STEPS TO ACHIEVE SOCIALLY JUST CLIMATE POLICIES AT GLOBAL SCALE

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INTRODUCTION

To achieve the global climate targets as agreed in the Paris Agreement, global greenhouse gas (GHG) emissions will need to be reduced to net zero by mid of the century. Yet, global GHG emissions are still increasing (Lamb et al. 2021). While industrialized countries are responsible for the lion's share of GHG emissions that cause climate change, their emissions have recently decreased. By contrast, emissions in low- and middle-income countries (LMICs) have grown starkly in recent decades. Countries in East Asia, Southern Asia and South-East Asia in particular have shown rapid industrializing processes, expanding their fossil-based systems to cover their rapidly increasing demand for energy (ibid.). Deforestation and land use changes have driven recent emission increases in Latin America, South-East Asia and Africa. Achieving international climate targets will not only require countries to reduce emissions; for countries that are still developing their energy systems, leapfrogging the historically established way to provide energy – often closely linked to development and industrialization – will be necessary.

This message does not always come easy and raises important ethical debates. Given a very strong historical correlation between socio-economic development and fossil-fuelled industrialization (van Benthem 2015), foregoing fossil fuel based development pathways in LMICs raises concerns about delaying or disallowing poverty reduction and reaching Western affluence levels. The United Nation's Framework Convention on Climate Change (UNFCCC) therefore highlights the need for common but differentiated responsibilities when it comes to fighting climate change. While this hints towards the need for international support to developing countries to mitigate (and adapt to) climate change, there remains a strong necessity for all countries to reduce emissions and invest in sustainable energy systems.

The intended emission reductions require policy interventions. As a central part of climate policy, many economists, environmental scientists, and politicians highlight that carbon pricing should be a cornerstone policy to reach the Paris Climate Agreement (High-Level Commission on Carbon Prices 2017; Pigou 2013). In theory, a carbon price would simultaneously influence a large number of economic activities by increasing the relative price of high-carbon goods and services (internalizing the cost of carbon), thereby spurring the development of comparatively cheaper carbon-neutral activities (incentives for adoption and innovation of new technologies), and in turn reducing GHG emissions (Baranzini et al. 2017; Boyce 2018). A carbon price might also get more prominence on the political agenda in LMICs, as some jurisdictions, e.g. the European Union (EU), increasingly think of implementing a Carbon Border Adjustment Mechanism (CBAM). A CBAM would put a tariff on imported goods that are not subject to carbon pricing in their home jurisdictions. Taxing carbon domestically might be a way to circumvent the tariff and capture revenues domestically.

In the context of LMICs, a carbon price can come with some additional benefits. Carbon taxes could increase the tax base, particularly important for developing countries that – on a per gross domestic product (GDP) basis – often suffer from a low tax base (Besley/Persson 2014). Administratively, a carbon price could be implemented easily when levied upstream, and is relatively difficult to circumvent (Steckel et al. 2021b). A carbon price is further believed to shift informal activity back to the formal sector, generally leading to welfare gains (Bento et al. 2018). Levied effectively, a carbon price would also entail multiple environmental co-benefits, e.g. in terms of lowering air pollution (West et al. 2013).

Yet, little is known about the actual effectiveness of carbon pricing in the context of LMICs. Generally, the empirical literature based on experience in high-income countries (HICs)[1] confirms the economic intuition that carbon pricing is effectively reducing emissions (Andersson 2019; Best et al. 2020; Leroutier 2022) and triggers low carbon innovation (Calel 2020). Political reali-

ties, such as the prevalence of influential lobby groups, can however alter the effectiveness to lower emissions (Kalkuhl et al. 2020). In addition, in countries with a high prevalence of informal fuels for cooking, i.e. charcoal and firewood, price increases of fossil fuels have proven to increase the use of such biomass sources (Greve/Lay 2022), with negative effects on human health and female labour participation rates (Aggarwal et al. 2022; Köhlin et al. 2011; Pratiti et al. 2020). While decreasing carbon emissions, an increase in firewood consumption could exacerbate deforestation resulting from unsustainable forest usage (Aggarwal et al. 2022; Masera et al. 2015).

