The carbon pricing proposals of the 'Fit for 55' package

An efficient and fair route to carbon neutrality?

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Introduction

The European Green Deal sets out very ambitious goals for the EU. Carbon neutrality should be reached in 2050. The intermediate goal is a reduction in CO_2 emissions of 55 per cent by 2030 compared with the 2005 level. In July 2021, the European Commission delivered the ‘Fit for 55’ package, which contains policy proposals for achieving the ambitious goals of the European Green Deal. The package includes proposals for carbon pricing with the extension of the Emission Trading System, a revision of the Energy Taxation Directive and a Carbon Border Adjustment Mechanism.

This working paper will not discuss the whole package, but just its carbon pricing component and the key issues for implementing carbon taxation. While there is a broad consensus among economists about the merits of carbon pricing, there seems to be at least a significant political reluctance to take that route. And while economists widely consider carbon pricing to be superior to other instruments, political choices and implementation appear to favour other instruments, which might include environmental tax incentives and norms and standards.

We need to understand why implementation has not taken the route suggested by the economic approach. Two main obstacles have been identified: distributional issues regarding households and adverse effects on competitiveness regarding firms. Up to now, they have been taken into account in a way that acts against the environmental objectives. Carbon pricing has been used sparsely. Exemptions from carbon taxes or free allowances for the emissions trading system have been widely used to avoid adverse effects on competitiveness. Both types of measure destroy the price signal we need to achieve environmental objectives. When preferring environmental tax incentives to carbon pricing – rewarding the good rather than taxing the bad – policies have resulted in high costs for avoided emissions.

The ‘Fit for 55’ package has been issued: will the same obstacles prevent its implementation? Or does the package include approaches that will allow countries to overcome them?

This working paper is organised as follows: Section 1 start with a brief presentation of the carbon pricing components of the ‘Fit for 55’ package. These include the extension of the Emission Trading Scheme (ETS); the revision of the Energy Taxation Directive (ETD) and the Carbon Border Adjustment Mechanism (CBAM). Section 2 discusses the contrast between the economic merits and the political acceptance of carbon pricing. Section 3 examines the distributional issues. Our view is that the debate is truncated and misleading when it sticks to the regressivity of carbon taxation. The issue is not whether we should introduce carbon pricing or not, bearing in mind the regressivity, but rather what instruments achieve the best combination of fairness and effectiveness among the ways of delivering a reduction in emissions. Because of the revenue it procures, carbon pricing appears to offer a win–win solution. Section 4 discusses the competitiveness issue and the Carbon Border Adjustment Mechanism proposal.

1. Carbon pricing in the 'Fit for 55' package

1.1 Structure and principles of the package

The 'Fit for 55' package was issued on 14 July 2021. It includes a set of policy proposals whose aim is to ensure that the ambitious targets set in the European Green Deal are delivered on time and that the transition should be 'fair and competitive' (European Commission 2021a).

Carbon pricing is at the heart of the proposals. The package strengthens the current Emission Trading System (ETS) by including aviation and maritime, and extending its mechanism to road transport and building. A Carbon Border Adjustment Mechanism is included to deal with competitiveness in a way that maintains the price signal from carbon pricing. The Energy Taxation Directive (ETD), which is considered to be out of date, is revisited and reformulated in a way that is compatible with climate objectives.

Although carbon pricing is at the heart of the proposals, it does not exhaust them. The package also includes regulation, with stricter CO_2 environmental performance requirements for cars and vans, new infrastructure for alternative fuels, and cleaner and more sustainable fuels for aviation and maritime. It also includes revisions of various directives and regulations on land use, forestry, renewable energy and energy efficiency that are planned to update targets and put them in line with the ambitions of the European Green Deal.[1]

The Commission communication (European Commission 2021a) emphasises the need for a socially fair and competitive transition. The transition towards climate neutrality is presented as being 'a unique opportunity to reduce systemic inequality'. Solidarity is mentioned as a 'defining principle of the European Green Deal, between generations, Member States, regions, rural and urban areas and different parts of the society' (European Commission 2021a).

But the reference to fairness is not merely rhetorical. It includes proposals to tackle the adverse social effects that carbon pricing is expected to have. Among those is the argued regressive effect of carbon pricing and the adverse

1. Decisions on the extension of the Emission Trading System and on the Carbon Border Adjustment Mechanism are under qualified majority voting, while approval of the revised European Taxation Directive requires unanimity.

effect on employment in industries that rely heavily on fossil fuels. The intention is to address these adverse effects by revenue recycling and by active labour market policies – including training – for sectors that will suffer from the transition.

At the heart of the ‘fairness’ is the new social climate fund (72.2 billion euros (€) in current prices for the period 2025–2032) that will provide Member States with dedicated funding to support the people most affected or at risk of energy poverty. It will complement existing funds, such as the Cohesion Fund, the Just Transition Fund and the European Social Fund Plus. In addition to these EU-wide initiatives, the carbon pricing proposals include provisions that should direct the revenue of auctioning (or taxing) to those who are adversely affected.

1.2 Strengthening the Emission Trading System

The first component of the carbon pricing strategy is the revision and extension of the Emission Trading System (European Commission 2021b).

The current Emission Trading System (ETS) legislation was revised in 2018 to deliver a 43 per cent reduction in ETS emissions by 2030 compared with 2005. This was consistent with a reduction target of at least 40 per cent by 2030 compared with 1990. Even though more recent analysis indicates that emission reductions could reach 51 per cent under the current framework, the cap has to be revised to be in line with the new objective of a 55 per cent reduction by 2030 below 1990 levels. With 2005 as reference, emission reductions should reach –61 per cent.

The achievement of an economy-wide 55 per cent reduction in emissions requires additional measures in sectors not currently covered by the ETS. For example, achieving the climate objectives requires at least 80 per cent emission reductions by 2050 relative to 1990 in maritime transport. Road transport and the building sector are also – partially in the latter case – outside the Emission Trading System.[2] They are responsible, respectively, for 20 per cent and 36 per cent of energy-related greenhouse gas emissions and there is no pricing instrument at the EU level for those sectors.

The main objective of the proposal is (i) to strengthen the Emission Trading System in its current scope to provide –55 per cent emission reductions by 2030 compared with 1990, while ensuring protection for sectors exposed to a significant risk of carbon leakage and addressing the distributional and social effects of the transition by reviewing the use of the auctioned revenue, and (ii) to include sectors not yet covered, such as maritime transport, road transport and buildings.

2. More than half the emissions in the building sector are already included in the Emission Trading System (electricity and district heating).

Maritime transport will also be included in the current Emission Trading System, with a phase-in period of four years. Emissions from intra-EU voyages, half of the emissions from extra-EU voyages and emissions occurring at berth in EU ports will fall under the ETS. The proposal includes a transitional period up to 2026. The current cap will be adjusted to take into account the new objective and the inclusion of the maritime sector.

Road transport and buildings will be included in a separate Emission Trading System. The Commission's aim is 'to avoid any disturbance of the well-functioning emissions trading system (…) given the different reduction potentials in those sectors and different factors that influence demand' (European Commission 2021b: 3). The 'ETS2' is supposed to be established by 2025, and issuance of allowance and compliance obligations will be applicable only from 2026. The point of regulation will not be the final emitter but the economic agent releasing fuels for consumption in the corresponding sectors.[3] The emissions cap for the new ETS will be set from 2026 based on data collected under the Effort Sharing Regulation (ESR) and decrease to achieve emission reductions of 43 per cent by 2030 compared with 2005 levels. A corresponding reduction factor will be defined. No free allowances will be issued. A Market Stability Reserve will also operate in those sectors.[4]

The proposal amends the provision on auction revenue to the effect that Member States are supposed to use all the revenues they obtain from the Emission Trading System for climate-related purposes, including support for low-income households and investment for sustainable renovation of dwellings. Auctioning should also fund the energy transition in Member States with GDP per capita below 65 per cent of the EU average in 2016–2018.

1.3 Revision of the Energy Taxation Directive

The second component of the carbon pricing strategy is the proposal for a Council Directive that updates the Energy Taxation Directive (ETD). At the EU level, the taxation of energy products and electricity is still regulated by a Directive from 2003 that is clearly outdated, as confirmed by a review that took place in 2019 (European Commission 2021c).

The current framework raises three main concerns:

– The Energy Taxation Directive is not in line with today's climate and energy objectives: less carbon intensive fuels that have emerged since

3. The regulated entities are defined in accordance with the current system of excise duties.
4. The aim of the Market Stability Reserve is to prevent too large fluctuations (mainly downwards) of the carbon price. The mechanism implemented for the existing Emission Trading System was designed in response to the structural and long-lasting nature of the emission allowances surplus that emerged among the effects of the global financial crisis that started in 2009. Even if no free allowances are included in the new Emission Trading System, market prices may fluctuate in a way that hamper its efficiency.

