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The Role of Social Protection in Environmental Fiscal Reforms

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Abstract

Socio-ecological transitions need to address the pressing challenges of our time, namely climate change mitigation and social development – including poverty and inequality reduction – in a complementary manner. The importance of achieving resilient and sustainable societies has been made more evident by recent shocks such as the Covid-19 pandemic and the war in Ukraine. As a consequence, national and international development policies need to foster links between social and environmental goals and policies.

One way to achieve such synergies is through environmental fiscal reforms, defined as the combination of carbon-pricing mechanisms and consequent revenue spending for environmental and socio-economic goals. Even though carbon pricing is just one of the instruments needed to achieve climate goals, it provides the complementary benefit of expanding revenues while incentivising a reduction in emissions though market signals. This paper discusses environmental fiscal reforms from the perspective of low- and middle-income countries and development cooperation, with a focus on how to improve the social outcomes of such reforms. While revenues can be recycled for different purposes – including compensating industries with high adaptation costs, further investments in environmental projects and research, and use for the general budget – the paper focusses on social spending. The revenue can be used to decrease poverty and inequality levels and to compensate the poorest for increases in prices by utilising social protection mechanisms. This is particularly important to garner broad societal support and to make environmental fiscal reforms and carbon pricing more socially acceptable and implementable at sufficient levels in more countries.

The paper first presents the key features of different carbon-pricing policies and the revenues they can generate, especially for low- and middle-income countries that have limited fiscal space. It then shows how the revenue can be used to fund social protection mechanisms that can compensate the poorest and address distributional concerns. It underlines the gaps and limitations of current social protection programmes, especially in terms of low coverage of vulnerable populations. This also constrained the response to the war in Ukraine, as lower-income countries had to use price stabilisation mechanisms – which ultimately generated negative fiscal and environmental effects – to avoid inflicting greater burdens on the poor instead of providing targeted programmes.

The paper also offers some design principles to best address distributional concerns, including sequencing and sectoral coverage. It then discusses the role that development cooperation can have in implementing environmental fiscal reforms in low- and middle-income countries.

Overall, the paper suggests that environmental fiscal reforms can be used to achieve resilient societies and accelerate the fight against climate change, with the goal of building a more inclusive and sustainable future. Such reforms should become a priority of German development cooperation and a key lever for its strategic goals, instead of occupying a peripheral role, as it currently does. Most importantly, the analysis strongly underlines the case for environmental fiscal reforms rather than the current use of subsidies and price controls; this is true when considering both climate goals (as keeping prices low does not incentivise shifts in production and consumption) as well as social goals (e.g. cash transfers result in significantly greater levels of poverty and inequality reduction when compared to untargeted subsidies). Therefore, social protection investments are urgently needed, also in lower-income countries. The current energy crisis due to the war in Ukraine and the Covid-19 pandemic has made this clearer.

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Abbreviations

BMZ	Federal Ministry for Economic Cooperation and Development / Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CO_2	carbon dioxide
COP	Conference of the Parties
ETS	emissions trading scheme
EU	European Union
GDP	gross domestic product
GHG	greenhouse gas
IMF	International Monetary Fund
LPG	liquefied petroleum gas
OECD	Organisation for Economic Co-operation and Development
VAT	value added tax

1 Introduction

Development cooperation faces increasing sets of challenges. On one side, development objectives have to address, and achieve, different dimensions and goals. The Sustainable Development Goals – but also the narrative of just transitions and the Pairs Agreement – call for achieving social, environmental and economic goals jointly. Achieving these socio-ecological transitions is particularly demanding in lower-income countries. On the other side, current crises such as Covid-19 and the war in Ukraine are pushing us towards radical change due to increased challenges. These include the need for more fiscal space and protecting the most vulnerable while achieving energy security and balancing short- and long-term policy priorities. In the context of these growing challenges, it is critical for development cooperation to advise and implement policy mixes that achieve different goals.

Environmental fiscal reforms can be defined as the combination of taxes (and tax-like instruments, such as the removal of subsidies) related to environmental damages (such as carbon emissions) coupled with socially and environmentally productive ways of using the revenues raised. The taxes can redirect investments as well as production and consumption patterns towards greener outcomes while raising revenues to achieve social outcomes (Organisation for Economic Co-operation and Development [OECD], 2017). By implementing environmental fiscal reforms, countries can then achieve a "triple dividend": cutting pollution, increasing economic activity and generating development co-benefits such as cleaner water, safer roads and improvements in human health.

To achieve these advantages – and because environment-related tax volumes are low in many lower-income countries – environmental fiscal reforms have been strongly advocated for during the Covid-19 recovery, given the fiscal constraints and the need to protect the poorest. But these reforms have also been advocated increasingly over the last decades. This began with discussions about the role that environmental fiscal reforms could play in pursuing the Millennium Development Goals of "halving absolute poverty" and "reversing the loss of environmental resources by the year 2015" (OECD, 2005). This was underlined in the 2002 UN summits on Financing for Development and Sustainable Development. Given this importance, this discussion paper is meant to be a primer on environmental fiscal reforms, focussing on how to improve the social outcomes of such reforms by recycling revenues towards social protection policies. The geographical focus is mainly low- and middle-income countries and includes the role of development cooperation.

Many economists believe that pricing the emission of carbon is the most efficient way to reduce emissions. Yet, to achieve emission-reduction goals, carbon pricing has to be accompanied by other climate mitigation policies, such as regulations, subsidies, voluntary information and action. For example, regulations will be required to reduce emissions from greenhouse gas (GHG) sources that are not easily covered by carbon pricing, such as agricultural and other land-use activities and certain production activities, including, for example, methane emissions from oil and gas production. Therefore, a policy mix is needed, given the imperfect monitoring of pollution, the limitations of policy and the existence of political constraints.

A carbon-pricing instrument is nonetheless a critical component of a climate policy mix, wherein additional instruments compensate for the non-optimal levels of the main policy instrument (van den Bergh et al., 2021). Carbon-pricing instruments are increasingly being implemented, for example there are 68 carbon taxes and cap-and-trade instruments in operation, covering around 23 per cent of total global GHG emissions (World Bank, 2022).

Moreover, carbon pricing produces revenues that can be used to address different issues and actors, including reducing other (distortionary) taxes; directing revenues to households; providing transitional support to industry; addressing competitive issues; reducing public debt or using revenues for general spending; and providing funding for additional climate investment

(Jakob, Flachsland, Steckel, & Urpelainen, 2020). In this paper, we focus on using revenues for social policies to achieve emissions and environmental targets in a just and inclusive manner. Although other purposes are also important, we focus on this type of revenue recycling, as recent research has shown how the fairness of climate policies such as carbon taxes is the main determinant for their acceptance by the public (Bergquist, Nilsson, Harring, & Jagers, 2022). This is in line with the current focus on just transitions. Therefore, recycling the revenues from environmental taxes to other fiscal measures, especially social spending, is not only intrinsically important – as poverty and inequality are important policy goals per se – but also instrumentally important. The importance of combining social and environmental goals has been underlined in recent international arenas such as meetings of the Conference of the Parties (COP) and G7, especially through just transitions (which include environmental fiscal reforms), less support for fossil fuel (subsidies) and support for climate clubs, which can be conceptualised as global environmental fiscal reforms.

From a practical perspective, the implementation of environmental fiscal reforms is not straightforward. These reforms depend on several design components such as i) the tax level, ii) the coverage of the tax and iii) the use of the revenues. Efficiently using revenues for social purposes can be important, as well as leaving a share of the revenues for other goals; environmental fiscal reforms are categorised as revenue-neutral if all the revenue is redistributed to firms and citizens (Yip, 2018).

This paper is structured as follows. Section 2 explores the types of and revenue potential of carbon pricing by underlining the advantages and disadvantages, especially in the context of low- and middle-income countries. It also considers how implicit – and not just explicit – carbon-pricing mechanisms can be used. Section 3 looks at the different effects of carbon pricing. It points out that carbon pricing could potentially have negative effects on poverty and inequality. It reviews the literature and informs development cooperation of the main negative distributional effects that need to be addressed if environmental fiscal reforms are to achieve socio-ecological transitions. In Section 4, the importance of distributional effects is underlined, namely how the fairness of climate policies is the main factor in determining the level of support from the public. Section 5 explains how social protection mechanisms can be used to address these distributional effects. This section is directly linked to the next one in underlining the principles and mechanisms (but also barriers) that development cooperation needs to consider. Section 6 summarises the main policy implications, while Section 7 discusses the role of bilateral and multilateral development cooperation and what needs to be done to facilitate environmental fiscal reforms in low- and middle-income countries.

2 How to price carbon: Types and revenue potential

We focus here on carbon pricing as a form of environmental tax. This is because of the large and expanding body of literature on carbon pricing and because of its policy relevance. Nonetheless, much of the research also concerns environmental taxes, such as those that cover all GHG emissions. Many reports have calculated the carbon-pricing levels needed to achieve the Paris goals (Carbon Pricing Leadership Coalition, 2017). Broadly speaking, these goals would need to result in net zero emissions by 2050, with a considerable reduction by 2030. To achieve this goal, it has been estimated that the price for a ton of carbon dioxide (CO_2) in the next few years would need to be between US$40-50 and US$80-100 per ton.

We first focus on national carbon-pricing mechanisms before discussing global mechanisms in subsequent sections (Section 7 focusses on development cooperation). Although a first-best solution would be a global uniform carbon price and unlimited financial transfers between countries (and between households within countries) (Kornek, Klenert, Edenhofer, & Fleurbaey, 2021), this is clearly not feasible politically, especially in the short term. The same can be said

of coordinated carbon tax levels across regions that take into account differentiated responsibilities and capabilities. Therefore, unilateral national carbon-pricing initiatives must be the driving force in the coming years.

At the end of this section, we present the revenue-raising potential of carbon pricing to underline the possibilities for fiscal reforms and poverty reduction.

2.1 Explicit and implicit pricing

Carbon pricing can take different forms and include different instruments.[1] In the following sub-sections, we divide the instruments into the ones that put an explicit price on carbon and those that put an implicit price on it.

2.1.1 Explicit pricing

Explicit carbon-pricing policies are policies that put an explicit price on the externality, in this case carbon emissions. This means that the total volume to be paid by, for example, a company is explicitly linked to the amount of emissions produced. Explicit carbon-pricing policies include two main instruments: carbon taxes and emissions trading schemes (ETSs).[2] Broadly speaking, a carbon tax puts a price on CO_2 emissions and lets the market determine the amount of emissions; an ETS puts a cap on the total amount of carbon emissions, and then it is up to the market to decide the price from the buying and selling of rights to pollute within the fixed maximum amount, or cap (Metcalf, 2021). In 2022, there were 68 carbon-pricing instruments in place globally, including 37 carbon taxes and 34 ETSs (both carbon taxes and ETSs apply simultaneously in some countries); these instruments covered around 23 per cent of total global GHG emissions (World Bank, 2022). But the pricing level of most initiatives is still very low and far from the necessary levels previously mentioned. In addition, some carbon-pricing initiatives do not cover the entire economy but just some sectors. Therefore, the level that is communicated is actually much higher compared to the average carbon price for the economy as a whole, given that many sectors and actors that emit high proportions of national emissions are not covered (Finch & van den Bergh, 2022).