A common concern for introducing even moderate adjustments to prices is related to the possible adverse (or regressive) impacts on poverty and inequality. These concerns are reflected in low public acceptance of direct and indirect carbon pricing policies due to public perception of (un)fairness (Clayton 2018; Dreyer/Walker 2013; Hammar/Jagers 2007; Maestre-Andrés et al. 2019). As a result of low public acceptability, some attempts by governments to introduce a carbon tax or reform energy subsidies have been met with strong social unrest both in the Global North, e.g. the 'yellow vests' protests in France (2018), and Global South, e.g. unrests in Nigeria (2020), India (2021), and Ecuador (2019 and 2022). To alleviate distributional concerns, compensatory measures could be built in to carbon pricing policy designs, such as transfer schemes, either lump-sum or targeting the affected population.

In this article we discuss potential steps to achieve socially balanced climate policies at global scale. We start with discussing potential distributional effects of domestic climate policy measures, focusing on carbon pricing policies in LMICs and how they could be addressed. Next, we consider social and political acceptability of climate policies by analysing determinants of public attitudes towards carbon pricing policies. Finally, we discuss the international dimension, including measures of international climate finance that could support the introduction of effective climate policies across the world.

DISTRIBUTIONAL EFFECTS OF CARBON PRICING AND REVENUE RECYCLING

A growing body of literature analyses the distributional effects of direct and indirect carbon prices, such as carbon taxes, fuel taxes and fossil fuel subsidy reforms in LMICs. The majority of distributional analyses are motivated by understanding impacts across different income groups (i.e. vertical effects) due to traditional welfare theory focusing on equalizing household utility and bringing the poor and rich closer together (Fischer/Pizer 2017). However, analyses that are more recent have focused on distributional effects within income groups (i.e. horizontal effects) to better understand the impacts of carbon pricing on households that face similar changes. This analysis has roots in welfare theory, which looks at the desirability of public policy in comparison with a status quo reference point (ibid.) Since carbon pricing policies can have widely different distributional impacts across and within income groups, both vertical and horizontal effects need to be considered in carbon pricing policy designs.

VERTICAL EFFECTS

When looking at the vertical distributional effects, studies show that carbon prices in HICs are often regressive while in LMICs they are often progressive (Ohlendorf et al. 2021). That implies poorer groups of society being less affected than richer groups – in relative terms. In absolute terms, the burden implied on poor households can still be high. While available studies of vertical distributional effects use different methodological approaches, the dominant methodology in scientific literature assumes full price pass-through to final demand and apply environmentally extended input-output models to analyse short-term impact. Solely focusing on energy related emissions from fossil fuels, Renner (2018, for Mexico), Saelim (2019, for Thailand) and Malerba et al. (2021, for Peru) find slightly progressive impacts of carbon taxes. For the removal of energy subsidies, a comparable policy to fossil fuel carbon emissions, the literature also finds progressive impacts (Coady et al. 2015; Schaffitzel et al. 2020).

A key reason why distributional outcomes in LMICs vary from HICs is because households in LMICs show different energy usage pattern across income groups, whereas households in HICs show different usage patterns in food, goods or services. In low-income countries, when a poor household's income increases so does their demand for formal energy items. Therefore, households whose incomes increase pay a greater share of their income for the energy items, leading to progressive results of carbon pricing – as long as other important consumption items are not exceptionally carbon intensive. Meanwhile, in HICs when a household's income increases,

they spend less on energy items relative to their income and more on consumption goods and services, leading to regressive results of a carbon price. These results are confirmed empirically on a global level by Dorband et al. (2019) in an analysis covering 87 LMICs. Further, in a detailed and comparative approach of eight countries in developing Asia (Bangladesh, India, Indonesia, Pakistan, Philippines, Thailand, Turkey, and Vietnam), Steckel et al. (2021a) confirm the progressive findings of single-country studies with few notable exceptions. For example, in India the fossil fuel-intensive agricultural sector (based on diesel-run water pumps) would be responsible for higher food prices and therefore result in regressive outcomes.