2003 are taxed like their fossil equivalents, despite their lower energy content. Diesel's minimum rate is lower than that of petrol. This increases the demand for diesel, which is more harmful than petrol. The current structure cannot ensure preferential treatment of environmentally sustainable technologies and products.

- The Energy Taxation Directive de facto favours fossil fuel use because of highly divergent national tax rates, combined with a wide range of exemptions. These constitute fossil fuels subsidies.
- The Energy Taxation Directive no longer contributes to the proper functioning of the internal market. The minimum rates are now so low that they have lost their convergence effect on national tax rates. They no longer prevent a 'race to the bottom'. In addition, the long list of exemptions and reductions increases the fragmentation of the internal market.

A revision was clearly needed to align the Directive to the new climate and energy policies.

The proposed new Energy Taxation Directive will switch from volume to energy taxation and so eliminate most fossil fuel subsidies that exist under the current Directive. The proposed tax structure will group energy products and electricity into four categories, ranked by their environmental performance:

- Category 1 will include conventional fossil fuels, such as gasoil and petrol and will be taxed at the higher rate.
- Category 2 will include less harmful fossil fuels, such as natural gas and hydrogen of fossil origin. They will be taxed at two-thirds of the rate of category 1 and will have to converge to the higher rate at the end of a transitional period of 10 years.
- Category 3 is that of sustainable but not advanced biofuels, which will be subject to 50 per cent of the reference rate.
- The lowest rate applies to electricity, advanced biofuels, bioliquids, biogases and hydrogen of renewable origin.

Current exemptions will have to be removed with transition periods. This holds for sectoral exemptions (aviation) and also for exemptions on heating fuels for non-vulnerable households. Regarding vulnerable households, the proposal introduces the possibility to exempt them for a transition period of 10 years. The Energy Taxation Directive will complement carbon pricing through the Emission Trading System.

1.4 Carbon Border Adjustment Mechanism

There is a world outside the EU. Non-EU countries may have less stringent environmental regulations with no or lower carbon pricing, which might make them more attractive to polluting firms. With no specific provisions, pricing carbon emissions on EU territory may harm the competitiveness of EU firms and result in carbon leakages.

The adverse consequences of carbon pricing for competitiveness have been identified as one of the major political economy obstacles to its introduction (see below). Up to now, in the absence of international cooperation, the issue has been dealt with by exempting exporting firms from carbon taxes or by granting them free allowances in the Emission Trading System. Both solutions remove the price signal of carbon pricing.

When presenting the European Green Deal, the Commission announced its intention to propose a Carbon Border Adjustment Mechanism (CBAM): 'Should differences in levels of ambition worldwide persist, as the EU increases its climate ambition, the Commission will propose a Carbon Border Adjustment Mechanism, for selected sectors, to reduce the risk of carbon leakage' (European Commission 2019).

The 'Fit for 55' package includes the corresponding proposal (European Commission 2021d). The Carbon Border Adjustment Mechanism is not a self-standing provision but part of the Emission Trading System. As indicated above, the revision of the ETS should entail a stronger price signal because of the broadening of scope, the phasing out of free allowances and the lowering of the cap.

The Carbon Border Adjustment Mechanism will apply on specific imported goods, listed in Annex I of the proposal. Those are cement, electricity, fertilisers, iron and steel and aluminium. The scope also includes 'processed products from those goods'. Importers will be charged at the EU ETS price, either on the basis of the default value of the carbon content of the imported good or the embedded emissions. The second option provides an incentive for emission reduction to producers located outside the EU and exporting to the EU. In this way, the Carbon Border Adjustment Mechanism aims to ensure that import prices more accurately reflect their carbon content, in a way compatible with WTO rules.

2. From policy rationale to implementation

2.1 Rationale for carbon pricing

Carbon pricing is widely advocated by economists as a key instrument in environmental policy. It is however not the single one. A first distinction has to be drawn between regulations and economic instruments. 'Regulations' refer to norms and standards. They have been widely used to date. Environmental standards have been laid down, for example, for vehicles and housing. Economic instruments include carbon pricing, but also environmental tax incentives.

Carbon pricing can be implemented through carbon taxes or tradable permits. Both instruments put a price on pollution. From an economic point of view, the main difference is that, in the case of carbon taxation, the government sets the price and the market determines the outcome – the reduction of CO_2 emissions – while in the case of tradable permits, the government sets the outcome by fixing the cap and the market sets the price.

Both instruments directly target pollution. They add the external cost to the price of the polluting good. In the absence of carbon pricing, the market prices of polluting goods merely match the sum of the cost of production, the profit of the supplier and any general consumption tax. Polluters do not pay for pollution; they charge it to society. The basic principle of the so-called 'Pigouvian taxation', which is a century old (1920), is to price-in the externality. By doing so, ideally, pollution is reduced and those who pay for the remaining pollution are those who produce and consume the polluting goods.

The ultimate goal, however, is not to charge polluters but to reduce emissions or, more globally, pollution. This may occur through several channels. On a short-term basis, higher prices reduce demand and production. From a formal standpoint, the higher the elasticities of demand and supply, the larger the reduction in pollution. The elasticity will be higher if consumers can easily change their consumption patterns by moving to less or non-polluting good and services. Using private transport emissions as an example, the more 'clean' alternatives are available, the higher the price elasticity of the demand curve for road transport and the larger the reduction in its use and the resulting pollution.

On a medium- to long-term horizon, an important effect of carbon pricing is that producers may react by investing in cleaner technologies: abatement (reduction in emissions) will be profitable up to the point at which its marginal cost does not exceed the carbon tax or the price of the permit. Carbon pricing increases the rate of return of abatement technologies.[5] By doing so, it ensures dynamic efficiency, which regulation cannot ensure: if the policy instrument consists of norms or standards, producers will comply with the new norm, but will not go further, as there is no incentive to do so. Regulation ensures only static efficiency.

From a theoretical point of view, there is a clear case for carbon pricing and a broad consensus among economists about its desirability.

There is more uncertainty, however, on the desired level of the tax and about the explicit trajectory that should be followed (Schubert 2013). In France, the Quinet report (2009) provided a summary of the discussion and reached a 'shadow price' of carbon, increasing from €32/CO_2 tonne in 2010 to €56 in 2020, €100 in 2030 and a range of €150 to €305 in 2050, with a median value of 200.[6]

2.2 From theory to empirical evidence: does carbon pricing work?

The theory is convincing, but does it work in practice? As explained below, implementation is a different story. Only a few countries have been implementing a specific carbon tax.

Early adopters provide opportunities for case studies. One is Finland, which introduced the planet's first carbon tax in 1990. Mideska (2021) conducts an empirical analysis of the effects of the carbon tax in Finland, focusing on the transport sector. Transport was chosen for the following reasons: (i) it is internationally non-tradable, so the analysis is confined to the domestic economy; (ii) the structure of energy production and use in transport activities is fairly similar across countries, which makes a difference-in-difference approach easier to conduct; and (iii) data availability is better than for other sectors.

The author compares trends in Finnish emissions with those of a control group 'synthetic Finland', which includes countries with similar transport technologies but no carbon pricing. Considering the gap between actual Finnish emissions and those of the control group, he concludes that Finnish

5. The final report of the Belgian National Debate on carbon pricing (2018) provides examples in the case of housing, (see pp. 69–75) and transport (see pp. 103–106).

6. More recently, the Belgian National Debate on carbon pricing came up with three options, after considering, among other sources, the Quinet report and the recommendations from the High-level Commissions on Carbon Prices: the central scenario suggested a trajectory from €10 in 2020 to €70 in 2030 and €190 in 2050. In a less stringent trajectory, the carbon price should increase to €40 in 2030 and €100 in 2050, while in a more stringent trajectory it should increase to €100 in 2030 and €280 in 2050.

emissions were 16 per cent lower in 1995 and 31 per cent lower in 2005 relative to the counterfactual. The carbon tax has resulted in stabilising emissions at the 1990 level in Finland, while they were sharply rising in countries without a carbon tax.

Kohlscheen et al. (2021) provides an ex-post analysis of the effect of climate policies on CO_2 emissions on a larger scale. The analysis is based on a comprehensive database of 121 countries with different climate policies. In addition to carbon pricing, they also examine the effects of other climate policies by using an index of their stringency. The dynamic panel regression control for macroeconomic factors such as economic development, GDP growth, urbanisation and the energy mix. Results indicate that carbon pricing is effective in reducing emissions: an increase in carbon tax by USD 10 per tonne of CO_2 reduces emissions per capita by 1.3 per cent in the short term and by 4.6 per cent in the long term. The same increase in Emission Trading System permit prices has a quite similar effect, but the effect seems to be less robust from an econometric point of view, as it varies between specifications and is not always significant.