Although both carbon taxes and ETSs have the advantage of raising revenues (and they can both be applied to the economy as a whole or to specific sectors), they each present specific advantages and disadvantages. This has consequences for deciding when to use them, depending on the different contexts and political economies (Metcalf, 2021).

Carbon taxes present significant advantages that make them preferable to ETSs, such as the fact that they fix the price (tax level), and therefore are not subject to price volatility.[3] This lower degree of volatility may also increase efficiency, as it avoids resource misallocation arising from inaccurate predictions of costs.

1 Taxes can be levied on energy production, consumption or trade, for example.

2 In this paper, we refer to cap-and-trade schemes as emissions trading schemes (ETSs), which is a system in which emitters can trade emission units to meet their emission targets. The two main types of ETSs are cap-and-trade and baseline-and-credit. The former applies an absolute limit (cap) on the emissions, with emissions allowances distributed for free or through auctions. Baseline-and-credit systems define baseline emissions levels for individual regulated entities; credits are given to entities reducing their emissions below this defined level and can be sold to other entities (World Bank, 2022).

3 Over time, however, both taxes and ETSs can, at least to some degree, balance uncertainty over emissions and prices, so in practice the differences between the two approaches may be less pronounced. ETSs may include price stability mechanisms such as price floors and banking/borrowing provisions, while future emissions caps could also be adjusted, if needed, to help stabilise prices.

In addition, taxes are less administratively complex. They can be easily levied on major producers of CO_2 and largely integrated into existing tax policy frameworks. Carbon taxes can also be applied at different points of the production chain. The easiest point to tax would be *upstream* (at the point of fuel extraction), integrating carbon taxes into existing regimes for coal, gas and oil producers plus fuel import. They can be integrated *midstream* (after fuel refining and processing) into collection procedures for existing fuel taxes and extended to other fossil fuels, where much of the legal and administrative infrastructure needed for carbon taxes already exists. Almost all existing national carbon taxes are applied midstream (Parry, Black, & Zhunussova, 2022).

Moreover, carbon taxes (in contrast to ETS or hybrid measures) do not require a largely new policy and institutional architecture, including, for example, allocating emissions allowances. The challenges associated with ETS implementation should not be underestimated, particularly for low- and middle-income countries with weaker institutional capacities and emissions data availability. As a result, ETSs, which generally come under the purview of environment ministries, typically require more sophisticated administration, which may lead politicians to impose them only for certain industries, mostly *downstream* to large stationary sources in the power and industrial sectors.

Carbon taxes also avoid another problem inherent with ETSs, namely “adverse policy interactions”. In most cases, politicians apply additional, often sector- or technology-specific, measures to reduce emissions. This includes, for example, subsidies for renewable energy, low-carbon fuel standards for refineries and measures to increase energy efficiency. Within an ETS, the emission reductions achieved by such additional policies lower the price of emissions, thereby creating an incentive to pollute more. Any emission reductions in supplementary programmes will simply be offset by increases in emissions elsewhere. Moreover, revenues from the ETSs will decrease, whereas the economic costs of reducing emissions will be driven up. If the goal is to achieve the largest decrease in emissions, the best strategy would be a combination of carbon taxation with renewable energy policy; the latter is important to address (expensive) reductions that cannot be driven by the tax (van den Bergh et al., 2021).

Conversely, ETSs also present some advantages. Compared to carbon taxes, the allowances created in an ETS are valuable assets that policy-makers can distribute in ways that minimise political opposition; free permits to emit can be given to vested interests in certain situations to diminish opposition from big players. ETSs have sometimes been chosen over carbon taxes for constitutional and legal reasons, such as restrictions on new taxes. For example, the European Union (EU) does not have a fiscal union, and tax measures require unanimity, whereas regulations such as an ETS require a qualified majority (International Monetary Fund [IMF], 2022). ETSs also provide certainty regarding the overall amount of emissions, at least in the short term.

To maximise the advantages of both instruments, “hybrid” policies can be implemented; in fact, both carbon taxes and ETSs apply simultaneously in some countries. This is done to introduce cost controls and limit price volatility. Incorporating features of a tax into an ETS (through, for example, the establishment of a price floor and/or ceiling in the trading price range) potentially helps balance additional flexibility in the face of uncertain costs. This reduces price volatility, which can otherwise hinder incentives to invest in low-carbon technologies.

2.1.2 Implicit pricing

Carbon emissions are not only priced through explicit instruments such as carbon taxes and ETSs, but also via implicit pricing instruments such as fuel excise taxes and energy subsidies. These implicit pricing mechanisms change the marginal cost of emitting carbon without explicitly targeting the emissions or the carbon content of fuels (Dominioni, 2022).

Compared to explicit pricing mechanisms, it is more difficult to estimate the price that arises from these implicit pricing mechanisms. Few organisations publish figures related to implicit carbon pricing. The Organisation for Economic Co-operation and Development (OECD), in general terms, estimates implicit prices by dividing fuel tax rates per unit of fuel or energy by the carbon content of the fuel (OECD, 2021). The International Monetary Fund (IMF) follows a similar method to estimate implicit carbon prices applied via fuel taxes, but it subtracts negative implicit carbon prices applied via fossil fuel subsidies (IMF, 2019).

While in the previous section we showed that explicit carbon-pricing policies have increased significantly in recent years yet are still somehow limited, implicit carbon-pricing policies have been adopted even more widely, as virtually every country has fuel taxes in place. One important point is that implicit forms of carbon pricing tend to receive less opposition than explicit carbon pricing (Dominioni, 2022).

2.1.3 Subsidies as implicit negative carbon pricing

As part of implicit carbon pricing, it is important to consider subsidies. (Fossil fuel) Subsidies can be conceptualised as an implicit negative carbon price, as they lower the price of carbon emissions that is embodied in the production and use of the products being subsidised. Subsidies can be given for all or only specific fuels and for the products made with those fuels (such as electricity). In recent COP and G7 meetings, the importance of addressing inefficient and harmful fossil fuel subsidies has been reaffirmed.

From a fiscal perspective, the amount of subsidies is significant. Global fossil fuel subsidies amounted to US$5.9 trillion in 2020, representing 6.8 per cent of global gross domestic product (GDP). This is expected to increase to 7.4 per cent of global GDP in 2025 due to increases in fuel consumption in emerging markets (where price gaps are generally larger) (Parry, Black, & Vernon, 2021). This figure is inclusive of 1) a smaller share (8 per cent of total subsidies) of pre-tax subsidies (meaning the difference in the price of energy or fuel in the country compared to international prices), which peaked in 2018 at US$760 billion, then fell to US$450 billion in 2020, but are projected to rise and then remain at about US$600 billion from 2021 to 2025; and 2) the majority (92 per cent of total subsidies) represented by post-tax subsidies, including health, congestion and global warming costs as well as a forgone value added tax (VAT) from the government.[4]

Most organisations – and in particular the IMF – are using the price-gap method, which estimates subsidies by comparing domestic prices to world reference prices. Others also include energy subsidies by looking at all measures that support fossil fuels, such as preferential excise tax rates, which account for around 75 per cent of the support for fossil fuels in the OECD area (IMF & OECD, 2021).

2.1.4 Effective carbon taxes

Effective carbon prices are defined here as the sum of explicit and implicit carbon prices. Although there is no established method to estimate effective carbon prices, some institutions have started building datasets with slightly different methodologies. The OECD's "effective carbon rates" include implicit carbon prices imposed via fuel taxes, which account for most of

4 Local air pollution costs represent the largest share of global fossil fuel subsidies (42 per cent), followed by the costs from global warming (29 per cent) and other local externalities, including congestion and road accidents (15 per cent).

the effective carbon prices in all countries considered (OECD, 2021).[5] The OECD method does not include subsidies though.

A focus on effective carbon prices compared to explicit ones can address important political economy barriers. First of all, it can create new synergies among government departments (especially finance with regard to climate). In many jurisdictions, the involvement of finance ministries in climate policy is limited, which hinders climate policy (Dominioni, 2022). In addition, countries' engagement in carbon-pricing policy can be expanded through the use of effective carbon pricing to other actors and increase the ambition of climate policy and emission reductions.

Despite these advantages, the use and measurement of effective carbon pricing need to be carefully communicated and interpreted so as to avoid undermining climate change policy. First, it is important to underline if/that the price ranges of the High-Level Commission on Carbon Pricing refer to explicit carbon prices alone (Carbon Pricing Leadership Coalition, 2019). If this is the case, these explicit carbon prices should be imposed on top of other existing implicit pricing mechanisms, such as fuel taxes. Second, establishing what level of effective carbon pricing delivers a mitigation outcome requires estimating in a precise way the level of implicit carbon pricing (e.g. a fuel tax) needed to deliver mitigation outcomes, and its equivalence to explicit carbon pricing (e.g. a carbon tax). Only if this can be done properly will it be possible to identify combinations of implicit and explicit carbon prices that deliver a mitigation outcome.

2.2 Revenue potential

What is the potential impact of environmental fiscal reforms and their role in a green recovery? According to Parry et al. (2021), efficient pricing could raise revenues of about 3.8 per cent of global GDP; (pre-tax) subsidies account now for 0.6 per cent.[6] It has also been estimated that a carbon tax of US$30 (the lower end by which the Paris goals are to be met) would raise between 1 and 4 per cent of GDP for large middle-income countries (IMF, 2019). Removing subsidies and increasing fuel prices to their efficient levels would also generate revenue levels comparable to the ones needed to achieve the Sustainable Development Goals (Parry et al., 2021).[7]

2.2.1 Revenue decrease for less use/production of fossil fuels

In a recent study (Laan & Maino, 2022), it is argued also that revenues from fossil fuel use and production need to be considered, as they can be significant in some countries. On one side, revenues from the production side include mainly royalties, corporate income taxes, export duties and dividends from state-owned fossil fuel extraction companies. On the other side, excise taxes and VAT represent the largest share of consumption taxes.

5 In parallel, the IMF follows a similar method but also considers negative implicit carbon prices applied via fossil fuel subsidies and takes into account the effectiveness of different instruments (e.g. ETSs) to yield emission reductions compared to a hypothetical carbon tax applied to the whole economy (IMF, 2019).

6 Efficient pricing could also reduce global emissions by 36 per cent, preventing 0.9 million yearly local air pollution deaths.

7 Many emissions do not come from CO_2 combustion in many countries (especially in Africa and Latin America).

Vulnerabilities to fossil fuel phase-out vary significantly between countries, depending on revenue dependency, the ease of extraction of fossil resources and the country's capacity to diversify into other sectors. For example, in BRIICS[8] these revenues are between 1.1 and 3.4 per cent of GDP (just in Russia such revenues are higher than 9 per cent), and between 5 and 34 per cent of total government revenues. Therefore, although phasing out fossil fuel subsidies and the use of fossil fuels can free up fiscal resources and improve environmental outcomes, it is also true that there can be negative effects on budgets. For example, for Brazil, China, Indonesia and Russia, by 2050 revenues from fossil fuels are projected to be equal to around 35 per cent of 2019 levels; for India and South Africa they will be around 65 per cent of 2019 levels.