HORIZONTAL DIFFERENCES AMONG SIMILAR HOUSEHOLDS ARE MORE IMPORTANT TO CONSIDER

Independent of distributional effects across income groups, recent studies highlight the significant variability of distributional effects within income groups (e.g. horizontal effects). In other words, even though distributional impacts across income groups would be progressive, some households within the same income group would suffer severe losses. In a detailed analysis of short-term distributional effects of implementing a global carbon price of USD 40 per ton of carbon dioxide (CO2) for a selective sample of LMICs across three regions, Latin America, sub-Saharan Africa, and Asia, observations show that independent of a household's income, within-income group variation are generally larger than across income groups. This means that certain households are affected more notably than the median household in a specific income group (Steckel et al. 2021b). These findings are also highlighted by a recent comparative study of 16 Latin American countries conducted by Missbach et al. (2022), which shows that in twelve countries differences within income groups are more pronounced than across income groups. These findings yield important consequences for the political economy of carbon pricing policies: even if vertical effects showed progressive outcomes and therefore facilitate the implementation of carbon pricing policies, if highly affected interest groups might be affected more severely due to horizontal adverse effects, then policy opposition could still form (Steckel et al. 2021b).

While horizontal equity looks at differences within income-groups, another recent field of research analyses specifically which and why certain households within income groups might face exceptional additional costs due to carbon pricing policies (i.e. hardship cases). Different concepts of hardship cases are conceivable, such as highest absolute costs or highest costs relative to income group. Other concepts may also analyse households' accessibility – or lack thereof – to potential government transfers to alleviate hardships, or households' capability – or lack thereof – to substitute for other cleaner goods and services. Only few studies describe empirically what factors contribute for households to end up as a hardship case. For Asia, Steckel et al. (2021a) hint towards the importance of vehicle ownership and the choice of cooking fuels. For the EU-27, Feindt et al. (2021) find that most affected households by a European carbon tax would predominately be located in poorer Eastern European countries. In the regional country analysis focused on 16 Latin American countries meaningful factors that explain variations within income groups include car ownership, cooking fuel choices, location of households and socio-demographic factors, such as education and ethnicity (Missbach et al. 2022).

REDISTRIBUTING REVENUES FROM CARBON PRICING POLICIES BACK TO SOCIETY

There are four main ways to use revenues from carbon pricing policies to redistribute back to society: (1) *cash transfers* to all or a targeted segment of society, such as low-income households or specific interest groups that are affected; (2) *green spending*, by explicitly investing in infrastructure projects to further mitigate or adapt emissions reductions; (3) *tax cuts* to reduce other taxes proportionally to the price increase in high-carbon goods and services; and (4) *general budget*, to contribute to general governments funds or reduce budget deficits.

Since households suffer an effective welfare loss from carbon pricing, *cash transfers* via lump-sum payments to all or targeting low-income households could be an effective compensatory measure to allot more in transfers than they spend on taxes (Klenert et al. 2018). Such transfers could be very salient if paid directly to the households at regular intervals and potentially increase public support for carbon pricing policies (ibid.). Governments in LMICs, for example in Latin American countries, have already demonstrated their ability to redistribute resources via social assistance programs (Malerba et al. 2021; Vogt-Schilb et al. 2019). Nevertheless, there are challenges to

apply transfer schemes within the carbon pricing debate. For example, coverage rates for existing transfer schemes are generally found to be low, putting in question the suitability of using existing social assistance programs to transfer revenues from carbon pricing policies (World Bank 2018). In fact, coverage rates for the poorest 20 % of the population been found to be particularly low (ibid.). Yet, country specific analyses (e.g. for Ecuador) show that in some countries using existing transfer schemes can indeed significantly alleviate the distributional burden of poorer households (Schaffitzel et al. 2020).

In LMICs, revenues from direct or indirect domestic carbon pricing policies could also create synergies between climate mitigation and development objectives. As with *green spending*, having large needs for additional infrastructure development, for example, could justify investing in (green) infrastructure (Klenert et al. 2018). Furthermore, public opinion surveys in HICs have shown that individuals may not believe in the effectiveness of carbon pricing policies to reduce emissions and would therefore prefer if revenues raised are explicitly re-invested in environmental projects, such as developing renewable generation sources (Kallbekken/Sælen 2011). This effect might be even more pronounced in LMICs. Given the importance of socio-economic development, governments in LMICs may also look beyond infrastructure investments and consider investing in other underfunded sectors, such as health or education. Franks et al. (2018) find that revenues from carbon pricing can cover a wide range of public investment needed to achieve a broad set of Sustainable Development Goals (SDGs). As gaps in access to basic infrastructure are most pronounced for poor households, using carbon pricing revenues to invest in basic infrastructure access, such as electricity or sanitation, would be highly progressive (Dorband et al. 2022).