Another way to obtain a global view of the effectiveness of carbon pricing policies is to conduct a meta-review of ex-post quantitative evaluations of carbon pricing policies around the world since the early 1990s. Green (2021) has conducted such an analysis. A first point to be noted is that despite the fact that carbon pricing clearly dominates the policy debate, there are not too many empirical assessments: 37 studies according to the author. Secondly, Green considers the aggregate reductions as 'limited', between 0 and 2 per cent per year, with considerable variation across countries and sectors. According to the same author, carbon taxes seem to perform better than emission trading schemes. Finally, the EU Emission Trading System should only have a limited effect, from 0 to 1.5 per cent a year.

These results have to be put in their economic and institutional context, however, which the analysis does not do. The author takes note that only 30 countries have implemented a carbon tax and that 31 emission trading systems are operating around the world. But the interpretation of the results does not take into account that those countries, roughly all of which are small, open economies, have been limited in their actions because of the lack of international coordination. The EU Emission Trading System provides a good example of the problem: as the EU was acting alone, with no carbon border adjustment, the competitiveness issue was dealt with by granting free allowances on a fairly massive scale. That resulted in a low price of carbon that undermines the scheme's effectiveness, limiting its potential reducing CO_2 emissions. The same holds for countries that introduced a carbon tax: the competitiveness issue was dealt with by granting exemptions to sectors exposed to carbon leakages, which also limited the potential for reducing CO_2 emissions.

The meta-review proves that carbon pricing, introduced as it has been with no international coordination, has a limited effect on emissions reductions. The current and future contexts are quite different because the implementation of the Paris agreement will result in more countries adopting carbon pricing and encourage some major blocks, notably the EU, to consider carbon border adjustment. And finally, has the effect really been 'limited', as stated by Green (2021)? The upper bound of her estimates (2 per cent a year) translates into a 22 per cent reduction in a decade and 48 per cent over 20 years.

2.3 What about implementation?

Despite a strong policy rationale and convincing evidence, there has been a low level of implementation.

According to I4CE (2021), 47 jurisdictions (countries or sub-national jurisdictions) are operating a carbon pricing scheme (tax or Emission trading system) in 2021. More than 46 per cent of the emissions regulated by carbon pricing are still covered by a price under USD 10, however, which is far below the rate required to put emissions on a trajectory compatible with the goals set by the Paris Agreement.

The I4CE report considers only explicit carbon taxation and disregards the taxation of fossil fuels by excise duties and so undermines effective tax rates. The OECD approach (OECD 2021a) is more comprehensive as it includes implicit carbon taxation through excise duties on energy use. The report computes an effective carbon rate, expressed in euros per tonne of CO_2, that includes fuel excise tax on energy products, specific carbon tax and emission permit price, and compares it to benchmarks. The carbon pricing score (CPS) expresses the percentage of emissions that are priced at least at a given level[7] and the carbon pricing gap is next computed as (1–CPS). Benchmarks are set at €30, €60 and €120 per CO_2 tonne. The middle estimate fits the mid-range 2020 benchmark according to the High-level Commission on Carbon pricing.

Even with a broader concept, 60 per cent of carbon emissions from energy use in OECD and G20 countries[8] remained entirely untaxed in 2018. Only 19 per cent of the emissions are priced at or above a level of €30 per CO_2 tonne. The carbon pricing gap thus amounts to 81 per cent.

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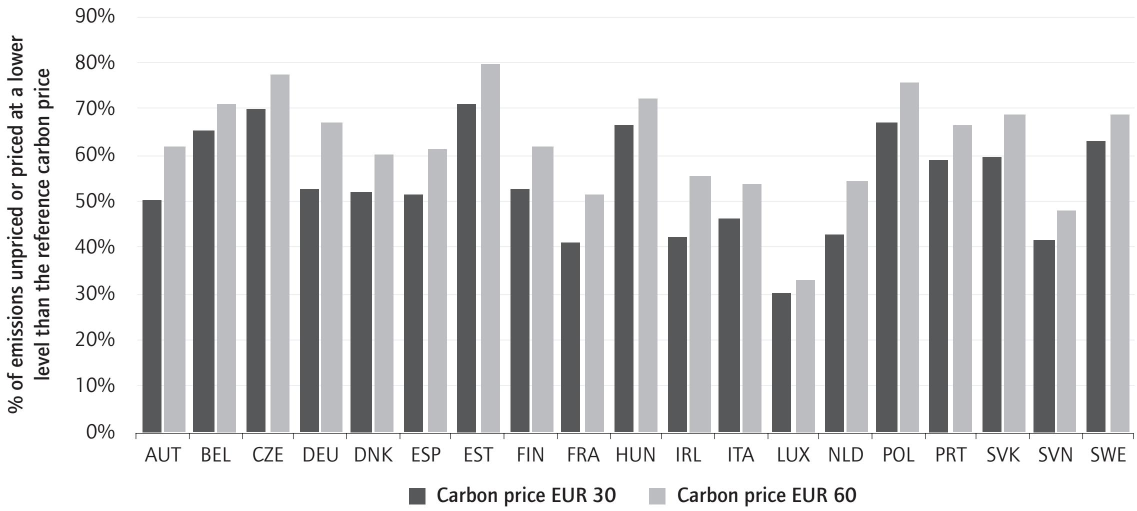
7. The rates and score may be expressed as a marginal score (or rate) or average. The two concepts only differ for permit prices in the case of free allocation. Free allowances reduce the average permit price but do not reduce it at the margin. The effect is similar to a zero rate band in a progressive income tax. It lowers the average tax rate but not the marginal tax rate.

8. Those countries are responsible for 80 per cent of emissions.

Figure 1 **Carbon pricing gap, EU countries, 2015**



Source: OECD (2021a)

Figure 1 gives the carbon pricing gap of the EU countries covered in the report (OECD 2021a). The carbon pricing gap is significant even when the benchmark is set at the lowest level. At the more pertinent level of €60 per CO_2 tonne it amounts to more than 50 per cent for most of the EU countries covered, apart from Luxembourg.[9]

The carbon pricing score and gap varies widely across countries but also across sectors. The score is the highest, and the gap the lowest for road transport. The score is lower for residential and commercial and for electricity and the industrial sectors.

Table 1 **Carbon pricing score by sector, OECD and G20 countries**

	EUR 30	EUR 60	EUR 120
Agriculture and fisheries	43%	38%	23%
Electricity	10%	5%	3%
Industrial sector	9%	5%	3%
Off-road transport	34%	25%	13%
Residential and commercial	14%	10%	6%
Road transport	91%	80%	58%

Source: OECD (2021a)

9. The low gap for Luxembourg originates in the dominant role of the road and transport sector, which has a higher pricing score and a lower pricing gap compared to the other sector.

More recent information (OECD 2021b) indicates some progress for G20 countries, but they are uneven. The effective carbon rate across G20 countries range from €17 to €19, which is still below the lowest benchmark.

2.4 Political economy obstacles

Implementing carbon taxes is not an easy task and the ways in which they have been implemented – when they have been – might be quite different from the theoretical framework. In many cases, their level is still below the shadow price of carbon and their coverage is limited by numerous exemptions.[10]

Political economy considerations seem to have been prevalent. Introducing carbon pricing requires that two main obstacles be overcome: the tax is perceived as unfair, being regressive, and businesses have strong concerns about adverse competitive effects (OECD 2006).

Regarding competitiveness, the 'first best' option[11] is certainly international coordination. A second best option should be a border tax adjustment. Countries that have introduced carbon taxes so far have done so in isolation. Room for international coordination was very limited and more or less non-existent for the EU countries. The same holds for the implementation of a carbon border adjustment. As indicated above, countries implementing carbon taxes have consequently decided to introduce exemptions for energy intensive industries facing international competition. These exemptions of course undermine the environmental effectiveness of the tax.

10. For a description of the existing carbon taxes, see Belgian National Debate on Carbon Pricing (2018), 38–43.
11. 'First best' refers to the policy option that maximises welfare.

3. Distributional issues

Distributional issues also pose a major obstacle for the implementation of carbon pricing. The concern is, in a first stage, regressivity: the tax burden of energy taxes, expressed as a percentage of income, appears to be higher for low-income earners, and introducing carbon pricing on top of current energy taxes is likely to make the problem more acute as their base is at least partly similar. The argument refers to the first stage and short-term effects of carbon pricing.

The debate on fairness is broader, however. It should not be confined to energy and carbon taxes but also encompass the distributional effects of any climate policy. Those are very large. Climate policies will affect employment, the wage distribution and returns from capital. Regarding labour market effects, sectoral effects will have distributional consequences. Closure of some sectors and development of green technologies will also affect the returns from capital in various ways, depending on the sectors in which capital is invested. Studies investigating the distributional effect of climate policies on the primary distribution of incomes are not numerous and there is no one-size-fits-all conclusion, as reported by Zachman et al. (2018). A lot depends on sectoral effects and on the policy mix, including active labour market policies.