This underlines the fact that, on the one hand, climate policies such as carbon pricing can raise revenues, but on the other they may negatively affect revenue collection if prior revenue streams relied on emission-intensive industries. Similarly, when focussing on a carbon tax, there is a trade-off over time between the carbon tax level and the generated revenues. In fact, a very high carbon tax can accelerate decarbonisation and thereby quickly reduce carbon revenues; this is especially true if regulations and other policies make renewable energy even cheaper. This pattern – called the (carbon revenue) Laffer curve (Budolfson et al., 2021) – shows that tax revenues do not increase with the carbon tax rate, as high tax levels reduce emissions over time, thereby reducing the ability to generate revenue. This needs to be accounted for in terms of revenue recycling, for example tax revenue levels channelled towards social protection mechanisms can be initially high but decline once the economy decarbonises. In addition, emission levels are very low for many low-income countries, thereby the potential revenues from carbon pricing are also low in the short term. This implies that policy-makers must consider the importance of (1) decreasing emissions and climate change, which requires high carbon tax levels, and (2) increasing revenues, which require some level of continuing emissions to achieve progressive redistribution. Therefore, for low-income countries, a solution can be to identify a tax level that both decreases emissions but keeps sufficient tax revenues for redistribution for some time. This can be achieved especially if more decarbonisation happens in the short term in high-income countries and less in lower-income countries, while also responding to issues of historical responsibilities. Therefore, this needs to be taken into account, especially at the international level, and is discussed in the sections below.

3 Effects of carbon pricing: Focus on distributional implications

What are the effects of carbon pricing? And why are environmental fiscal reforms that complement carbon pricing with social programmes needed? We first briefly outline the environmental (emission reductions) and macro-economic effects to set the scene. Most concerns arise, in fact, from the potential negative effects of environmental policies on the economic performance (and as a consequence, the number of jobs) of countries. We then discuss in more details the distributional effects, meaning the effects across different income groups.

We also distinguish between real experiences and simulations – the latter are particularly important to understand the potential effects on countries that have not yet implemented ambitious carbon pricing.

8 BRIICS is an acronym for the combined economies of Brazil, Russia, India, Indonesia, China and South Africa.

3.1 Effects on growth and emission reductions

We first start with actual experiences of explicit carbon pricing, which have been limited to mainly European and North American countries.

Green (2021) outlines that the vast majority of existing studies are focussed on Europe, and that the aggregate emission reductions from carbon pricing are limited (between 0 and 2 per cent per year), but with variation across sectors. Overall, the evidence indicates that carbon pricing is potentially effective in reducing emissions, but current prices are too low.

In terms of aggregated economic indicators (GDP and employment), there is no real significant effect. Metcalf concludes that the European carbon-pricing mechanisms have positive effects on GDP growth and employment, but these effects are not statistically significant. In terms of employment, Metcalf (2019) underlines that the evidence suggests shifts in the types and sectors of jobs in response to a carbon tax, but overall employment rates are likely to be relatively unchanged and could, in fact, rise. This is important, given the political concerns around the economic and job impacts of carbon pricing in general, and carbon taxes in particular. Other research (Malerba & Wiebe, 2020; Popp, Vona, Marin, & Chen, 2020) confirms that the net effect of environmental policies on employment is small, especially when general equilibrium effects and offsetting mechanisms are accounted for. There is therefore no support for the view that carbon taxes are job or growth killers. Yet again, this may change as carbon prices increase.

In terms of innovation, Lilliestam, Patt and Bersalli (2021) conclude that the effectiveness of carbon pricing in stimulating innovation and zero-carbon investment remains theoretical. So far, there is no empirical evidence – based on existing carbon-pricing policies – of its effectiveness in promoting the technological change necessary for full decarbonisation. This is in part driven by the low tax rates of existing initiatives, the limited global coverage and the short time period to encourage innovation (van den Bergh et al., 2021). Therefore, current evidence does not preclude that future carbon-pricing policies will be more effective.

3.2 What are the expected distributional effects of environmental taxes?

We now look at the distributional effects of carbon pricing. In fact, policies can impact some groups more than others. In this case, we mainly look at income categories and define a policy as *progressive* if it increases the income of the poorest more compared to the richest. Otherwise the policy is defined as *regressive*. Therefore, a progressive policy reduces inequality, whereas a regressive policy increases inequality. In Section 4 we outline why looking at these distributional implications is key for the implementation of climate policies.

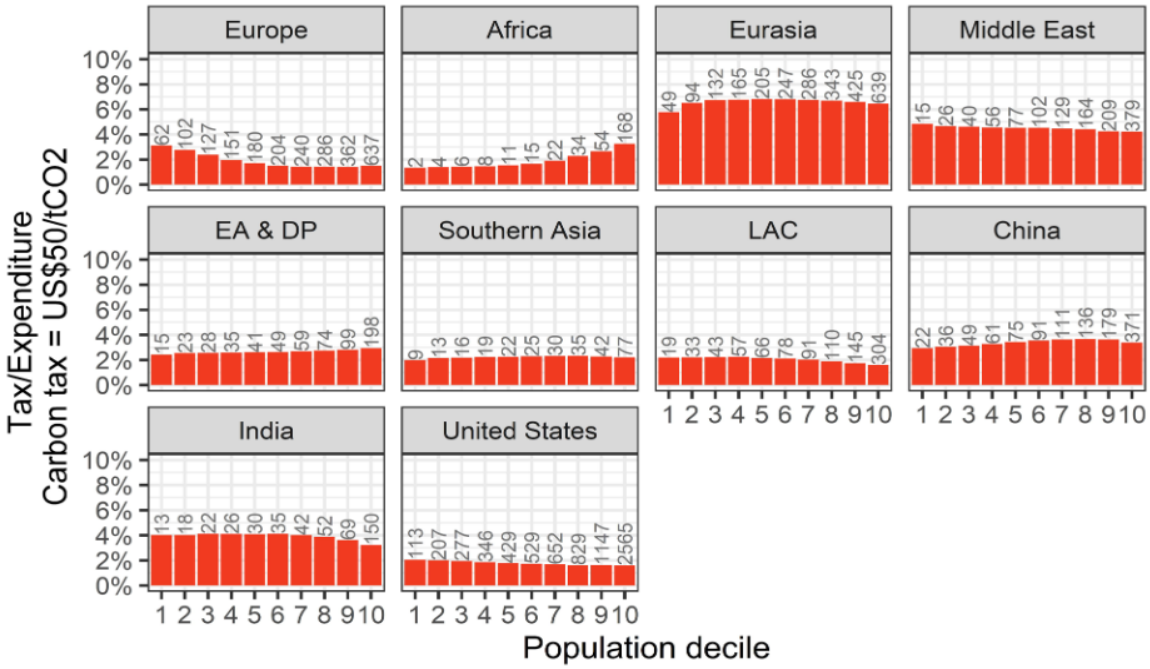
To understand the (monetary) distributional implications of climate policies, we focus on two channels: i) the effects of carbon taxes on consumer prices and ii) their effects on jobs.[9] These two channels are the ones that are more directly related to (income) poverty and inequality. Most studies have focussed on the former due to computational issues.

9 We understand that this is not exhaustive. For example, Metcalf (2021) highlighted that focussing on consumer spending patterns (a use side analysis) argues that the tax will affect factor prices as well as consumer prices. If returns to capital fall more than wages, then the carbon tax will have a progressive aspect on the sources side. A third channel therefore would be to look at stranded assets and capital. This is not included.

3.2.1 What are the effects on consumers?

Research has shown how the distributional implications of carbon pricing vary between lower- and higher-income countries (Budolfson et al., 2021; Malerba, Chen, Feng, Hubacek, & Oswald, 2022). Figure 1 shows this difference: In Africa, for example, the ratio of the estimated carbon tax to overall total expenditure (this ratio is defined as incidence) is higher for richer deciles, whereas for Europe it is the opposite (Malerba, Chen et al., 2022).

Figure 1: Incidence of a carbon tax of US$50 per ton of CO_2, by population decile and region



Note: The number in the bar shows the carbon tax per capita (in current US$ for 2017) for each population decile.
EA & DP: East Asia and Developing Pacific

Source: Malerba, Chen et al. (2022)

In high-income countries, Wang, Hubacek, Feng, Wei and Liang (2016) confirm that a pure carbon tax without revenue recycling is, on average, regressive and increases inequality; lower-income households will be proportionally more affected, as they spend a larger share of their budget on energy services. Energy is a necessary good and comprises a higher share of household budgets for low-income households than for high-income households. On the other hand, a recent study has found that a carbon tax would be mostly neutral or progressive for 23 European countries; but between-country differences would mean that, at the European level, a carbon tax would be regressive (Feindt, Kornek, Labeaga, Sterner, & Ward, 2021). However, in low- and middle-income countries, a carbon tax would be slightly progressive to neutral, meaning that inequality would not significantly change (Dorband, Jakob, Kalkuhl, & Steckel, 2019; Steckel et al., 2021; Vogt-Schilb et al., 2019). Nevertheless, poor households in low- and middle-income countries are still greatly burdened by carbon taxes, as shown by the effects on poverty and the loss in purchasing power. For example, despite reducing inequality, a moderate carbon tax without compensation would increase poverty by 7 per cent in Peru (Malerba, Gaentzsch, & Ward, 2021).

But these generalised results outlined above hide heterogeneities, as the progressivity of carbon pricing depends also on the contextual factors and design. For example, results from a recent study (Steckel et al., 2021) on Asian countries estimate that a national economy-wide carbon

price would be progressive in five countries, neutral in one, and mixed or regressive in two (Thailand and Turkey). Hence, whether a certain policy is progressive or regressive – as well as the ranking of different policy instruments with regard to their distributional effects – depends on the specific country context, and especially on the carbon content of production and the share of expenditure on different items such as energy and transport fuel. For example, carbon pricing can be regressive in countries where the food sector is highly carbon-intensive, as the share of food in overall consumption is higher for poorer households.

In addition, the sectoral focus of the tax is critical. Taxes on electricity and heating fuels (energy taxes) are regressive, but negligible in absolute terms. Conversely, transport fuels are progressive in countries with lower GDPs per capita, although slightly regressive in wealthier countries.

In summary, different designs for carbon tax mechanisms play a key role in affecting the distributional impacts as well as impacts in other policy arenas, indicating that trade-offs between efficiency and equity always exist when designing a carbon tax.

The effects of subsidy reforms are similar to the ones for carbon pricing presented above. In fact, the impacts of fossil fuel subsidy reforms are approximately distributionally neutral, with the percentage decrease in income being very similar across income groups. However, substantial variation across products is hidden. The impacts for gasoline and electricity are strongly progressive, but the kerosene impact is strongly regressive (as it is used by lower-income households for cooking, but also lighting and heating). The distribution of the impact of liquefied petroleum gas (LPG) seems to differ across regions. Looking at the absolute impact (meaning the share of the total expenditure that will be represented by increases in price), eliminating subsidies will have a much bigger effect (a reduction of around 5-6 per cent of total expenditure) than with the case of carbon pricing seen above.

3.2.2 What are the distributional effects on jobs and assets?

Looking at the distributional effects from job disruptions is more complex, due to methodological reasons. But we try to summarise here the existing literature and findings.

