that receive free allowances account for 94% of industrial emissions in Phase 4 of the EU ETS (2021-2030) and 35% of total emissions covered by the EU ETS in 2019.[29]

The allocation of free allowances has even been counterproductive in some respects in the past phases of the EU ETS. It may have led to overproduction in the most emission-intensive sectors,[30] as a result of over-allocation in the early phases of the EU ETS. In the past, the volume of free allowances received by sectors at risk of carbon leakage actually exceeded the level of their verified emissions.[31] A recent report by the European Court of Auditors indicated that in Phase 3 of the EU ETS (2013-2020), free allowances should have been better targeted to effectively provide incentives for recipient sectors to decarbonise.[32]

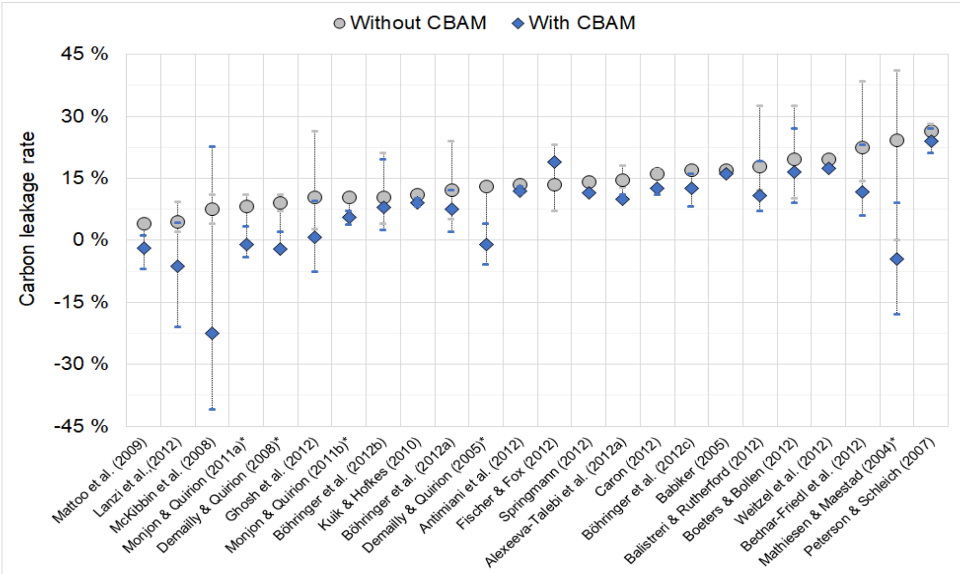
The rules for allocating free allowances in Phase 4 of the EU ETS (2021-2030) are now more stringent than in previous phases and will address a number of past inefficiencies. However, this instrument *de facto* reduces the effectiveness of carbon pricing through the EU ETS and does not seem to provide sufficient incentives to implement the revised EU targets for net emission reductions by 2030, which require greater efforts to decarbonise across all sectors, including those at risk of carbon leakage. The implementation of a more effective instrument is therefore necessary.

(25) Commission Delegated Decision (EU) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council concerning the determination of sectors and sub-sectors deemed at risk of carbon leakage for the period 2021 to 2030.
(26) Emission intensity is calculated as the sum of direct and indirect emissions in a sector divided by its gross value added. Exposure to international trade, *i.e.* trade intensity, is calculated as the combined value of EU exports and imports from third countries, divided by the value of the EU internal market (domestic production and imports).
(27) Impact assessment accompanying Commission Delegated Decision (EU) 2019/708 of 15 February 2019, *Op. cit.*
(28) Free allowances are allocated on the basis of benchmark values for the top-performing 10% of participants for emissions in each sector, providing an incentive for under-performing installations to decarbonise.
(29) Based on ETS data from the European Environment Agency. See European Court of Auditors (2020), *Special Report 18/2020: The EU's Emissions Trading System: free allocation of allowances needed better targeting*.
(30) Kuusi, T., Björklund, M., Kaitila, V., Kokko, K., Lehmus, M., Mehling, M. … & Wang, M. (2020), *Op. cit.*
(31) European Roundtable on Climate Change and Sustainable Transition (2020), *2020 State of the EU ETS Report*.
(32) European Court of Auditors (2020), *Op. cit.*

3.2 An EU carbon border adjustment mechanism will need to address multiple challenges

A number of studies have highlighted that an EU carbon border adjustment mechanism (CBAM) would be more effective than free allowances in reducing carbon leakage (see Figure 3).[33] In the absence of uniform global carbon pricing, a CBAM aims to price emissions from products imported into the European market at a level equivalent to that applied to European products from sectors subject to the EU ETS. It would therefore provide a full carbon price signal across the EU, which would play a role in reducing the EU's carbon footprint. At the same time, a CBAM would provide incentives for third country producers to decarbonise their processes and stimulate the development of low-carbon technologies.[34] It could even lead to "negative" carbon leakage: third country emissions would decrease as a result of a more ambitious EU climate policy.