We will first discuss the distributional consequences of energy and carbon taxation, as this issue is considered to be prevalent. But it is not the end of the story, as the distributional consequences of those instruments have to be considered in comparison with other policies: what will be the distributional consequences of non-action or of the use of alternative policy instruments?

3.1 Distributional effects of energy and carbon taxation

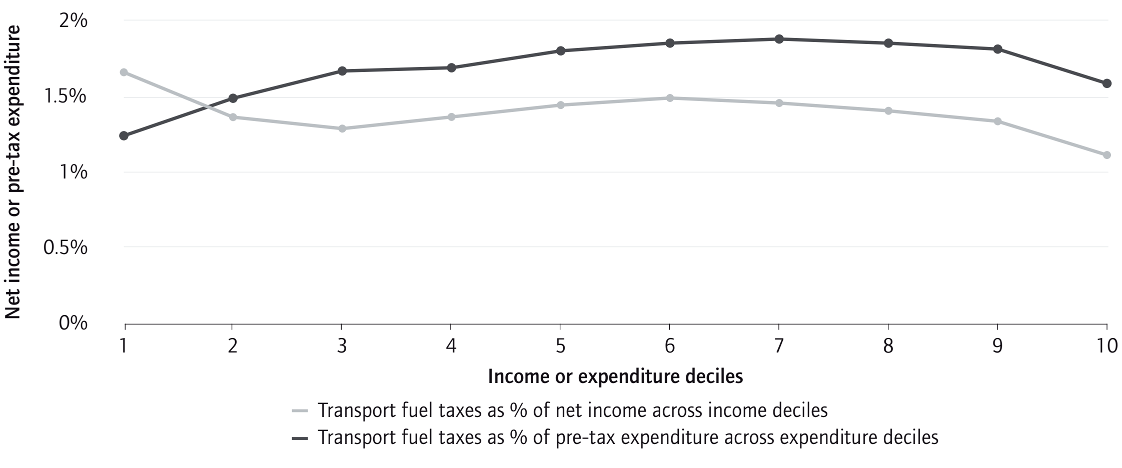
3.1.1 How the tax is distributed

As indicated above, carbon pricing as such has not been widely implemented up to now at the household level. Energy taxes, however, have been in force for quite a long time in many – if not all – countries. Their distribution impact sheds light on what should be the distributional impact of carbon taxation.

The distributional impact of energy taxes has been examined by Flues and Thomas (2015), who build a general microsimulation model for 20 OECD countries.[12] They rely on household budget surveys including detailed micro-data on expenditures. Energy taxes, however, are not ad valorem but based on quantity, which requires using prices to convert energy expenditure. Energy carriers are close to homogenous goods, so prices should not widely differ at the household level. The authors note that some inaccuracy may result at the individual level because of differences in prices at the regional level, for example. Competition between providers – mainly for electricity – may also result in price variations at the household level. The authors consider that those differences should not affect the main findings and we agree with that. Energy taxes are then modelled by imputing the corresponding tax rates to the quantities for the various energy carriers.

The amount of taxes can be expressed as a percentage of total expenditure or income. There are arguments for both denominators. It is often considered that income better reflects welfare. This holds true on a year-to-year basis, but expenditures may better capture welfare on a long-term basis. As income may vary over time, some who are 'poor' on a yearly basis may just have a transitory low income.[13] The political debate about the distributional impact is more about 'income' than 'expenditure', however. Another argument for using income as a basis is that compensation schemes are usually income-based.

Figure 2 **Average transport fuel taxes as % of net income or pre tax expenditures**



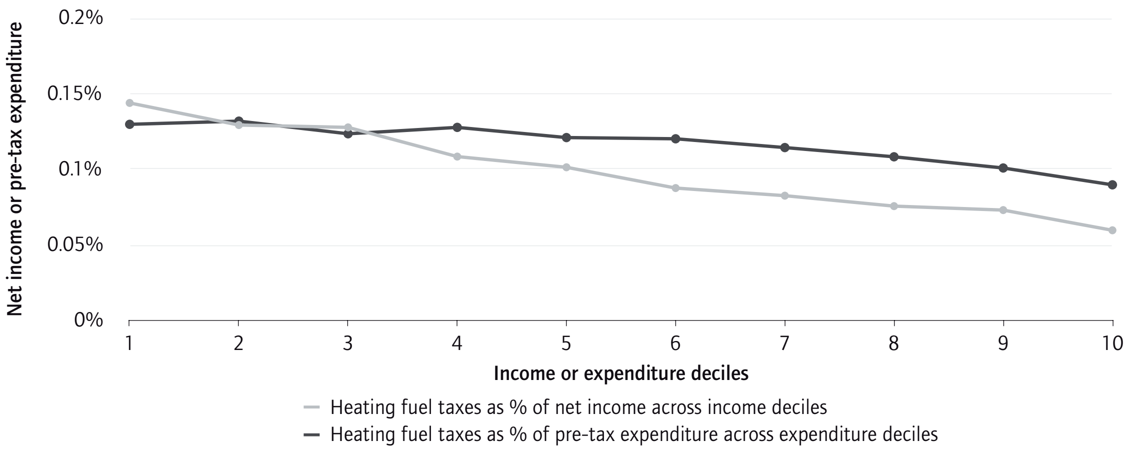
Source: Flues and Thomas (2015)

12. They cover 16 EU countries: Austria, Belgium, the Czech Republic, Germany, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Luxembourg, Poland, Slovenia and Slovakia.

13. A typical example is a student that graduates in June or September and finds a job a few weeks later. As his income is considered to be his income for the whole year, he will be classified as a low income earner.

Flues and Thomas (2015) assess separately the distributional impact of heating fuels, transport fuels and electricity. The microsimulation model is static: no behavioural reactions are included. Results also have to be interpreted as short-term. Figure 2 displays the profile of the average rate for transport taxes across income or expenditure deciles for the 21 countries covered in Flues and Thomas (2015). Figure 3 displays the corresponding results for heating fuels.

Figure 3 **Average heating fuel taxes as % of net income or pre-tax expenditures**



Source: Flues and Thomas (2015)

The main results are as follows:

– Taxes on transport fuels (petrol and diesel) have proportional to progressive effects for the majority of countries on an expenditure basis. The pattern is more diverse on an income basis, with some countries progressive in some respects while regressive in others. The pattern is in most cases not monotonic. The implicit tax rate might be high at the bottom of the income distribution, decreasing in the first quintile, increasing again up to the fifth quintile, and finally decreasing at the upper end of the income (or expenditure) distribution. The non-regressivity of taxes on transport fuels might be explained by the ratio of households not using a motor vehicle, which exhibits a decreasing trend according to income or expenditure deciles in most countries. Households in the middle- and upper-income classes are more likely to have a car and even more than one. Specific factors might explain the observed regressivity at the upper end of the distribution: high income earners are more likely to use untaxed or less taxed transport modes such as air transport, public transport and company cars.[14]

14. In addition to that, taxis and personal driving services are recorded as driving services in household budget surveys and the energy taxes relating to their use are not recorded in the survey.

- Taxes on heating fuels are slightly regressive on an expenditure basis and exhibit higher regressivity on an income basis. The authors indicate three possible explanations: low-income earners are likely to live in smaller dwellings but on the other hand, insulation might be poor. They are also more likely to live in apartment blocks than in detached houses. The overall effect of these three elements seems to be unclear. The 'slight regressivity' may reflect the budget constraint, with low-income earners heating only to lower temperatures. Regarding country-specific effects, the ratio of untaxed to taxed fuels does not provide any consistent explanation of country-specific distributional effects of taxes on heating fuels.
- Taxes on electricity[15] are regressive on an income basis and on an expenditure basis, but their impact on households is quite limited, up to 1 per cent expressed as a share of income. It is hard for poor households to save on this type of energy as a fixed amount has to be consumed anyway. Poorer households may also have difficulties replacing old appliances with more energy-efficient ones.

A significant number of country studies have also been devoted to the distributional effects of energy or carbon taxes. Most of them draw similar conclusions, which is not surprising as they use similar data. Some of them depart from static estimates and take into account behavioural effects. We will just report on country studies that examine the introduction or the increase of a carbon tax.

Douenne (2018) examines the distributional effects of carbon taxation in France, more specifically the increase of the carbon tax from €22 to €44.6 €/CO_2 tonne that took place between 2016 and 2018. He uses a microsimulation model that combines a household budget survey and a separate database of taxable income. The model includes households' behavioural reactions to an increase in price. Income elasticity is around 0.5 (an increase in income of 10 per cent results in an increase of 5 per cent of energy expenditure) and price elasticities are estimated at −0.45 for transport and of −0.2 for domestic energy consumption. Moving from a static to a dynamic simulation does not change the overall picture: the increase in the carbon tax is found to be regressive according to income and roughly proportional according to total expenditure.