From a macro perspective (countries and sectors), Ward, Steckel and Jakob (2019) find that the impacts on industrial competitiveness are highly heterogeneous across regions and economic sectors. The competitiveness of Brazil, Japan, the United States and advanced economies of the EU is likely to improve, whereas industries and labour markets in newly industrialising Asian economies as well as Eastern Europe are likely to experience substantial adverse impacts. In terms of its effects on economic sectors, those with high energy intensity are affected more by a uniform carbon tax, while preferential measures to protect these industries face a trade-off between environmental effectiveness and economic growth. Studies find job losses to be concentrated in polluting industries and among unskilled workers (Marin & Vona, 2019). In a cross-country study, Malerba and Wiebe (2020) find that the few job losses will be concentrated in specific industries such as mining, whereas new jobs will be created in industries that are currently witnessing relatively high in-work poverty rates, such as construction.

From the perspective of individual workers, Ward et al. (2019) estimate that jobs are impacted in different ways depending on the qualification level. In three out of four countries, low-skilled jobs are projected to see the largest relative changes; this means that for countries that see increases (decreases) in jobs, low-skilled workers will see the largest relative increase (decrease). For example, in China, more than 2 per cent of the low-skilled workforce would be under pressure. Similar findings on unskilled workers are found by Yip (2018).

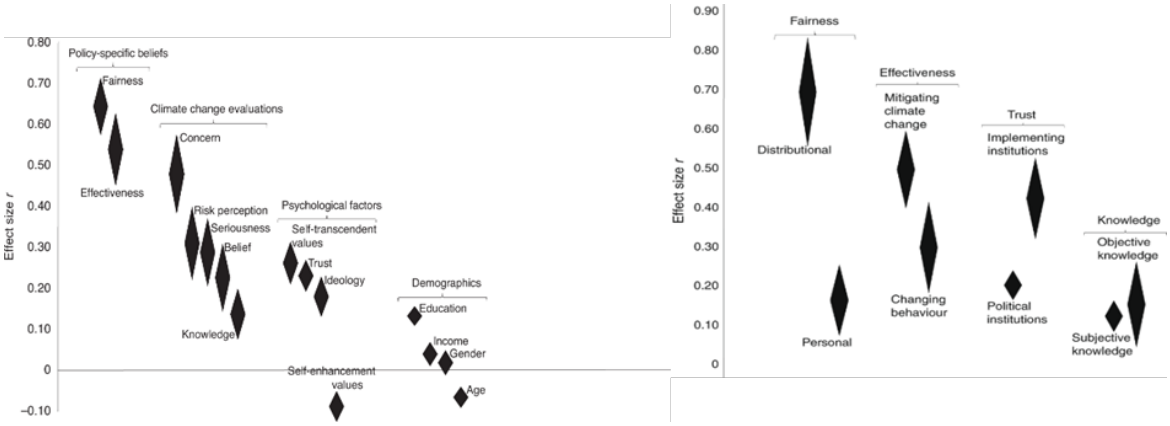
4 Managing distributional outcomes as a key determinant of public support for climate policies

Looking at the distributional implications of climate policy is not just intrinsically important (as inequality and poverty reduction should be priority goals for any government), but it is also instrumentally critical. In fact, making sure that carbon taxes and climate policy are publicly accepted can help in addressing the political economy. Past protests such as the yellow vests movement in France and opposition to subsidy reforms in Nigeria show that reforms can be blocked if they are deemed unequal (Douenne & Fabre, 2022; Klenert et al., 2018).

In this sense, research has identified the following as the main factors that influence climate policy support of citizens (Drews & van den Bergh, 2016): (1) social–psychological factors and climate change perceptions; (2) the perceptions of climate policy and its design, which includes the policy costs, policy fairness and the recycling of potential policy revenues through social protection mechanisms; and (3) contextual factors, such as the positive influence of trust, norms, participation, communication and broader economic, political and geographical aspects. The distributional implications and personal costs included in the second category are critical for acceptance by the public.

Most importantly, a recent publication has shown that fairness is the most important determinant of the public's acceptance of climate policies (Bergquist et al., 2022).[10] A weaker effect was found for personal fairness, measuring how fair a policy is perceived to be for oneself. This means that if policy-makers want to win the public's support for implementing carbon pricing, they need to make sure that these policies are not perceived as being unfair and hurting the poor the most.

Figure 2: Determinants of acceptance by the public for climate policies



Source: Bergquist et al. (2022)

On a negative note, most empirical research on the acceptance of climate policies comes from industrialised countries, and more research needs to be done in the context of lower-income countries (Fairbrother, 2022). This is important, as there are differences between high- and lower-income countries. For example, there can be a different prioritisation of socio-economic goals (Malerba, 2022).

The distributional implications of carbon pricing can be addressed in several ways. In the next section, we see how this can be done in terms of using the revenues. But distributional

10 Acceptance was also strongly related to the perceived effectiveness of a policy and concerns about climate change.

implications can also be addressed through the design of the pricing mechanisms. For example, a carbon tax could target the fuels on which the poorest households are least dependent.

5 The role of social protection mechanisms to address distributional implications and encourage public acceptance

Social protection mechanisms can play an important role in mitigating the adverse distributional implications of carbon pricing. Although it is usually argued that directing (a portion of the) revenues towards direct cash transfers for the poorest is a promising solution, two main points can be made and are developed further in this section. First, social protection mechanisms are not confined to cash transfers to households. Second, there are two ways in which carbon-pricing revenues can be linked to a particular purpose, such as social protection.[11]

5.1 Different forms of social protection

Social protection is the sum of contributory social insurance, non-contributory social assistance and labour market policies. Social assistance policies are the instruments mostly used in low- and middle-income countries, given the high levels of informality and poverty. A growing body of evidence has shown that these programmes lower poverty levels and the vulnerability of the beneficiaries in low- and middle-income countries (Bastagli et al., 2019); these programmes have also played a significant role during the Covid-19 pandemic.

Nonetheless, the implementation of adequate social protection measures in lower-income countries is still limited due to budgetary constraints and technical challenges. Regarding the former, lower-income countries spend around 2 per cent of GDP on social protection measures, whereas higher-income countries spend on average 16 per cent. The latter challenge means that social protection programmes cannot always reach the most vulnerable in a context of high informality, which is also due to the lack of social registries and different programme design options. Due to these limitations, 53 per cent of the global population (4.1 billion people) is not covered by social protection programmes, with the largest gaps existing in lower-income countries (International Labour Organization, 2021). It is critical that the current architecture of social protection measures be taken into account when advocating for the design of environmental fiscal reforms.

Given the multiple instruments available, social protection programmes can be used to address the different effects of carbon pricing within environmental fiscal reforms (Malerba, 2021). In its simplest form, social protection measures in the form of cash transfers (social assistance) can address the effects on consumers and the income effect. In this regard, many programmes have been created in response to fossil fuel subsidy reforms in order to compensate for higher prices, such as in Indonesia and Iran (Zarepour & Wagner, 2022). But social protection programmes can potentially also address labour market effects through unemployment insurance and active labour market policies (re-skilling).[12] But as previously underlined, these policies are limited in low- and middle-income countries.

11 Legal earmarking, in which revenues are linked to expenditure initiatives through legislative or executive decision, and hypothecation, in which the links between revenue and expenditure are communicated without an enforcing legal structure.

12 Finally, social protection can also be used indirectly for climate policies; it can increase trust in governments and, as a consequence, the implementation of climate policies (Malerba, 2022).

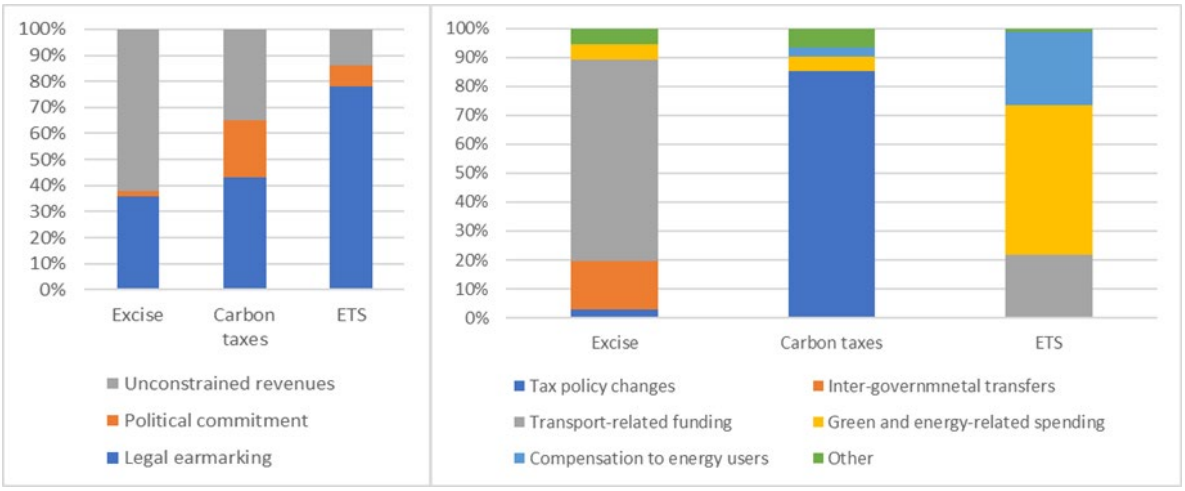
5.2 Earmarking of revenues for social protection

There are currently 68 carbon-pricing policies in place globally, including 37 carbon taxes and 34 ETSs (World Bank, 2022). Global carbon-pricing revenue collected in 2021 was estimated to be US$84 billion, which is US$31 billion more than in 2020. For the first time ever, in 2021 revenues generated by ETSs (67 per cent of the total) surpassed revenues generated by carbon taxes. This is due to the prices of ETSs rising faster than fixed-price instruments and the decreasing share of free allocations in ETS schemes (World Bank, 2022).

Nonetheless, revenues raised from explicit carbon-pricing mechanisms are still significantly lower compared to implicit mechanisms. A study analysing 40 countries – including the 35 OECD countries and 17 of the G20 countries,[13] representing the large majority of global energy use and the CO_2 emissions resulting from it – finds that revenues from excise taxes (taxes on produced goods that are levied at the moment of manufacture rather than at the sale) on fuels are around 20 times higher than those raised by explicit carbon pricing. They find that excise taxes on fuels exist in all 40 countries considered, carbon taxes are in place in 17 countries and emissions trading takes place in 28 countries (largely due to the scope of the EU-ETS).

How do governments use the revenues (see Figure 3)? Across 40 OECD and G20 countries, it has been estimated that earmarking (legal or political commitment) is higher for ETS auctions (86 per cent) when compared to excise taxes on fuels (65 per cent) and carbon taxes (38 per cent) (Marten & van Dender, 2019).

Figure 3: Use of revenues by instrument



Source: Author, based on Marten and van Dender (2019)

Revenue from existing carbon-pricing schemes is allocated for different purposes (Klenert et al., 2018). Interestingly, the use of revenues for specific purposes also depends on the carbon-pricing instrument used. Marten and van Dender (2019) show that for excise taxes, the majority of the revenues go towards transport-related issues and a large share also go towards intergovernmental transfers.[14] For carbon taxes, this looks very different. The majority of the revenues are earmarked for tax policy changes, in particular to offset the additional burdens caused by higher energy costs for households and businesses. Finally, revenues from ETSs mainly go towards green spending, followed by compensation for energy users.[15] This confirms

13 Russia, Indonesia and Saudi Arabia are not included.

14 This is when looking at the share of revenues (and not instruments) of the earmarked revenues.

15 The main beneficiaries are energy- or electricity-intensive industries.

previous studies showing that, for ETSs, the majority of the revenues are used for environmental projects. On the other hand, revenues from carbon taxes are distributed mainly towards firms and citizens (Carl & Fedor, 2016).