Chart 3: *Ex ante* model estimates of carbon leakage



Source: DG Trésor using meta-analysis by Branger, F., & Quirion, P. (2014). Op. cit.
Note: Figure 3 shows average carbon leakage rate identified in each study, with and without the implementation of a CBAM. The horizontal bars represent the interval between the minimum and maximum rates estimated in each study. The studies are ranked according to their estimated average carbon leakage rate without a CBAM. Studies marked with an * use partial equilibrium models; all other studies use computable general equilibrium models.

The European Commission's European Green Deal foresees the introduction of a CBAM to replace the existing carbon leakage instruments of the EU ETS, including free allowances.[35] The Commission is expected to publish its proposal by June 2021 ahead of an implementation of the CBAM envisaged in early 2023. As part of the Commission's public consultation, France has made a number of specific proposals for a short-term implementation of a CBAM that tackle the legal, technical, economic and political challenges the mechanism must address.[36] These proposals are set out below.

a) The necessary compatibility with international trade rules shapes the design of the mechanism

First and foremost, the EU CBAM must comply with World Trade Organization (WTO) rules. Otherwise, the EU's trading partners could have legitimate grounds to impose trade sanctions. The EU CBAM must therefore

(33) See, for example, the meta-analysis of 25 studies by Branger, F., & Quirion, P. (2014), *Op. cit.* It should be noted that while instruments for preventing carbon leakage (free allowances and CBAM) can reduce direct leakage associated with reallocation of production, they are unable to limit indirect leakage associated with potential increases in fossil fuel demand. However, at the EU level, indirect carbon leakage would be relatively small, as the EU accounts for a moderate share of global fossil fuel demand. See Chen, J., Chepeliev, M., Garcia-Macia, D., Iakova, D., Roaf, J., Shabunina, A., ... & Wingender, P. (2020), "EU Climate Mitigation Policy", *EUR Departmental Paper,* IMF; Organisation de coopération et de développement économiques (2020), *Op. cit.*
(34) See Fullerton, D., Karney, D., & Baylis, K. (2011), "Negative leakage" (No. w17001), National Bureau of Economic Research ; Arroyo-Currás, T., Bauer, N., Kriegler, E., Schwanitz, V. J., Luderer, G., Aboumahboub, T., ... & Hilaire, J. (2015), "Carbon leakage in a fragmented climate regime: the dynamic response of global energy markets", *Technological Forecasting and Social Change*, 90, 192-203.
(35) European Commission Communication COM(2019) 640 final: *The European Green Deal*, 11 December 2019.
(36) https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12228-Carbon-Border-Adjustment-Mechanism/F525248

be non-discriminatory by ensuring that imports, regardless of their origin, and European products covered by the EU ETS, are subject to the same carbon price level. The sole objective of the CBAM must be to tackle carbon leakage.

In its public consultation on the EU CBAM, the European Commission put forward several options regarding its possible design, currently under review.[37] One option is a system of allowances that mirrors the EU ETS, whose functioning is now well established. Importers to the EU would be required to pay the EU specific emission allowances when their products pass through customs. The volume of allowances to be surrendered would be based on the carbon content of products, and their price would be the same as that of the allowances under the EU ETS. However, these allowances would not be tradable nor fungible with EU ETS allowances, so as not to alter its structure and internal equilibrium. This option, which France favours, would satisfy the non-discrimination requirement vis-a-vis third countries, as well as tie in directly with the EU ETS.

Another option would be to introduce a tax or customs duty based on the carbon content of imported products. However, there are a number of drawbacks to this option. In particular, such an instrument would not be flexible enough to adjust to the rapidly changing price of EU ETS emission allowances. A customs duty also raises a feasibility issue, as that may involve renegotiating all existing preferential agreements between the EU and third countries (almost 70 currently in effect).