Vergnat et al. (2020) use the Euromod micro-simulation model to examine the distributional consequences of the increase in excise duties that took place in Luxembourg in 2019–2020. Expressed in absolute terms, expenditures on transport fuels are increasing in equalised income. Expressed as a percentage, excise duties on transport fuels are found to be regressive and the same holds regarding total expenditure, which fits with the country results of Flues and Thomas (2015). The paper provides two simulations of the distributional

15. Taxes on electricity include taxes on the fuels used for electricity generation, calculated based on energy taxes on inputs and the energy mix. Permit prices are also included.

consequences of the increase in excise duties on transport fuels: a static one and a dynamic one, relying on the price elasticities of Douenne (2018) for France. Unsurprisingly, they are found to be regressive.

The Irish carbon tax is also found to be regressive. Tovar Reaños and Lynch (2019) report that emissions are increasing in income. As the carbon tax is quantity-based, its absolute value also increases income but the budget share of expenditure on heating and lighting is decreasing across expenditure quintiles. The same holds, but to a lesser extent, for transport fuels. So taxing energy and carbon emissions is found to be regressive for heating and lighting and roughly proportionate to expenditure for transport.

3.1.2 Taxation and compensation

To sum up, carbon pricing is found to be largely regressive or proportional, in any case not progressive. But it raises revenue.

Regressivity means that taxes, expressed as a percentage of income or expenditure, are higher for low income earners than for high income earners. Nevertheless, of course, even on this basis the absolute sums paid will rise with income.

The revenue might be used to compensate households. Compensation might be lump-sum or means-tested. Even in the first case, compensation will be higher for low-income earners in relative terms. The combined effect of the tax and the compensation is then progressive. Means-tested compensation will increase the progressivity of the package.

Vergnat et al. (2020) explore such schemes in the case of an increase of the carbon tax in Luxembourg. The redistribution of carbon tax revenue in the form of lump-sum compensation yields a positive result (compensation higher than the tax) for deciles 1 to 3 and a negative result for deciles 4 to 10. This does not, however, mean that there are no losers in deciles 1 to 3 and no winners in deciles 4 to 10. There is a substantial horizontal heterogeneity: some poor households may have higher consumption of transport fuels and richer households lower consumption. Means-testing the compensation could help to overcome horizontal heterogeneity.

Douenne (2018) examines the distributional consequences of the carbon tax increase in France in 2018. Energy vouchers, the level of which was means-tested and related to household size, were substituted for ‘social tariffs’ that applied only to electricity and gas. A lump-sum transfer has effects similar to those mentioned by Vergnat et al. (2020) for Luxembourg. Deciles 1 to 5 exhibit a net positive result and deciles 6 to 10 a net negative result. Both authors point out a substantial horizontal heterogeneity. Reaching the losers at the bottom of the income distribution requires additional targeting of compensation. He explores rural versus urban users and differentiation by energy carrier. This reduces heterogeneity and losers at the bottom of the income distribution but does not guarantee that there will be no losers. He made the point that there might be a trade-off between distributional objectives and incentives: an energy voucher differentiated according to energy carrier helps to resolve the former but has an adverse effect on the latter. It may be argued that, on a short-term basis, the existing heating mode is constrained so that the adverse effects on incentives is not an issue. Differentiated energy vouchers should then be accompanied by incentives for moving to less CO_2 emitting heating modes.

Valenduc (2017) reaches a similar conclusion for Belgium when considering the distributional implications of a change in energy taxation that would combine a levelling of excises duties according to CO_2 emissions and the introduction of a carbon tax: lump-sum or means-tested compensation leaves substantial horizontal heterogeneity, a dominant factor in which is the current heating mode.

Tovar Reaños and Lynch (2019), discussing the impact of an increase of the existing carbon tax in Ireland, consider two compensation scenarios that both redistribute the whole of the revenue to households: flat allocation (lump-sum transfer) and targeted allocation. They use a dynamic micro-simulation model with demand equations, so that the results incorporate the effects of the increases in carbon tax and energy bills on the whole basket of goods and services.

Table 2 **Effects of the increase of the Irish carbon tax on inequality**

	+ €30 per CO2 tonne	+ €80 per CO2 tonne
	Change in inequality (Atkinson Index) in %	
No compensation	+0.40%	+1.04%
Flat compensation	–0.46%	–1.05%
Targeted compensation	–1.23%	–2.78%

Source: Tovar Reaños and Lynch (2019)

An increase in the carbon tax should indeed have an adverse distributional effect with no compensation. Recycling the revenue to households lowers inequality, with a stronger equalising effect in the targeted scenario. The authors do not report on horizontal effects, however.

3.2 Intergenerational issues and the cost of inaction

Not acting today is a 'tax' on future generations, as they will face strong adverse effects on welfare. Well-designed policies may help to overcome the adverse distributional effect of carbon pricing on today's citizens, while there is no possibility for compensating future generations for the welfare loss they will face if we do not act today.

Moreover, inaction might also have strong adverse distributional consequences (Zachmann et al. 2018). Disadvantaged groups are more exposed to the adverse effects partly because of their housing location and working conditions (working outdoors). They might also be less able to cope with and to recover from the damage caused by climate hazards.

Inaction is simply not an option. The Paris Agreement has been signed and countries have made commitments. Countries need to act.

3.3 Carbon taxes versus other policy instruments

As inaction is not an option, the issue is not whether climate policy will be implemented, but *how* and to *what extent*. 'How' refers to the policy mix: on which instruments will climate policy rely? 'To what extent' refers to the speed and magnitude of decarbonisation.

Focusing the debate on distributional issues related to taxation disregards the distributional impact of other instruments. In this way, the debate is truncated and misleading. The distributional impact of taxes – and more generally carbon pricing – have to be weighed against the distributional impacts of alternative instruments. Those might be environmental tax incentives, norms or regulations. Two strands of issues have to be discussed: will alternative instruments do a better job regarding environmental objectives? And how would their effects be distributed?

3.3.1 Carbon taxes versus environmental tax incentives

The difficulties encountered in introducing carbon pricing may make a case for environmental tax incentives. These work the other way around: they aim to reward the 'good'. The routes seem similar, but there are many differences.

Environmental tax incentives do not charge for externalities and do not apply the polluter-pays principle. Abatement technologies are rewarded, if eligible for the incentives, but a tax preference provides no incentive to abate beyond that achieved by using an eligible technology. Because of that, they do not ensure dynamic efficiency (Braathen and Greene 2014). Moreover, the marginal cost of producing or consuming a unit of the polluting good or service is unchanged and might even be reduced. This may result in a rebound effect. For example, driving a low emission car is less costly per kilometre and it can result in driving more, which may lead to ambiguous results on CO_2 emissions.

Box 1 **Policy rationale for environmental tax incentives**

Positive externalities and market failures may provide a case for tax incentives. To what extent is this the case for environmental tax incentives?

The **innovation component** might justify tax incentives. Decarbonisation requires new technologies. Once a new technology is available on the market, carbon pricing will provide an incentive to invest in the relevant equipment, but it has to be available first. It is sometimes suggested that environmental innovation merits greater support than other types of innovation because it involves both positive innovation externalities and positive environment externalities. As noted by Braathen and Greene (2014), this confuses two separate issues. The development of a new emission reduction technology may well give rise to innovation spillovers, but the environmental benefits arise from deployment or adoption of the technology to reduce emissions. At that second stage, it could be argued that the carbon pricing instrument suits better: by pricing the negative externalities, it increases the rate of return of any investment in clean technologies. But despite that, there might be a case for an incentive targeted to the deployment of the new technology. Even when such technologies have been developed and demonstrated, however, high costs due to limited production volumes resulting from limited information about costs and benefits may create uncertainty for early adopters, limiting demand and deployment. The experience of early adopters might create 'learning by using' information that benefits later adopters. These kinds of external benefits may provide a policy rationale for tax preferences for the deployment of a new technology.

There might also be **capital market failure.** A lack of access to capital can prevent some people, in particular low-income households and the elderly, from benefitting from energy-efficiency investments. Financial support – subsidies or tax incentives – can reduce the borrowed amount and/or the interest rate and thus allow economic agents to overcome a possible lack of access to capital. Zero-rate loans can also help them to secure credit, but they need to be closely targeted to low-income households to prevent windfall gains. If they are accessible to high income earners, in other words, it might be profitable for them to finance green investments by tax favoured green loans, while at the same time investing their equity in other profitable assets.

There is some empirical evidence on environmental tax incentives. They appear to be costly and to have adverse distributional consequences.

Empirical studies indicate that free-riding is widespread, which makes the cost effectiveness balance at least problematic. Free riding occurs when the decision that the incentive aims to encourage would have been taken anyway: it increases the cost with no effect on additionality and so lowers the effectiveness of the incentive.