In relation to social protection programmes and revenue redistribution, despite their advantages, there is not much revenue from explicit carbon pricing that is used for transfers. Just a very small share is recycled to households (<5 per cent). In this regard, Switzerland and Canada offer the only two examples of countries that provide rebates. In Switzerland, they are provided through health insurance rebates, and in Canada through tax rebates (Mildenberger, Lachapelle, Harrison, & Stadelmann-Steffen, 2022). Discussions and plans for a carbon tax and revenue redistributions to citizens are ongoing, also in countries such as Austria and Germany.

Given that explicit carbon pricing has not been implemented (with relatively high prices) in low- and middle-income countries yet, due mostly to political economy barriers, no evidence is available. We make the case that in low- and middle-income countries, recycling revenues to households can play a larger role, such as through subsidy reforms. This is because it is a very visible way of using revenues, and because other taxes cannot be changed due to informality.

5.2.1 Effects of recycling revenues to households via cash transfers

There are many ways to recycle revenues to households. One way could be to implement targeted energy subsidies (such as vouchers, subsidies or targeted lifeline tariffs, whereby households that consume less than a minimal amount pay less per unit of energy). These policies depend critically on individually and accurately metering each customer. Even if this is the case, it can also lead to poor targeting, because low levels of electricity consumption are not a perfect predictor of poverty.

A second way to compensate the poorest is to use social policies to compensate poor households for higher energy prices. In Vietnam, for example, poor households are entitled to free health insurance cards, exemptions from education fees and access to subsidised credit, among other forms of compensation. During the “food, energy and financial crisis”, the eligibility threshold for these subsidies was raised by 50 per cent to increase the coverage of these programmes in the face of price rises. The Philippines increased the coverage of its subsidised health insurance that was targeted to the poor at the same time it was implementing energy subsidy reform.[16]

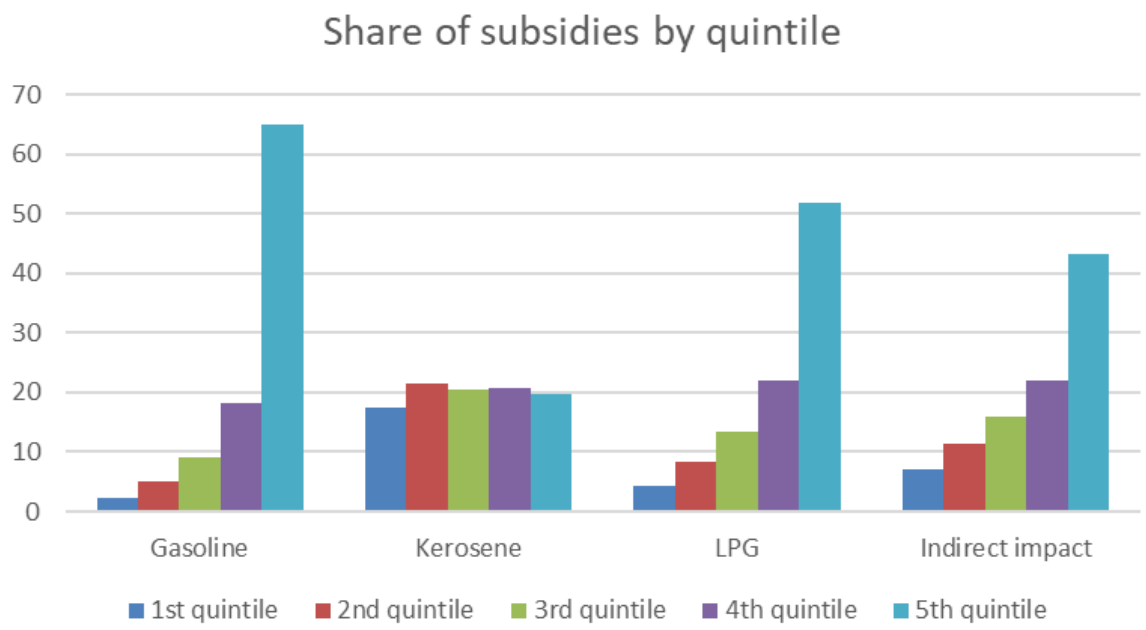
A third way – which is the focus of this section – is the recycling of revenues from carbon pricing to households through targeted cash transfers. This can reduce poverty and inequality when compared to the status quo, and it is advocated by many (Malerba et al., 2021; Vogt-Schilb & Hallegatte, 2017). In addition, the combination of carbon pricing (or subsidy removal) and cash transfers is a much more efficient method to reduce poverty when compared to energy and fossil fuel subsidies. The main reason is that, as shown in Figure 4, the top 20 per cent richest people in a country benefit from around half of all subsidies. Therefore, energy and fossil fuel subsidies are not properly targeted to the poorest parts of the population. For this reason, it has been estimated that in Latin America and the Caribbean, it costs governments on average US$12 to transfer US$1 of income to households in the poorest quintile via energy subsidies, whereas targeted programmes such as cash transfers cost on average US$2 for every US$1 transferred to the poorest households (Feng, Hubacek, Liu, Marchán, & Vogt-Schilb, 2018).[17]

16 There is another dimension not covered in detail in this report, which is the use of labour market policies.

17 A recent report has also estimated that the amount of pre-tax fossil fuel subsidies represents three

Ideally it is good if the recycling of revenues to households also encourages pro-environmental behaviour rather than just compensation for higher prices.

Figure 4: Beneficiaries of fossil fuel subsidies in low- and middle-income countries



Source: Author, based on Coady, Flamini and Sears (2015)

Given the advantages of direct and indirect transfers when compared to subsidies, there are already examples of countries lowering or eliminating economy-wide subsidies in order to use the fiscal space for cash transfers and other forms of support targeted to the poorest and most vulnerable (see Table 1) (Jakob et al., 2019). In terms of cash transfers, in Mexico for example, the government gradually removed the LPG subsidy while strengthening an existing social welfare programme (*Oportunidades*) to cushion the effects of higher energy prices on poor households. In 2007, *Oportunidades* was extended with a component that supports household energy costs (*Oportunidades Energéticas*). These reforms employed transfer mechanisms within existing social welfare mechanisms (*Oportunidades*) to mitigate the effects of higher prices[18] (Toft, Beaton, & Lontoh, 2016).

Overall, one main message is that the practice of using cash transfers to mitigate energy price increases is widespread, but it needs to be designed carefully because in many low- and middle-income countries, it is difficult to reach and target the poorest.

times the annual amount required to “eradicate” extreme global poverty (United Nations Development Programme, 2021).

18 As a further example of social expenditure, in Colombia, the income from the national carbon tax finances activities related to peace-building, sustainable rural development and conservation, and environmental sustainability.

Table 1: Subsidy reforms and associated social protection programmes

Country	Type of reform	Revenue distribution action	Source
Brazil 2001-2004	fuel subsidy reform	LPG voucher system for poor households; cash transfers to poor families with children aged 6-15 (*La Bolsa Escola*). These were later merged with other social programmes into *La Bolsa Familia*	a, i
	excise on fuels	to subsidise LPG consumption for vulnerable households and provide revenue for environmental protection projects, road construction and subsidies for ethanol production	
Egypt 2014	energy subsidy removal	cash transfer programme to protect poor people; compensation for health and education budget support	e, f, h, i
Ghana 2008	fuel subsidy reform for cash transfer	income support and health insurance for poor households	g, f, i
India 2013	transition from biomass to LPG	direct cash transfers after purchase of LPG	a, b, c, f, i
Indonesia 2005, 2008, 2015-2017	energy subsidy removal	special programmes for poverty eradication, human development, infrastructure development, assistance to poor students; cash transfers to the poor	b, f, g
Kenya 2005	electricity tariff reform	investment in rural electrification; preservation of lifeline tariff for consumers using 50 kWh or less per month; off-grid and clean lighting, and cooking solutions	a
Mexico 2007	LPG subsidy removal	current cash transfer programme was extended by a component to support household energy costs	
Morocco 2015	subsidy swap; energy subsidy removal and cash transfers for special programmes	increased funds for education and implementation of a health insurance scheme (support for renewable energy production)	b, e, f, i
Namibia 2003-2008	fuel price reform	subsidised food distribution scheme for the rural poor (together with zero-rate VAT for staple foods, tax rebates for food importers)	a
Niger 2011-2012	fuel subsidy reform	allowed 19 per cent increase in social spending for education investment and hiring of teachers	a
Switzerland 2008	carbon-pricing scheme	two-thirds of the revenue is returned to the public and private sector (while the remaining one-third is spent on green activities)	d

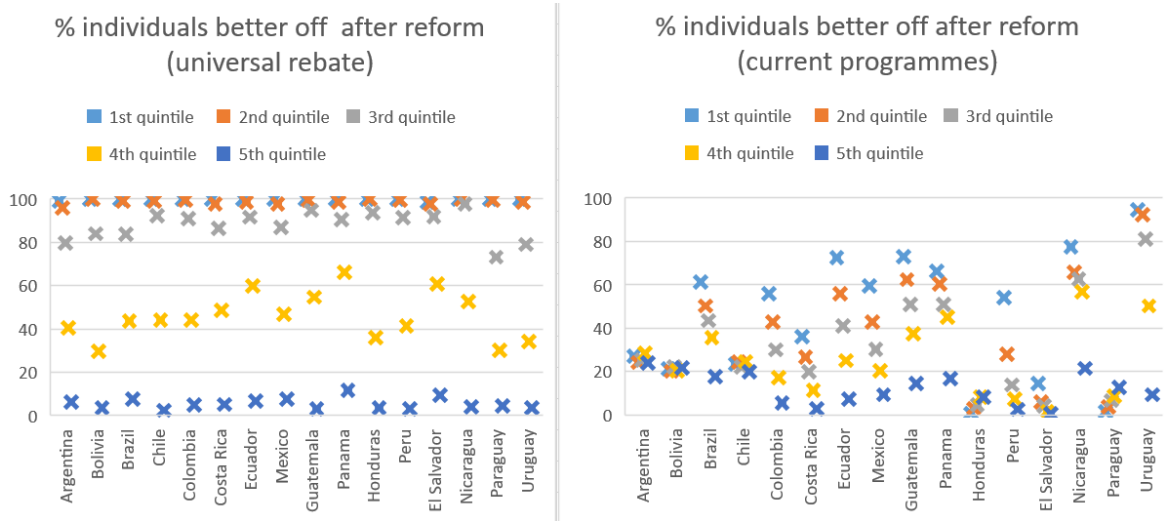
Source: [a]Adeoti, Chete, Beaton and Clarke (2016); [b]Bridle, Sharma, Mostafa and Geddes (2019); [c]Garg et al. (2020); [d]Klenert et al. (2018); [e]Rentschler and Bazilian (2017a, 2017b); [f]Sanchez, Wooders, Mostafa, and Bechauf (2020); [g]United Nations Development Programme (2021); [h]World Bank (2017); [i]Yemtsov and Moubarak (2018)

Positive findings also arise from ex-ante simulations of environmental fiscal reforms (carbon pricing plus cash transfers) in low- and middle-income countries. Studies show that if revenue is partially distributed back to households, poverty could be decreased by around 1-2 per cent (depending on the design of the recycling mechanism), and the bottom quintile would gain – when compared to the status quo – by around 4 per cent. One important point is that just a small share of the revenues would be needed to compensate the poorest groups (Vogt-Schilb et al., 2019).