An alternative scenario would involve charging a carbon tax on the consumption of emission-intensive products.[38] This option would supplement the EU ETS pricing on production. This gives rise to questions as to how the instrument would articulate with the existing carbon pricing framework, and would require to keep the existing instruments such as free allowances to limit carbon leakage and avoid double carbon pricing on European products. This option also has major operational limitations in terms of emissions traceability along the value chain. Finally, this instrument might gain less social acceptance than a mechanism that addresses emission-intensive producers directly.

b) The lack of emissions data for imported products poses a technical challenge

Most third-country producers are not subject to the same reporting and accounting requirements as European producers under the EU ETS, making it difficult to calculate the carbon intensity of imported products. To overcome this problem in the short term, the EU could use a default value for the carbon intensity of imports by product type (given in tCO2eq per tonne of product), while giving importers to the EU the option to provide an actual carbon intensity value for their products where they can document this accordingly. This flexibility would also incentivise foreign producers to reduce the carbon intensity of their products, reinforcing the climate impact of the EU CBAM. This is also necessary to ensure that the mechanism is fully compliant with WTO rules.

Careful consideration must be given to the level of this default value, as too low a value would reduce the effectiveness of the CBAM in tackling carbon leakage. On the other hand, too high a value would not be justified to our trade partners and could potentially weaken compliance with WTO rules. In the absence of internationally recognised benchmarks for carbon intensity at this stage, the average European carbon intensity, which is known in a robust manner within the framework of the EU ETS, could be used. In the medium term, average values by sector and country, or global averages could potentially be used, by developing internationally recognised benchmarks. That would induce a higher climate ambition.

c) Economic considerations

The EU CBAM is intended to replace the existing instruments aimed at tackling carbon leakage. To ensure visibility and buy-in from economic agents, the mechanism would need to be phased in gradually. It could also be tested during a blank test phase and cover a limited scope of basic products from pilot sectors at the highest risk of carbon leakage (*e.g.* steel and cement). Moreover, a transitional phase could be envisaged to ensure a gradual phase-out of the EU ETS free allowances by 2030. Over this period, the remaining free allowances would be taken into account

(37) Inception Impact Assessment (2020)1350037 of the European Commission of 4 March 2020.

(38) Neuhoff, K. (2016), Inclusion of Consumption of carbon intensive materials in emissions trading-An option for carbon pricing post-2020, *Climate Strategies*; Pauliuk, S., Neuhoff, K., Owen, A., & Wood, R. (2016). Quantifying impacts of consumption based charge for carbon intensive materials on products (No. 1570), *DIW Discussion Papers*; Pollitt, H., Neuhoff, K., & Lin, X. (2020), The impact of implementing a consumption charge on carbon-intensive materials in Europe, *Climate Policy*, 20(sup1), S74-S89.

in the calculation of the adjustment due under the EU CBAM to ensure that the mechanism remains non-discriminatory.

Furthermore, European exporting sectors that would no longer be allocated free allowances would pay a higher carbon price under the EU ETS, without being directly affected by the EU CBAM. This would lead to an increase in their carbon price relative to third country producers for products that they sell outside the EU on third markets. Such a situation could result in carbon leakage.[39] European sectors further down the value chain could also experience an erosion of their competitiveness. This would apply to sectors whose processes involve using imported products for intermediate consumption that would be subject to the EU CBAM or intermediate consumption no longer covered by free allowances. They could lose market shares both on the internal and third markets to the benefit of foreign competitors that are subject to low or zero carbon pricing. The impact assessment to be attached to the Commission's proposal will be instrumental in assessing the extent of these effects at European level, and in determining the relevance of potential WTO-compatible accompanying measures that would preserve the EU CBAM's climate integrity and maintain incentives for affected sectors to decarbonise.

d) Meeting the EU's international commitments

In line with the principle of common but differentiated responsibilities enshrined in the Paris Agreement,[40] the introduction of the EU CBAM must not pre-empt climate targets that third countries are free to set for themselves. Taking account of third country climate policies, in particular their carbon pricing, and their levels of development will be key within the multilateral climate framework of the Paris Agreement.

These aspects, while also important in ensuring that the mechanism complies with WTO rules, could be addressed through bilateral equivalence agreements between the EU and its trading partners, or the establishment of an independent supervisory body that engages experts from third countries in the reflection. Such an initiative would allow for a cooperative and transparent approach with the EU's trading partners. This is essential to ensure that the EU CBAM is a success and an effective instrument in strengthening international climate action and coordination.

(39) Organisation for Economic Co-operation and Development (2020), *Op. cit*.

(40) This principle balances the need for all states to fulfil their responsibilities to tackle the global challenge of climate change on the one hand, with the acknowledgement of major disparities between states in terms of their economic development and historical emission trends on the other hand.

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