Alberini et al. (2014) investigates the cost effectiveness of a tax incentive for energy efficient appliances introduced in Italy in 2007. Homeowners were allowed to deduct from their income tax bill up to 55 per cent of the expenses related to certain types of energy efficient renovations or sources of renewable energy. Eligible expenses included heating systems, isolation of the entire envelope or specific isolation (roof, window and door replacement). The results indicate significant free-riding: for example, regarding door and window replacements, the policy variable is only significant when related to the 'climate' variable: the colder the climate, the more effective the policy. Overall, the policy appears to be ineffective and free-riding is extremely high regarding the replacement of heating systems: this is an example of expenditure that should have been done anyway.

The French sustainable development tax credit (CIDD, 'Crédit d'impôt pour le développement durable') provides another example. It was introduced in 2005, with rates ranging from 15 to 50 per cent of the investment cost and varying according to categories of investments and energy performance criteria. The tax credit was capped at €8,000 per year and person, and available for five consecutive periods. The estimated share of free-riders among CIDD beneficiaries varies between 40 and 85 per cent in years in which the effect of CIDD was significant (Nauleau 2014). Nauleau indicates that this is consistent with the range of values found in the literature and confirms that free-riding is an important phenomenon.

Baveye and Valenduc (2011) investigated the effect of the environmental tax incentive introduced in Belgium in the early 2000s. The tax credit was set at 15 per cent of the qualifying expenditure, up to €590 in 2002. This included photovoltaic arrays and other items related to home insulations. The ceiling and the rate of the tax credit were increased to €2,600 and 40 per cent in 2007. In addition, more favourable provisions were introduced for photovoltaic arrays: up to €3,380 with a carryover of three years, which was enough to ensure full coverage of the investment in many cases. Empirical evidence indicates a high budgetary cost, low environmental effectiveness, presumptions of free-riding and adverse distributional effects. The budgetary cost of the scheme expanded rapidly. According to the annual editions of the Federal Inventory of Tax Expenditures, the revenue forgone increased from €36 million in 2002 to €1.15 billion in 2010. The environmental effectiveness of the scheme was assessed as low in a report by the High Council of Finance.[16] A further assessment by Baveye and Valenduc (2011) of the specific case of photovoltaic arrays – the most widely used in the qualifying expenditures – estimates the environmental cost of the tax credit at €497 per avoided CO_2 tonne. At that time the ETS price of a CO_2 tonne was around €15.[17]

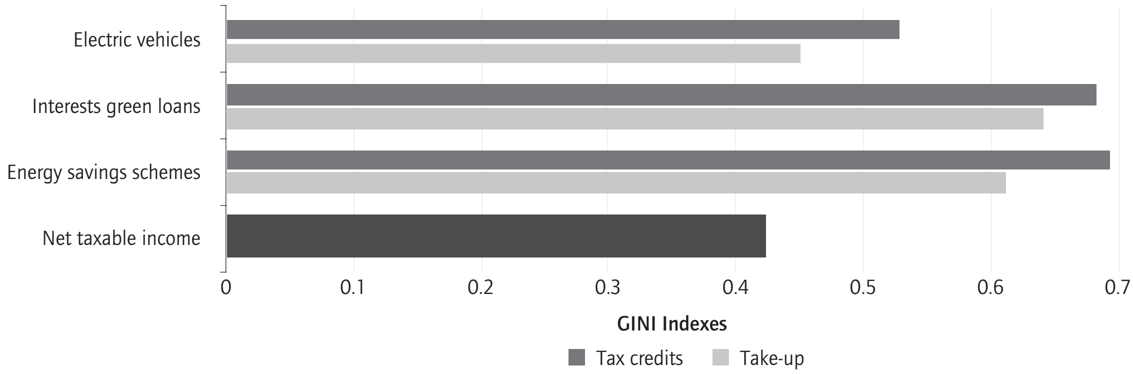
Finally, the tax credit appears to be unevenly distributed.[18] The same holds for other tax credits related to 'green' expenditure. Figure 4 illustrates this synthetically, using GINI indexes. These are computed on the basis of tax

16. Conseil supérieur des Finances (2009), 157–162.
17. In addition to the federal tax credit, households investing in photovoltaics were eligible for regional premiums, including 'green certificates' rewarding green management of home electricity production. According to Spies et al. (2008), the budgetary cost of the avoided CO2 tonnes reached €1,558, taking into account premiums and green certificates.
18. Conseil supérieur des Finances (2009), 152–155.

credits and their take-up. The GINI index of the environmental tax incentive is higher than the GINI index of the distribution of taxable income. This indicates that the benefit of the tax credit is concentrated on the upper side of the income distribution. Most of the adverse distributional effect arises from the distribution of the take-up, which means that there is an issue of non-affordability for low- to middle-income earners.

Belgium also introduced a tax credit for interest paid on green loans. As indicated in Box 1, there might be a capital market failure that could provide a policy rationale for such a tax credit. The tax credit was not means-tested, however, and most of its benefits for households and revenue forgone by the government were clearly concentrated at the upper end of the income distribution, with a GINI index of the take-up of the tax credit higher than those prevailing for other environmental tax incentives (see Figure 4). Clearly, the incentive does not solve the capital market failure; if it did, the distribution of the take-up of the tax credit should be more equal than the distribution of net taxable income.

Figure 4 **Distribution of environmental tax credits and of net taxable income. Personal income Tax, Belgium, 2015**



Note: the GINI index is a measure of inequality, ranging between 0 (total equality) and 1 (total inequality). GINI indexes are computed for net income (the black bar) and for tax credits, with a distinction between the distribution of the take-up (light grey bar) and the distribution of the revenue forgone (total, dark grey bar). The GINI index for take-up is calculated by imputing to any taxpayer claiming the tax credit (having made the eligible expenditure) the average amount of the tax credit. As the GINI index is independent of the mean of the distribution, the corresponding figures capture only the effects of the take-up, disregarding differences in the amount of the tax credit and the underlying qualifying expenditure. In most case, the tax credits are distributed more unequally than net income is. This means that the effects of tax expenditure are concentrated on middle- to high-income earners.
Source: Federal Ministry of Finance – Belgium – author calculations

Eurofound (2021) provides a broader view of the distributional effects of environmental incentives. For most of them, the distributional effect appears to be regressive. This holds for incentives for the purchase of electric and hybrid vehicles. These are not affordable for low-income households so that most of the beneficiaries are concentrated at the upper end of the income distribution. This holds for schemes available in Austria, Lithuania, Norway, Romania and Sweden.

Even if carbon pricing is found to be regressive, environmental tax incentives do not appear to be a valuable alternative option:

- Switching to them does not solve the distributional issue: it just replaces regressive (at worst) or proportional taxes by tax expenditures that benefit mostly the rich. The qualifying expenditures are not affordable for low-income earners.
- Moreover, the use of environmental tax incentives is costly, while carbon taxes or tradable permits raise revenue. While the revenue of carbon pricing can also be used for compensating low-income earners for the regressivity of carbon taxation, the revenue forgone from tax incentives requires funding, which may result in increasing taxation elsewhere, the distributional consequences of which also have to be considered.
- The two types of instruments also have opposite consequences from an intergenerational point of view. In the case of carbon taxes, costs fall on the current generation and are highly visible, while the benefits are for future generations and are obscure. In the case of environmental tax incentives, the benefits are for the current generation and are highly visible, but the financing costs are an invisible burden on future generations.
- Finally, the cost of the avoided CO_2 tonnes is very high, due to free-riding.

3.3.2 Carbon taxes versus norms and regulations

Regulations and norms have also been widely used in environmental policy. The European Green Deal and the 'Fit for 55' package do not disregard this route: for example, they reinforce standards on cars. They have also been used for dwellings.

Economists have long argued that taxes are more efficient than standards in reducing vehicle emissions. If standards are less or not at all regressive, there should be a trade-off between carbon pricing and standards. If they are regressive, there is no trade-off and carbon pricing would be a win–win strategy regarding cost effectiveness.

Empirical studies on the distributional effects of standards are scarce compared with the literature on the distributive effects of energy taxes and carbon pricing. But there are some interesting conclusions. Levison (2016) discusses the issue from theoretical and empirical points of view. Both approaches conclude that standards are more regressive than taxes. The empirical approach relates to the US standards for cars that the author compares with the gasoline tax. To avoid comparing apples and oranges, the standard is transformed into an equivalent tax inversely related to energy efficiency. The author next discusses more broadly the debate between standards and taxes in the areas of transport and buildings. Richer households drive cars that are less energy efficient, not more. Their cars might be less pollutant according to the strict view of energy efficiency (theoretical emissions and energy consumption) but they differ from the cars of the poor – when they have cars – in many other ways that sacrifice fuel economy. One such way is that they drive more: this is an illustration of the above cited rebound effect. Car ownership increases with income, but less steeply than the number of kilometres driven.

The same predictions may be made regarding appliances and buildings. Empirical evidence indicates, for example, that the proportion of homes with double or triple-glazed windows increases with income. So a standard requiring such windows would bear more disproportionately on low- and middle-income earners.