The policy design, including the policy sequencing, is important and is further expanded upon in Section 6. In terms of the design for targeting the recycling of revenues to households, for the case of Latin America it has been estimated that a universal rebate (meaning redistributing the revenues to all households in the same way) is highly progressive. Almost all individuals in the first two deciles are better off (meaning that their incomes would increase compared to the status quo) from the environmental fiscal reforms; more than 80 per cent of the individuals in the third decile are also better off, as well as around 50 per cent of the fourth quintile. Only a very small proportion (5 per cent) of the upper quintile (the richest 20 per cent) would gain from the reform. This also means that inequality is reduced.

A different picture emerges if instead of universal rebates, current programmes and their targeting are considered (red figures in Figure 5). On one side, the reform would still be progressive, but less so than in the previous case. Secondly, the share of poorer individuals (i.e. individuals in the lower deciles) that gain from the reform is much lower. Both of these problems are due to targeting issues of current cash transfer programmes that exclude many individuals. This underlines the more general problem of the inefficiencies (leakages, targeting errors) and operational overhead costs of (setting up and running) social protection programmes, all of which needs to be considered.

Figure 5: Share of quintiles better off from environmental fiscal reforms in 14 Latin American countries



Source: Author, based on Vogt-Schilb et al. (2019)

Similar evidence exists for fossil fuel subsidy reforms. Schaffitzel, Jakob, Soria, Vogt-Schilb and Ward (2020) found that, in Ecuador, removal of a subsidy without compensation would be regressive for diesel and LPG, progressive for gasoline and approximately neutral for electricity. Most importantly, they find that removing all energy subsidies and expanding the current cash transfer programme would increase the real incomes of the poorest quintile by 10 per cent while leaving a large share of the revenues for the public budget.

In terms of design, it is also important to consider indexing transfers to inflation in order to maintain the real, rather than nominal, value of the transfers (Goulder, Hafstead, Kim, & Long,

2019). Another paper has shown that not linking transfers to inflation significantly decreases the poverty-reduction effects of revenue recycling (Malerba, Ward, Gaentzsch, & Roscioli, 2022). As a final design feature, in terms of sequencing, social protection programmes should be in place before carbon pricing is introduced to make the fiscal reforms more acceptable (see also Section 6). This, for example, helped Iran implement its subsidy reforms (Rentschler & Bazilian, 2017a, 2017b).

5.2.2 Specific focus: Social protection mechanisms as a response to increased prices from the war in Ukraine

It is also important to look at the issue and use of subsidies vs social protection cash transfers in the context of the war in Ukraine (see also Sgaravatti, Tagliapietra, & Zachmann, 2022; United Nations, 2022). Preliminary estimates from the International Energy Agency for 2022 point to global fossil and energy subsidies doubling from the previous year to an all-time high (International Energy Agency, 2023).

Social protection mechanisms have been extensively used in the course of the war in Ukraine. The main reason has been to counterbalance increases in energy prices, with a special focus on the poorest. Important lessons can therefore be derived for environmental fiscal reforms.

Gentilini et al. (2022) estimate that 221 social protection schemes in 84 countries were implemented in response to soaring prices of food, fuel, fertilisers and other items. Subsidies such as for fuel and food were by far the most widely used policy instruments by a significant margin, representing 79 per cent of the total response. Among all subsidies, the largest share (60 per cent of all subsidy measures) was comprised of subsidies for fees and exemptions/reductions of taxes (VAT and excise duties) followed by fuel subsidies (fuel price controls).

Similar findings were underlined by other reports. The OECD (2022) highlighted how measures that act to lower the price of energy are not targeted and weaken incentives to reduce energy use when supply is tight. When analysing the support measures implemented in 42 OECD countries and large economies, it is discovered that governments' responses have focussed largely on price controls (66 per cent), which tends to support rather than curb demand. Income-support measures account for 34 per cent of the total value of the support provided. Of all the income-support measures, most have been targeted; by contrast, price support is in large part non-targeted (94 per cent). In terms of recipients of individual measures, most support has been directed towards households, and to a lesser extent firms. The IMF (2022) found that more than half of the 134 countries surveyed had announced at least one measure in response to higher energy and food prices. Emerging and developing economies announced fewer new policy measures.[19] The large majority of advanced economies used cash and semi-cash transfers (such as vouchers and utility bill discounts). Conversely, emerging and developing economies implemented mostly reductions in consumption taxes, price freezes and subsidies.

The use of price controls to limit the price pass-through may not be the best approach.[20] According to the IMF, policy-makers should allow high global prices to pass through to the domestic economy while protecting vulnerable households affected by the increases. That is ultimately less costly than keeping prices artificially low for all, irrespective of their ability to pay. If prices remain elevated, governments should shift to more targeted measures, including the use of income support, noting that such a shift may require improvements to existing transfer and social protection systems to ensure effective targeting. With the current energy crisis,

19 They might also have less fiscal room to react or more difficulty in quickly scaling up their social safety nets.

20 The majority of G7 members have suspended (or are considering suspending) excise taxes on gasoline and diesel to address rising prices of such fuels.

governments initially rolled out mainly price-support measures, reflecting the relative ease with which price-support measures can be administered when urgent action is needed. In a second phase, countries with strong social protection systems could use targeted, temporary cash transfers to lessen the impact on vulnerable people through targeted transfers and existing programmes. Unfortunately, many lower-income countries were not able to do so, given the lack of digital tools and comprehensive beneficiary registries to deliver benefits.

In terms of the possibilities of social assistance when setting policies, for those countries with adequate coverage and information systems, social protection systems were able to use existing programmes to deliver targeted (to old and new beneficiaries), temporary cash transfers to lessen the impact on vulnerable people. Countries with underdeveloped social protection systems need to rapidly develop and implement digital tools to be used, for instance, to register beneficiaries and deliver benefits. For all countries, the elimination of energy or food subsidies should be gradually calibrated based on the gap between retail and international prices, the available fiscal space and the existing capacity to implement social protection measures to protect the vulnerable.

The need to invest in social protection measures can also be linked to the experience of the Covid-19 pandemic. Covid-19 also underlined the need for universal delivery systems that can potentially reach the whole population. In fact, existing social protection systems and programmes were not always adequate enough to be scaled up (both horizontally and vertically) and reach the most vulnerable. The need for universal delivery systems includes improvements in identification and registration mechanisms, as well as payment mechanisms (with a focus on digital payments). Having better information systems could also facilitate the use of automatic social protection stabilisers. To identify gaps in response readiness, social protection systems should be routinely stress-tested (Gentilini, 2022).

6 Policy implications to make climate policies just and encourage acceptance

Given the issues addressed above, there are a few policy implications that arise which should drive the implementation of environmental fiscal reforms. The following elements are the most significant policy implications for making environmental fiscal reforms progressive. They are categorised by policy design, policy sequencing, information and communication, and the involvement of stakeholders and civil society. Nonetheless, one thing to keep in mind is that the effects depend on the country context.

<u>Policy design:</u>

- There needs to be careful consideration of the sectors to be taxed (or whether to tax the whole economy). For example, results indicate a significantly increased likelihood of progressive distributional outcomes for transport-sector taxation.
- Earmarking revenue recycling for (a) specific purpose(s) increases acceptance of carbon pricing and can increase the social and environmental effects of an environmental fiscal reform; also revenue from implicit carbon-pricing policies can be used for social goals.[21]

21 Although earmarking revenues for a specific purpose is not favoured by economists, as they may decrease the economic and environmental effectiveness of carbon-pricing mechanisms (compared to using revenues for the general budget and lowering distortionary taxes), it can make it viable to implement by addressing political economy issues.

- It is critical to understand if it is a viable option to use current social protection schemes or if there is a need to create new social protection programmes; as seen in the Covid-19 response and previous subsidy reforms, existing programmes may not be adequate. As also outlined in the paper, revenue recycling targeted to the poor may make many vulnerable people worse off due to the environmental fiscal reforms, as many of them are not currently being reached by targeted programmes. Therefore, in case there are gaps in the current targeted programmes, it could be better to use more universal programmes in the short term and risk overcompensating and over-targeting rather than to exclude large parts of vulnerable populations from compensation mechanisms. In any case, it is critical to have in place integrated social protection programmes and to invest in information systems and social registries so as to easily target and reach the poorest and most vulnerable, thereby compensating them for higher prices.

- Social protection programmes can also be designed to be linked to the environmental purposes of the carbon-pricing initiative, rather than for merely providing compensation for higher prices. For example, additional support for green consumption or sustainable and affordable energy (Cottrell et al., 2016) can complement pure cash transfers.

Policy sequencing:

- How should the carbon-pricing instrument be implemented in terms of pricing levels? Should the initial level be high, or is it better to begin low? It is advisable to start with a low level of carbon pricing and increase it over time (Pahle et al., 2018). Although this is a second-best solution in terms of emission reductions, it takes into account the political economy and the barriers to the implementation of carbon pricing.[22] In addition, public opposition might not persist and may decrease once a policy is implemented (Carattini, Carvalho, & Fankhauser, 2018). Lessons can be learnt also from subsidy reforms (including recent reforms in India, Indonesia and Saudi Arabia), whereby aligning the timing of reforms with low international energy prices can minimise price shocks (and public opposition).

- How to best sequence the carbon-pricing and social protection instruments? One could argue that delivering cash transfers before the carbon pricing is implemented may make the policy more acceptable. One solution could be the use of *antedated* cash transfers (Dominioni & Heine, 2019), which could reassure the public that the promised use of revenues to be redistributed to households would be maintained. This is particularly relevant in countries with low levels of vertical trust. The government of Iran, for example – before increasing the price of petroleum products by between 230 and 840 per cent at the end of 2010 – disbursed monthly cash payments to 70-80 per cent of all citizens; in addition, the benefits of the reform were clearly communicated in advance (Rentschler & Bazilian, 2017a, 2017b). The government later increased its targeting to the poor and vulnerable, facilitating transfers by opening bank accounts for household heads. The question is whether the funds for transfers are made available before the carbon-pricing revenues are obtained. If the answer is negative, another option could be to make electronic transfers before implementing a carbon tax; these transfers would be visible in bank accounts and are frozen until the day of the tax increase.[23]

- The combination of the two points above (sequencing/increasing tax level and sequencing of cash transfers and tax) is also crucial. Evidence from subsidy reforms has also shown

22 Two types of sequencing and various underlying causal mechanisms have been discussed in the literature: self-reinforcing and reactive sequences.

23 Another option is contributions to social insurance instead of cash transfers. This can be a challenge in low-income and high-informality contexts.

that gradual subsidy reductions can reduce energy price shocks and make compensation policies more manageable (Clements et al., 2013).

Information and communication:

- First, providing information about revenue usage significantly increases the willingness to pay a carbon tax, and it affects individuals' preferences for the design of carbon taxation. One reason concerns the level of trust in the government; therefore, knowing that the government will use the revenues for a specific purpose increases the level of trust. Recycling revenues to households need to be salient. Most people in Canada and Switzerland did not know that they had received a rebate (Mildenberger et al., 2022). Therefore, this information is of importance, and especially making clear the final effects (people may perceive themselves as net losers even if they are net beneficiaries). With past energy subsidy reforms, information campaigns were crucial. Of a sample of 25 fossil fuel subsidy reforms (mainly in the Middle East and North Africa), the reforms that used cash transfers and communications strategies successfully removed fossil fuel subsidies. However, without cash transfers, only 17 per cent of reforms succeeded, and without a communication strategy only 50 per cent succeeded (Sdralevich, Sab, Zouhar, & Albertin, 2014).