The literature further highlights the potential of *tax cuts*, or a "double dividend" of carbon pricing, if revenues are used to lower distortionary taxes (Goulder 1995). In the context of LMICs, such a compensatory measure may be less effective to offset distributional effects or to garner public support. Cutting labour taxes, for example, would not benefit low-income households, which predominantly participate in informal economic activities. Moreover, given the welfare losses suffered from increased prices, reducing import taxes on goods and services may also not be a visible compensatory mechanism and therefore do little to increase public support.

Using carbon tax revenues for the general budget is usually not found to be popular as this represents the status quo. Yet, in the general context of enabling countries to raise domestic revenues as outlined in the Addis Ababa Action Agenda, using carbon taxes for general budget purposes can be beneficial to help poor countries to increase their tax base.

UNDERSTANDING SOCIAL AND POLITICAL ACCEPTABILITY AND HOW TO GARNER SUPPORT

Attempts by governments to implement pricing policies are regularly met with strong public opposition. In addition, policy makers might need to cater to particular interest groups, such as unions or specific regions, as they might be in particular relevant for their voter base. Thus, understanding public perceptions and how to garner public support are preconditions for the political feasibility of implementing such policies. Generally, one major gap in the existing literature is evidence on public opinions in LMICs since over 90 % of studies are focused almost entirely on HICs (Bergquist et al. 2022; Maestre-Andrés et al. 2019). Since LMICs are crucial in tackling emission reductions and are structurally different from HICs, further research on public acceptance in those regions would help politicians to make informed decisions on how to design and implement carbon pricing policies. Nevertheless, evidence from HICs allows us to make initial inferences about public opinion on carbon pricing policies.

DETERMINANTS OF ACCEPTABILITY

Public acceptance of carbon pricing policies has shown to hinge significantly on three factors: (1) impact on individuals (self-interest or "fairness to me"); (2) impact on the collective (inequality concerns linked to distributional impacts or "fairness to others"); and (3) effectiveness (policy effectiveness in reducing emissions and procedural effectiveness of implementing revenue recycling schemes) (Bergquist et al. 2022; Dechezleprêtre et al. 2022; Maestre-Andrés et al. 2019).

With regards to individual impacts, higher energy prices and less purchasing power are often important arguments against carbon pricing policies (Maestre-Andrés et al. 2019). These perceptions may also negatively impact voting outcomes. A recent study conducted in Italy

showed that perceptions of burden on the individual from increased costs due to an indirect carbon pricing policy could shift voting behaviour towards political parties opposing climate policies (Colantone et al. 2022). However, results from a recent survey conducted across 20 countries, including middle-income countries, shows that respondents in HICs are overall more pessimistic when it comes to individual impacts, whereas respondents in middle-income countries are somewhat or significantly more optimistic (Dechezleprêtre et al. 2022).

Collective inequality concerns show to be more important in influencing public acceptability of carbon pricing policies than individual fairness concerns (Bergquist et al. 2022). Generally, these collective worries can be understood as concerns that poorer households may suffer more due to increased costs. (Maestre-Andrés et al. 2019). Based on other ongoing economic crises, people may be even more sceptical about additional fuel taxes, for example, and if they would hinder access to important fuels like for heating or cooking (Dresner et al. 2006). Another concern related to collective fairness is the perceived uneven policy burden among provinces, states, and countries. For example, in a study conducted in Turkey, respondents reported that they would be more inclined to support a carbon pricing policy in Turkey if other countries also implemented such policies (Gevrek/Uyduranoglu 2015). Similarly in Sweden, respondents preferred emissions reductions to take place at the EU level instead of only in Sweden to share the burden of emissions reductions (Brannlund/Persson 2012).

With regards to effectiveness, studies show that public concerns are often related to environmental benefits of climate policies (Maestre-Andrés et al. 2019). Respondents most pessimistic about emissions reduction effectiveness live in HICs, whereas those most optimistic about effectiveness are in India, Indonesia, Japan, and South Africa (Dechezleprêtre et al. 2022). Similarly, when compared to HICs, respondents in middle-income countries tend to believe that climate policies can influence individual behaviour, e.g. encouraging people to drive less (ibid.).

Other effectiveness concerns relate to scepticism towards a government's capacity to implement environmental tax reforms. More specifically, when compensatory mechanisms are included in carbon pricing policies, respondents in countries like Germany, Denmark, Ireland, France and the UK do not trust governments to spend the revenues as announced. (Maestre-Andrés et al. 2019). Unfortunately, not much is known yet in LMICs about public attitudes linked to institutional capacity of carbon pricing policies. However, if evidence from other opinion surveys on trust and government capacities in LMICs are any indicator, they show that lower income countries hold even lower levels of institutional trust than higher income countries (Perry 2021).