Eurofound (2021) gathers information on the distributional effects of standards. Evidence is mixed and the publication neither indicates nor discusses the methodology used to assess distributional effects. It just indicates whether they are progressive or regressive. The UK energy efficiency schemes for cars are found to be regressive and the same holds for the differentiation of vehicle taxes according to emissions in Denmark.

3.4 Carbon pricing: win-win strategy, including the issue of fairness?

In the policy debate, the discussion of distributional issues usually does not go further than the distributional consequences of carbon taxation. They are found to be regressive in most cases, almost never progressive.

This debate is clearly truncated. The buzzword today is 'something has to be done'. EU countries will have to curb carbon emissions by 55 per cent by 2030 and become carbon neutral at mid-century. If governments disregard carbon taxation, other instruments will have to be used, including incentives and regulations, and the related distributional consequences have also to be considered. A key point is that carbon pricing revenue can be used to compensate households and so reduce regressivity and even to turn the net effect into one of progressivity while standards and norms do not provide revenue and incentives are costly. Moreover, they seem to be regressive as well.

Taking into account intergenerational issues, which also matter, we have to consider the best combination of cost effectiveness and fairness. Regarding cost-effectiveness, it is well established that carbon pricing is superior to incentives and regulations. Taxes are regressive in a no-compensation scenario but well-targeted revenue recycling policies might turn the effect positive. Incentives are also regressive as they benefit the richest more than low- or middle-income earners. Moreover, they are costly for the budget and have to be financed by tax increases elsewhere or cuts in expenditure. It is unclear – and we may have strong doubts – that the financing may overcome regressivity. The distributional effects of regulations have not received much attention to date, but we may assume that they are unlikely to be progressive and could be regressive in most cases.

Finally, then, carbon pricing could be win–win, as well as fair, bearing in mind that revenue recycling scenarios are key. Taking into account intergenerational equity and the distributional consequences of inaction clearly reinforces our conclusions.

4. The Carbon Border Adjustment Mechanism

The Carbon Border Adjustment Mechanism is the third element of the carbon pricing component of the 'Fit for 55' package. We will first discuss whether and why we need it, next turn briefly to legal issues (compatibility with WTO rules) and then to design issues: does it have to be selective or general? We will then return to the rationale: is it a matter of economics or politics?

4.1 Do we need it?

From a policy – or political – point of view, the answer is obviously 'yes': competitiveness concerns have been identified as the second main political economy obstacle to the implementation of carbon pricing. But is it so obvious from an economic point of view?

Carbon leakages may occur through two channels.

The 'trade channel' is the most often cited. It refers to the loss of comparative advantages that countries face with carbon pricing or strong environmental regulations. Those policies increase relative production costs, which may result in a shifting of production and emissions abroad. The shift in production has adverse consequences for value added and employment in the regulating country, while global emissions are not reduced. They may even increase if in the new location production uses technologies that pollute more.

The 'energy price channel' is less frequently identified. Policies that reduce demand for fossil fuels push the price downward. If the implementing region is large enough – which is the case for the EU as a whole – price will drop significantly and this might increase demand for fossil fuels in the rest of the world. Even if the trade channel dominates the policy debate, the 'energy price channel' should not be disregarded: the OECD (2020) notes that, according to empirical evidence, the energy price channel may dominate.

There is significant uncertainty about the magnitude of carbon leakages. Among empirical evidence, a distinction has to be made between ex-ante and ex-post analysis. Ex-ante studies are based on a computable general equilibrium model. Most of them conclude indeed that unilateral climate policies will result in some form of carbon leakage. Ex-post studies are less numerous. As emissions embodied in trade flows are hard to calculate, they rely more on proxies such as trade or foreign direct investment (FDI) flows.

Effects on trade volumes appear to be limited (OECD 2020; Zachmann and McWilliams 2020). According to this strand of analysis, carbon leakage should be concentrated in a subset of energy-intensive sectors. Regarding the EU Emission Trading System, there is no evidence that it has led to carbon leakages. Effects on FDI also seem limited.

There thus seems to be a contradiction between the attention devoted to carbon leakage in the policy debate and its magnitude according to ex-post analysis. The direction of causality may be the explanation. Because the issue is extremely important it has been integrated in the design of carbon taxes and issuance of permits with the intention of limiting the potential risk of carbon leakage: early adopters of carbon taxes have introduced exemptions for exporting firms or firms facing competitiveness problems, and free allowances have been included in the Emission Trading System. It is therefore not surprising that, ex-post, the effects appear to be limited: climate policy instruments have been designed to limit them.

This does not mean, of course, that more stringent policy that diverges across regions would not lead to carbon leakage. The conclusion of ex-ante analysis is, from this point of view, more pertinent.

A significant risk of carbon leakages is a necessary condition for carbon border adjustment. But is it sufficient? Will the benefits outweigh the cost? The issue is discussed extensively by Horn and Sapir (2013). They consider that, from an economic point of view, a carbon border adjustment must be beneficial from an international perspective, which requires the factoring in to the analysis of the interests of importing and exporting countries. It should also prevent degeneration into protectionist abuses. They conclude that 'without an international agreement that would include prevention by countries of externalities, unilateral import restrictions might be justified from an international perspective as a second-best policy' (Horn and Sapir 2013: 4).

International coordination is obviously the 'first best' policy. But as climate action is needed urgently, carbon border adjustment is a valuable second-best option. In addition to its direct effects, it could also put pressure on countries outside the EU to further reduce CO_2 emissions. The second best option could pave the way for the 'first best'.

4.2 Compatibility with WTO rules

Any border adjustment has to be compatible with WTO rules. As the European Commission proposal relies on the Emission Trading System, we will discuss the compatibility issue in that framework.

According to OECD (2020), an emission trading system that requires importers to purchase allowances could be considered as a form of domestic regulation or as a tax under WTO rules. In both cases, the requirement of 'equivalence' will apply. Charges on imports that are equivalent to certain internal taxes or, like domestic products, are compatible with WTO rules if several conditions are met. The border tax adjustment must be imposed on specific products and the adjustment may not exceed the tax rate levied on domestic products. These rules make it possible, for example, to apply excise duties to imports because the same rules apply to imports and domestic production.

CO_2 emissions are not a product, but rather a by-product of the production process. They are not physically present in the final good. 'Equivalence' should then require that the tax be calculated in the same way, whether for domestic products or imports. From that point of view, the use of default values could be problematic. The proposed regulation (European Commission 2021d), however, leaves open an alternative option: foreign producers may prove that in their production process the carbon content is lower than the default value. If the carbon content is higher than the default value, the border adjustment will be lower than the domestic one, which makes it compatible. If it is lower and the producer can prove the carbon content, equivalence will hold. The only case in which equivalence would not hold is when the producer does not use the option of proving that carbon content is lower than the default value. In such circumstances, it is the foreign producer that breaches equivalence, not the domestic (here European) rules.

A border adjustment may also be permitted if it is related to the conservation of exhaustible natural resources, if such measures are implemented in conjunction with restrictions on domestic production or consumption. The case might be made that clean air is an exhaustible resource but the connection between means and ends has to be proved. The border adjustment should not be too wide in its scope.

4.3 Should border adjustment be selective or general?

The modelling exercise and empirical evidence tend to indicate that carbon leakages are concentrated in a subset of sectors, the so-called 'Carbon Intensive and Trade Sectors' (CITE sectors). A sectoral approach might therefore be an option. It should ease implementation while addressing a significant part of carbon leakages. The steel and cement industries, for example, could be among the targeted sectors. Zachman and McWilliams (2020) discuss the options and consider whether putting a carbon border tax on specific products could lead to trade distortions elsewhere in the value chain, with trade flows being redirected to downstream products. Tariffs imposed by the previous US government (before President Biden) provide an interesting case study. Tariffs on steel did not result in an increase in domestic steel production. Steel imports decreased but imports of steel products increased significantly. The decision was then made to extend tariffs further down in the value chain. This is a good example of 'cascading protectionism'.

The difficulties of implementing a sectoral approach make a case for comprehensive carbon border adjustment. But the broader the scope, the higher the complexity and the compliance costs. Calculating upstream emissions is far from being obvious. It requires details about the supply chains and there might be differences between marginal and average emissions. There is an obvious trade-off between effectiveness, which would require broader scope, and feasibility, which would require targeting of the most polluting activities.

The route taken in the 'Fit for 55' package seems to solve the trade-off with a compromise. Regarding scope, processed products are included in addition to 'specific goods', which could help to solve the trade distortions mentioned above. Regarding complexity, it proposes the use of default values while allowing importers to pay less if they can prove a lower carbon content.