- In addition to *information concerning the design* of the reform (such as the use of revenues), it is important to communicate the potential *effects* of the overall reform rather than just focus on the effect of the tax alone. In fact, misperceptions (studies show that citizens have a wrong, and negative, perception of the environmental and social effects of environmental fiscal reforms) are the main factor hindering acceptance of environmental fiscal reforms by the public. Better discussions of and communication about the potential effects of environmental fiscal reforms can therefore be critical in addressing political economy barriers and achieving socio-ecological goals.[24] This is especially important in low- and middle-income countries, where limited public support for carbon pricing may arise due to the priority given to social goals.

Involvement of stakeholders and civil society:

- Stakeholders need to be involved early on in the decision process to ensure democratic legitimacy. This is particularly important at a time when populist parties increasingly depict climate change mitigation as a project being undertaken by the political elites against the interests of the broader population, and a time when well-founded concerns about economic prosperity dominate the public discourse. Different forms of public deliberation, such as stakeholder dialogues, just transition commissions and citizen assemblies, reflect public opinion and could be key to furthering agreement between different interests.

- The level of cooperation between ministries needs to be increased. One way would be to use effective carbon pricing instead of just explicit mechanisms; in fact, by also considering implicit pricing such as fuel taxes, there would be a strict collaboration with finance ministries.

- There needs to be a good analytical basis for understanding the effects of such a reform. The same applies to study designs that consider indirect effects, demand-side adjustments of consumers or lifetime income proxies.

24 A poor understanding of the environmental effects of carbon pricing and using carbon tax revenue to reduce (corporate) taxation or to reduce the general government budget deficit also leads to a significant decline in support. People are sceptical about the idea of a double dividend of an environmental tax reform.

7 Development cooperation

We now look more closely at the link between environmental fiscal reforms and development cooperation. We first underline the importance of these reforms for development efforts; we then explore what German development cooperation is currently doing in this regard. In the conclusion, we suggest what the needed next steps could be.

Environmental fiscal reforms can be an important instrument for development, as development (cooperation) can no longer ignore environmental goals and constraints. As mentioned in previous sections, environmental fiscal reforms can potentially achieve social and environmental goals by also enhancing domestic capacity, such as improving tax revenues and strengthening social protection systems. Development cooperation can make substantial contributions to global climate change mitigation, as it can help in the cooperation concerning this goal and help make this process more just. Overall, the case for linking environmental fiscal reforms to development cooperation is strong.

In terms of current efforts, German development cooperation could do more in relation to environmental fiscal reforms. Currently, German development cooperation has created an integrated package of support for green public finance reforms. The package delivers governance advisory services; policy and technical advice; capacity development and networking to finance, environment and other sector ministries, as well as administrative bodies and non-state actors in order to green public finance (this is aligned with the concept of the Good Financial Governance concept and the core area strategy “Responsibility for Our Planet – Climate and Energy” of the Federal Ministry for Economic Cooperation and Development, BMZ).[25] Environmental fiscal reforms are often considered to be a component of a broader approach commonly referred to as “green budgeting”. But the main aim of such support and cooperation is tied to budgetary efficiency and transparency. Therefore, German development cooperation is focussing on the governance perspective of environmental fiscal reforms rather than on the socio-economic one. Germany provides technical expertise and capacity development for fiscal reforms and social protection schemes in very few countries (such as in Indonesia, where Germany supports reforms for tax and fiscal policies to increase the amount of public revenues, in addition to supporting health insurance coverage and social security systems). This narrow focus can be a missed opportunity, given the focus of BMZ and German development cooperation on supporting partner countries with the social and ecological transformations of their economies. In fact, environmental fiscal reforms could be a critical tool for green industrial policy, establishing the right price incentive for green production and consumption while also ensuring public support and social protection for the most vulnerable groups.

In parallel, multilaterals such as the IMF and the World Bank are increasingly arguing for environmental fiscal reforms, especially on the grounds of the potential triple dividend (environmental, economic and social/health) for low- and middle-income countries. BMZ and German development cooperation could complement this by offering their comprehensive bilateral portfolio worldwide, also in the areas of environment and good financial governance, which enables cross-disciplinary, country-specific support for green fiscal reforms and long-term support for partners (e.g. through integrated experts), which offer consequent, long-standing and trusting relations with many environment and finance ministries of partner countries. In

25 Measures to help public-sector actors introduce carbon-pricing instruments are especially important. This includes creating the institutional framework, building technical capacity and putting in place the legal prerequisites for introducing and implementing carbon-pricing tools, setting up emission registries and data management systems, establishing verification processes and developing measures to prevent carbon leakage.

addition, as one of the pioneers of eco tax reform, Germany has a great deal of experience in shaping them both nationally and in the European context.

Given this current limited effort, where are the potentials for a scale-up? One example of low-hanging fruit would be to support partner countries with their green fiscal reforms by embedding environmental fiscal reforms more strongly into the bilateral portfolio, either via new projects or via additional components in existing projects. This also includes the potential to help governments design fiscal reform options and analyse their environmental and social impacts. It is in fact critical to understand 1) which measures reduce carbon emissions in the most efficient manner, 2) the welfare losses caused by the carbon pricing (this can be done with statistical analysis by combining information from an input–output matrix with household survey data) and 3) analysing current social protection programmes and their potential expansion (vertical, horizontal or new programmes) using household survey data.

Another option to deliver more environmental fiscal reforms in development cooperation would be to work jointly on international projects of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), which has projects that go beyond the governance perspective and would help increase interministerial cooperation. For example, the federal ministry – together with the International Climate Initiative – supported the Green Fiscal Policy Network, established in 2014 by a partnership between the United Nations Environment Programme, the IMF and GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) to promote knowledge-sharing and dialogue on green fiscal policies. The Network represents an online knowledge-sharing platform aiming at sharing country experiences and advancing the international agenda on green fiscal reforms.

Environmental fiscal reforms can be advocated also as part of current parallel bilateral and multilateral initiatives using the window of opportunity created by such initiatives. The first initiative, launched at COP 26 in 2021, is the establishment of Just Energy Transition Partnerships, which can include an environmental fiscal reform component. The partnerships are meant to facilitate a country's move away from reliance on fossil fuel subsidies in a socially just way, and to consider the structural differences between high-income countries and middle-income countries. High-income countries pledged to phase out new direct government support for international, carbon-intensive fossil fuel energy, including the elimination of inefficient fossil fuel subsidies.

A second option for environmental fiscal reforms within multilateral initiatives that has been promoted in recent international panels such as the G7 meeting in 2022 is the establishment of climate clubs across countries that coordinate on climate policies. This idea was first proposed by economist William Nordhaus in 2015 as a response to climate mitigation coordination problems, and then developed further by many others (van den Bergh et al., 2020). The current proposal focusses on industrial decarbonisation and underlines the importance of avoiding carbon leakage. While not explicitly addressed in the proposal, club members (countries) could agree on a carbon price and address potential competitive disadvantages and carbon leakage from countries outside the club; this is also what is going to be established in relation to the EU ETS with the Carbon Border Adjustment Mechanism. In addition, the third pillar of the climate club proposal underlines the importance of bilateral and multilateral cooperation to foster alignment and synergies between cooperation and funding instruments in order to improve industry decarbonisation in low- and middle-income countries.

Overall, it is important to prevent the carbon club from being perceived as an initiative just from rich countries. In fact, many lower-income countries will not be able to meet the requirements for membership and join the club straightaway. It is therefore paramount that funding is used for capacity-building – including financial and technical capacity support and technology transfer development and deployment – that is created with revenues from a future Carbon Border Adjustment Mechanism (van den Bergh et al., 2020). A carbon club could also be important for

global social goals. A global mechanisms environmental fiscal reform linking a carbon tax with revenue redistribution could reduce poverty and inequality more compared to national mechanisms: It has been estimated that if the revenues of a global carbon tax are collected and redistributed on a per capita level at the global level, the average transfer to citizens in low- and middle-income countries will be higher than in the case of national taxes of the same amount (Carattini, Kallbekken, & Orlov, 2019; Soergel et al., 2021). This is because per capita emissions (and consequent revenues) in low-income countries are lower. In absolute terms, a global tax of US$30 per ton of CO_2 would generate 10 times the official development assistance budget and funds needed to fill the extreme global poverty gap. Therefore, if countries implement coordinated carbon prices – globally or starting with a core group of countries that would expand over time (carbon clubs) – it would also contribute to distributional justice and align with the principle of common but differentiated responsibilities. Similarly, the gap in adequate social protection coverage is estimated at around US$700 billion (2.2 per cent of GDP of low- and middle-income countries), whereas global subsidies were US$5.9 trillion in 2020 (of which US$450 billion is explicit).

Another option for German development cooperation is to link its social protection work more explicitly with environmental fiscal reforms, in ways that are shown in previous sections. In fact, in terms of bilateral development cooperation, there are many projects focussed on social protection programmes. This is in line with the goal formulated by the G7 development ministers of increasing social protection coverage by 1 billion people by 2025 (BMZ, s.a.).[26] It is also in line with the recent agreement for better coordination on social protection issues made with the World Bank and the International Labour Organization, whereby it was agreed that they would leverage their respective strengths and integrate their support more strategically in order to facilitate coordinated support for partner countries. Germany has assisted selected countries with the implementation of innovative approaches to social protection, such as digital tools[27] to achieve efficient data and process management in social protection schemes – from the identification of target groups for programmes to the payment of transfers – and for universal health coverage. By doing this in different countries, it also coordinates and facilitates cross-border knowledge exchange and global learning about adaptive social protection. It is important that German development cooperation continues to help build and deliver integrated social protection systems. This can be done by looking at different aspects of social protection systems, including information systems, monitoring and evaluation, and citizens interface, with a particular focus on the need for social registries (a) information and data, (b) software applications, (c) database management and (d) information and communication technology infrastructure.

The role of social protection systems in environmental fiscal reforms can be pushed by Germany also in other multilateral initiatives. For example, the United Nations Secretary-General launched the Global Accelerator on Jobs and Social Protection for Just Transitions in 2021. By improving multilateral efforts, this mechanism aims to help countries create 400 million decent jobs – including in the green, digital and care economies – and to extend social protection coverage to the 4 billion people currently excluded. The Accelerator's implementation strategy will be adapted to each country's diverse and specific context and circumstances. As such, the Accelerator could become a major platform for multilateral cooperation and result in concrete action leading up to the World Social Summit in 2025, as proposed in the United Nations Secretary-General's 2021 report *Our Common Agenda*. It is estimated to require US$2.2 trillion annually. As it is about climate mitigation and social protection, environmental fiscal reforms can be argued. A second critical multilateral cooperation initiative linking climate action and social

26 In particular, Germany is focussing on increasing the efficiency of social protection programmes, including the digitalisation of information management and adaptive social protection.