4.4 Is it about economics or policymaking … or politics?

We introduced the discussion of the Carbon Border Adjustment Mechanism by mentioning that political aspects seem to dominate. Finally, what is it about? Pirlot (2021) reviews the various purposes of a Carbon Border Adjustment Mechanism, including its economic and political purposes. Among economic purposes, she considers the issue of carbon leakage under 'fair competition' and the 'consumption-based story', under which emissions are supposed to be taxed where consumption takes place. Among political purposes, she discusses the fact that the Carbon Border Adjustment Mechanism includes an instrument intended to foster global compliance with the Paris Agreement and to position the EU as climate policy leader at international level. She also includes a fiscal objective, with the Carbon Border Adjustment Mechanism as a new resource for the EU Budget. She details how a Carbon Border Adjustment Mechanism should be designed for each of these purposes and compares these design requirements with the EU proposal. She also concludes that the Carbon Border Adjustment Mechanism proposed by the European Commission is inconsistent with the Commission objective of promoting fair competition and is primarily an instrument of climate leadership.

We do not deny the second point but the first is at least disputable. It lacks a clear definition of what 'fair competition' means from an economic point of view. 'Fair' could refer to competing on a level playing field, including internalisation of external costs. It also requires pricing in an equivalent way the carbon content of foreign producers and domestic producers. The author emphasises 'avoiding carbon leakages' and so considers that a Carbon Border Adjustment Mechanism should tax imports and relieve exports. In this way, competition would be 'fair' in the domestic market (the EU single market) and also on foreign markets. But relief for exports will counteract the climate objective. In a static view, it may be the case that 'fair competition' entails relief for exports, but viewed dynamically, it encourages foreign producers to adopt clean technologies. The mechanism is an incentive for fair competition, including externalities.

The concerns were more on the political side. It is therefore not surprising that the answer is also primarily political. But that does not mean that it deviates from fair competition. Rather it has to be seen as a new way of promoting fair competition, one that includes incentives to incorporate externalities. In doing so, it also improves intergenerational fairness.

Conclusion

Acting against climate change requires a broad and effective policy mix. From an economic point of view, carbon pricing may not be disregarded and has to be part of the package. The 'Fit for 55' package recognises that and makes proposals for an extension of the existing Emission Trading System to aviation and maritime transport, a new, separate Emission Trading System for road transport and buildings, a revised and updated Energy Taxation Directive and a Carbon Border Adjustment Mechanism.

Our discussion has focused on fairness and competitiveness.

Regarding fairness, its intergenerational dimension requires carbon pricing. Distributional issues have to be considered more broadly than up to now. The issue is not whether carbon pricing is regressive or not, but what the distributional consequences of carbon pricing are in comparison with other policy options. It appears that other options do not have better distributional consequences: failure to act will hit the poor more than the rich, environmental tax incentives benefit the rich more than low- and middle-income earners, and environmental standards may also be regressive, as the clean alternatives they impose are less affordable for low- and middle-income earners. But while carbon pricing procures revenue that can be used to compensate for regressivity, standards and norms do not procure any revenue that could be used for that purpose and environmental tax incentives have to be financed. In addition, carbon pricing ensures cost-effectiveness in a better way than incentives and standards.

Regarding competitiveness, it seems that the political dimension has dominated economic considerations. Economic evidence on carbon leakages is limited, but the fact that leakages seem to be limited results more from the political decisions made up to now – free allowances under the Emission Trading System and tax exemptions – than from economic mechanisms. The proposed Carbon Border Adjustment Mechanism would make it possible to achieve environmental objectives while limiting the adverse effects on competitiveness. It also includes a political dimension as it reinforces EU leadership in this area.

While the competitiveness issue is mainly in the hands of the European Commission, ensuring fairness is mainly in the hands of the Member States. The Commission has to deliver within the framework of its competences. In addition to the new social climate fund, revenue from the auction of permits for road transport and housing will be allocated largely to the Member States: it is up to them to use it to compensate those who need to be supported in the transition and to avoid regressivity.

Policymakers have an opportunity to take action against climate change in a fair and efficient way. Proposals have been made. They need to be complemented by national actions. It is up to national governments to ensure fairness.

References

Alberini A., Bigano A. and Bocri M. (2014) Looking for free riding: energy efficiency incentives and Italian homeowners, Energy Efficiency, 7 (4), 571–590.
Belgian National Debate on Carbon Pricing (2018) Carbon pricing: gradually correcting prices to support the low carbon transition – Final report, Brussels, Federal Public Service Health, Food Chain Safety and Environment.
Baveye J. and Valenduc C. (2011) Are environmental tax incentives efficient?, Bulletin de Documentation, 71 (2), 139–165.
Braathen N.A. and Greene J. (2014) Tax preferences for environmental goals: use, limitations and preferred practices, Environment Working Paper 71, Paris, OECD Publishing.
Conseil Supérieur des Finances (2009) La politique fiscale et l'environnement, Bruxelles, SPF Finances.
Douenne T. (2018) Les effets redistributifs de la fiscalité carbone en France, Les notes de l'IPP 34, Paris, Institut des Politiques Publiques.
Eurofound (2021) Distributional impacts of climate policies in Europe, Luxembourg, Publications Office of the European Union.
European Commission (2019) The European green deal, COM(2019) 640 final, 11 December 2019.
European Commission (2021a) 'Fit for 55': delivering the EU's 2030 climate target on the way to climate neutrality COM(2021) 550 final, 14 July 2021.
European Commission (2021b) Proposal for Directive of the European Parliament and the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, COM(2021) 551 final, 14 July 2021.
European Commission (2021c) Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity, COM(2021) 563 final.
European Commission (2021d) Proposal for a regulation of the European Parliament and of the Council establishing a carbon border adjustment mechanism.
Flues F. and Thomas A. (2015) The distributional effect of energy taxes, OECD Taxation Working Papers 23, Paris, OECD Publishing.
Green J.F. (2021) Does carbon pricing reduce emissions? A review of ex-post analyses, Environmental Research Letters, 16 (4).
Horn H. and Sapir A. (2013) Can border carbon taxes fit into the global trade regime?, Policy Brief 2013/06, Brussels, Bruegel.
I4CE (2021) Global carbon accounts in 2021, Paris, Institute for Climate Economics.
Kohlscheen E., Moessner R. and Takáts E. (2021) Effects of carbon pricing and other climate policies on CO_2 emissions, Working Papers 9347, Munich, CESifo.
Laurent E. and Le Cacheux J. (2011) Réforme de la fiscalité du carbone dans l'Union européenne : les options en présence, Revue de l'OFCE, 116, 393–407.
Levison A. (2016) Energy efficiency standards are more regressive than energy taxes: theory and evidence, Working Paper 22956, Cambridge, MA, National Bureau of Economic Research.
Mideska T. (2021) Pricing for a cooler planet: an empirical analysis of the effect of taxing carbon, Working Paper 9172, Munich, CESifo.

Naumeau M.-L. (2014) Free-riding on tax credits for home insulation in France: an econometric assessment using panel data, Energy Economics, 46, 78–92.
Quinet A. (2009) La valeur tutélaire du carbone, Centre d'analyse stratégique, Rapports et documents 16, Paris, La Documentation française.
OECD (2006) The political economy of environmentally related taxes, Paris, OECD Publishing.
OECD (2020) Climate policy leadership in an interconnected world: what role for border carbon adjustments?, Paris, OECD Publishing.
OECD (2021a) Effective carbon rates 2021: pricing carbon emissions through taxes and emissions trading, Paris, OECD Publishing.
OECD (2021b) Carbon pricing in times of Covid-19: what has changed in G20 economies?, Paris, OECD Publishing.
Pirlot A. (2021) Carbon border adjustment measures: a straightforward multi-purpose climate change instrument?, Journal of Environmental Law, 1–28. https://doi.org/10.1093/jel/eqab028
Schubert K. (2013) Plaidoyer pour la taxe carbone, in Askenazy P. and Cohen D. (eds.) 5 crises, 11 nouvelles questions d'économie contemporaine, Paris, Albin Michel, 697–748.
Spies B. and Buxant B. (2008) Des fonds publics pour le photovoltaïque : est-ce efficace ? , Valériane, 71.
Tovar Reaños M. and Lynch M.A. (2019) Carbon taxation in Ireland: distributional effects of revenue recycling policies, Dublin, Economic & Social Research Institute.
Valenduc C. (2017) Politique fiscale et environnement : quid pour le résidentiel ? Contribution to the second technical workshop of the National debate on carbon pricing, Politique fiscale et environnement, Quid pour le résidentiel ? https://climat.be/doc/10_Environmental_fiscal_policy_in_the_building_sector_CV.pdf
Vergnat V., D'Ambrioso C. and Liégeois P. (2020) La fiscalité écologique au Luxembourg : quels effets redistributifs ?, in Chambre des salariés du Luxembourg (ed.) Panorama social 2020, Luxembourg, Chambre des Salariés, 50–62.
Zachman G., Fredriksson G. and Claeys G. (2018) The distributional effects of climate policies, Brussels, Bruegel.
Zachman G. and McWilliams B. (2020) A European carbon border tax: much pain, little gain, Policy Contribution 5, Brussels, Bruegel.

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