27 Tools such as openIMIS through the State Plan for Independent Living (SPIL) framework.

protection is the Global Shield against Climate Risks, launched at the G7 summit and COP 27 through German leadership. Social protection is a key element of the Global Shield, which aims to systematically address country-by-country social protection gaps and work with the most affected countries by developing packages that will protect people financially against climate-related losses and damages (BMZ, 2022). Therefore, social protection efforts made via the Global Shield (Germany is contributing EUR 170 million to the Shield from the BMZ budget) can also be used for environmental fiscal reforms.

In summary, there are many opportunities for German development cooperation to more or less explicitly push work on environmental fiscal reforms.

8 Conclusions

The previous sections have outlined the potential of environmental fiscal reforms to achieve social and environmental goals. On one side, especially in times of crisis, environmental taxes such as carbon taxes can raise revenues that create fiscal space and increase expenditures for poverty eradication. This is especially true if implicit carbon pricing, such as fuel taxes, is considered. In turn, if (a portion of) this revenue is used for social policies, climate mitigation can be made more socially just and acceptable. One of the main messages arising from the paper is that, given these features, German development cooperation should make environmental fiscal reforms more central in their cooperation.

Although in terms of political economy, carbon pricing is difficult to establish due to the opposition of political economy players and the number of issues to address, we have focussed here on acceptance by the public and the public's concerns about price rises. This focus is justified because low levels of acceptance by the public have blocked many instances of reforms. Nonetheless, compensation for emissions-intensive companies and powerful interest groups is also important (this would also benefit from a well-designed compensation scheme for the most vulnerable, as fewer revenues would be needed to compensate the poorest if reforms are well-designed).[28]

Going back to the focus of the discussion paper, implementing environmental fiscal reforms to also address social outcomes is not straightforward and the reforms need to be carefully designed. The paper pointed to the following main policy implications.

First, there is the need for integrated social protection systems to be put in place, systems that are able to compensate for the negative effects of environmental taxes on the poorest. These systems include universal delivery systems, identification and registration mechanisms, as well as payment mechanisms. Many lower-income countries do not have such social protection systems, and many low-income households are in fact outside the reach of such social programmes. Given this issue, in the short term it may be better to use universal programmes rather than targeted programmes that exclude many vulnerable populations. In this spirit, the lack of integrated systems has been one of the main motivations for the widespread use of energy and fossil fuel subsidies in low- and middle-income countries, also during the current energy crisis. These subsidies are in fact seen as a tool to protect the poorest in the absence of better targeting mechanisms and social protection capacities.

28 Revenues can be used to build political coalitions and address political economy barriers (Klenert et al., 2018). Interest groups can leverage the fact that the costs of subsidy reforms or carbon taxes are visible to the public (e.g. high share of expenditures). Although every case is different, two pillars need to be considered: (a) mitigating opposition from special interest groups, or (b) compensating the broader public.

Second, ideally social protection programmes used in the context of environmental fiscal reforms should be adaptive and transformational and not just compensatory. This means that, apart from compensating for the loss of income due to higher prices, social protection programmes can also steer towards sustainable and affordable energy and pro-environmental consumption (Cottrell, Schlegelmilch, Runkel, & Mahler, 2016). It is possible that social protection policies could also be transformational in a sense of tackling the structural factors that drive social and environmental outcomes (such as structural inequalities or labour rights), but the transformational role of social protection policies is very difficult to enhance.

Third, the paper has underlined the importance of information and communication strategies. This is especially important to make the public aware of the potential positive distributional impacts of environmental fiscal reforms. There are, in fact, widespread misperceptions among the public in terms of policy effects. The public then opposes the reforms due to these misperceptions, as fairness and distributional justice are the most important factors for acceptance by the public.

Fourth, those designing the carbon-pricing instrument need to consider the amount of revenues that can potentially be raised – revenues that can also be used to fund social programmes (and other players previously mentioned). For example, high carbon tax levels present a trade-off between short-term and long-term revenues. Very high tax levels, in fact, can generate high revenue amounts in the short term, but in the medium term – as they discourage polluting activities that form the base of the tax – revenues can drop. In addition, very high carbon tax levels can increase the level of public opposition. Therefore, escalating prices gradually (starting with low prices and increasing them over time) and indexing the tax levels to inflation can be a good solution, also for country revenues. It would also be important to consider the health effects of carbon pricing. For example, the IMF includes in its estimation of fossil fuel subsidies also the health effects (post-tax costs) – this would create more fiscal space as well as increase acceptance by the public.

Fifth, linking more implicit and explicit carbon pricing can be an important step towards achieving interministerial cooperation and increasing the fiscal and environmental outcomes of environmental fiscal reforms. On one side, old and established taxes (e.g. many implicit carbon-pricing instruments such as fuel taxes) face less political opposition. On the other side, interministerial cooperation is critical because, especially in low- and middle-income countries, environment ministries tend to have low budgets and less importance. Therefore, environmental fiscal reforms can leverage their fiscal advantages in the short term to engage with the finance ministries; it can also be argued that carbon taxes are easier to administer and collect (fewer collection points) compared to other taxes. Overall, it is important for environmental fiscal reforms to be considered part of national development plans, and especially of broader fiscal strategies.

Sixth, in terms of development cooperation, it is clear that German development cooperation should give more priority to environmental fiscal reforms through bilateral cooperation. This means not only making (carbon) pricing a priority for BMZ, but also creating the analytical capacity for identifying pro-poor and egalitarian designs of environmental fiscal reforms. Another specific role, for example, can be on the financing side, for example, finance cash transfers before the carbon pricing is implemented (antedated cash transfers described in previous sections) to make the reform more acceptable. On the other side, it is paramount that German development cooperation continue its efforts with social protection and offer its expertise on projects by focussing on building social protection programmes via innovative approaches, but also through international initiatives and agreements.

In summary, the paper has shown how – in the context of carbon pricing – one option is to carefully recycle revenues for social programmes, both to protect the poor and to garner political support. Although recycling revenues to households is not common practice, it is being

considered by more countries (Switzerland and Canada use carbon pricing and redistribute revenues to citizens; other countries such as Germany and Austria are planning such reforms), but most low-income countries need to first urgently build their social protection systems. Most importantly, as underlined in the paper and as seen in the current energy crisis, whereby subsidies have reached record levels, environmental fiscal reforms present critical advantages to the current practice of using subsidies and price controls to protect the poorest. This can be seen when considering climate goals (as keeping prices low does not incentivise shifts in production and consumption) as well as social goals (cash transfers, for example, have a significantly higher impact on poverty and inequality reduction than untargeted subsidies) and fiscal goals (the cost of subsidies represents a very large share of the budget). This is motivation for a stronger use of environmental fiscal reforms in national plans and by development cooperation to achieve needed socio-ecological transitions.

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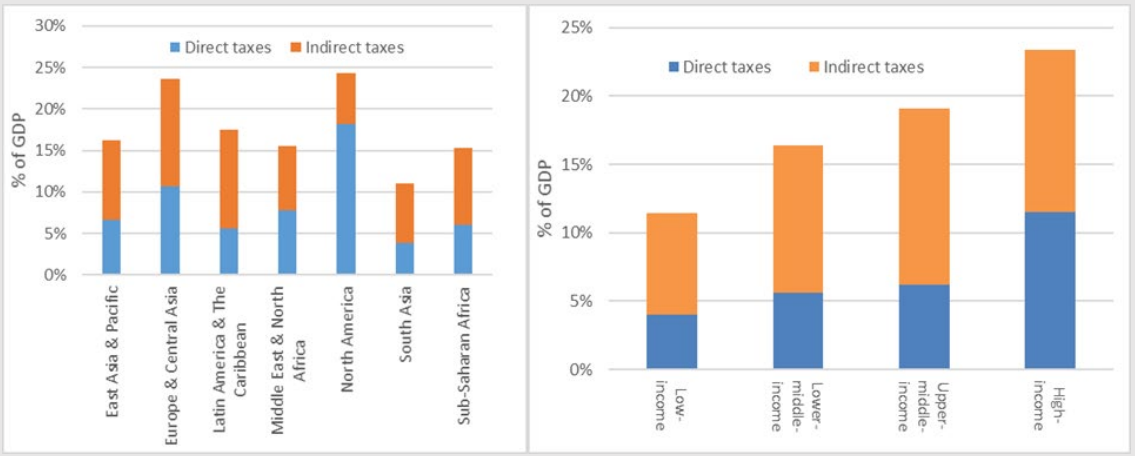
Appendix

Box A1: Tax revenues by source and region

How does this compare with the proportion of **current tax revenue** streams? Total tax revenues (including social contributions) are 38 per cent of GDP in high-income countries, decreasing to 14 per cent in low-income countries. In addition, there is a difference in the composition of tax revenues. Social contributions represent 41 per cent of total tax revenues in high-income countries, and just 18 per cent in low-income countries (UNU-WIDER, 2021).

Excluding social contributions, indirect taxes are higher than direct taxes in low- and middle-income countries, but they are the same on average in high-income countries. Especially in North America, direct taxes are four times as high as indirect ones. As an opposite example, in South Asia indirect taxes are twice as high as direct ones. Whereas OECD countries have high taxation from income and corporate taxes, most LAC and African countries' taxes are from goods and services. This further shows that the introduction of ecological taxation should be different across different regions.

Figure A1: Direct and indirect taxes by region and income group (2020)



Source: Author's elaboration, based on UNU-WIDER (2021)

Glossary

Environmental fiscal reforms: Defined here as the combination of taxes (and tax-like instruments, such as the removal of subsidies) and transfers through social protection mechanisms.

Carbon pricing: An instrument that puts a price on the CO_2 emitted. Such prices on carbon help shift the burden for the damage from GHG emissions back to those who are responsible for it. Instead of dictating who should reduce emissions where and how, a carbon price provides an economic signal to emitters. In this way, the overall environmental goal is meant to be achieved in the most flexible and least costly way to society.

ETS (emissions trading scheme): A market mechanism that allows the emission of CO_2 into the atmosphere and then for participants to buy and sell these emissions (as permits or allowances).

Upstream tax: The tax is applied to the industries dealing with the production of oil and gas (at the point of fuel extraction).

Midstream tax: The tax would apply after fuel refining and processing; the tax would therefore tax the first purchaser of fossil fuels in the supply chain. For example, a midstream tax would require a refinery to pay for the carbon content of all the crude oil it purchases.

Downstream tax: The tax would apply to oil and gas functions that occur after the production phase to the point of sale.

Explicit pricing: This pricing puts a price directly on carbon emissions.

Implicit pricing: Examples of this type of pricing are fuel taxes and subsidies for fossil fuel consumption, which change the marginal cost of emitting carbon without targeting the emissions or the carbon content of fuels directly.

Excise taxes: These are taxes on specific goods or services at purchase point, such as fuel, tobacco and alcohol taxes. These taxes are paid directly by businesses. This tax is often passed on to the consumer.

LPG: Liquefied petroleum gas. LPG is used as a fuel gas in heating appliances, cooking equipment and vehicles.

Subsidy swap: These swaps replace subsidies to fossil fuels with renewable energy to allow the removal of fossil fuel subsidies and promote the transition to clean energy.

Indexed transfers: Transfer programmes, such as social security, which are explicitly indexed to inflation.

Social protection policies: These are policies and programmes designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to manage economic and social risks, such as unemployment, exclusion, sickness, disability and old age. Social protection is composed of the following three broad categories: social assistance, social insurance and labour market interventions (active and passive).