LESSONS FOR REVENUE RECYCLING

Redistributing revenues back to society is a widely accepted way to increase public support for carbon pricing policies. Studies in behavioural socio-psychological, economics, and political science focus on the optimal revenue use and find that overall, any sort of compensatory measure would increase public support for carbon pricing policies, including green spending, cash transfers, and tax cuts. However, depending on each country's context, certain compensation designs might garner more acceptance than others. This indicates that carbon pricing policy designs should include context-specific compensatory mechanisms to increase public acceptance and thus political feasibility.

Beyond policy design, communicating explicitly on why, how, who will benefit from the policy has also shown to increase public support. Conversely, lack of information could downplay the effectiveness and relative benefits of climate policies and thus decrease support (Cohen/Viscusi 2012). A recent experiment demonstrates these points again: when information about a carbon policy is hidden, participants behaved more selfishly; but when provided with additional information on the intention of the policy, participants were inclined to respond more favourably towards collective concerns (Friedrichsen et al. 2022). Policy makers are therefore recommended to proactively raise awareness of carbon pricing policies and to highlight how generated revenues could potentially benefit their citizens (Beiser-McGrath/Bernauer 2019; Klenert et al. 2018; Maestre-Andrés et al. 2019).

INTERNATIONAL SUPPORT

Given their historic contribution, countries of the Global North have a moral obligation to support today's poorer countries to adapt to climate change and help mitigate further changes. Over 50 % of global CO2 emissions

(excluding land use, land-use change and forestry) between 1850-2019 stem from today's industrialized countries (IPCC 2022). In order to provide support, HICs listed in the Annex I of the UNFCCC have committed to provide USD 100 billion for climate measures for the Global South. Until today, HICs fall short to deliver on this commitment.

How mitigation efforts in LMICs can best be supported is still under discussion. Current practices of project-specific funding, e.g. supporting one particular wind park, suffer from accounting issues and also from questions regarding the additionality of projects. Moreover, funding specific projects might not cater to the systemic changes that would be necessary to drastically reduce emissions. Therefore, it is conceivable to support LMICs by providing funding which is conditional on the introduction of, e.g. carbon pricing policies. Funding could then be used by each country to address context-specific issues, such as issues of acceptability, investments in infrastructure, and managing distributional concerns (Steckel et al. 2017).

In addition, another feasible way to support LMICs is via sectoral agreements. For example, the 26th Conference of Parties to the UNFCCC (COP26) in Glasgow has focussed on measures to help countries transition away from using coal. Being the most emissions-intensive fossil fuel carrier, current and planned coal consumption in countries of the Global South by itself threatens to eat up the remaining carbon budget still available for reaching the 1.5°C target (Tong et al. 2019). A major outcome was the announcement for the Just Transition Energy Partnership to support South Africa achieve its National Determined Contribution emissions goals and transition away from coal. The Partnership is supported by France, Germany, the United Kingdom, The United States of America and the European Union and is expected to mobilize USD 8.5 billion in its first phase of financing via grants, concessional loans, and other investment instruments, including support from the private sector. Similar to the German government's effort to compensate workers in the coal sector in Germany, over the next 15 years the Partnership intends to finance workers and communities in connection to the coal-industry to ensure a just transition (ITUC 2022). Additional partnerships are currently under discussion, e.g. with Indonesia.

Another way to provide support is by helping to bring down high capital costs of clean technologies. Weighted average costs of capital for renewable energy projects are often found to be significantly higher in LMICs, disincentivising investments in clean energy projects compared to fossil fuel projects (Schmidt 2014; Steffen 2020). HICs can support inter alia by de-risking investments into renewable energies and related infrastructure, including grid capacity and storage facilities (Steckel/Jakob 2018).

CONCLUSION

To achieve international climate targets, greenhouse gas emissions will need to be reduced across the globe. Considering LMICs socio-economic development challenges as set forth in the SDGs, climate policies are needed that can bring down emissions effectively while accommodating for country-specific circumstances. Given the potential impact of direct and indirect carbon pricing to reduce emissions and considering the administrative ease of implementation, a pricing policy package could be designed to leverage for climate- and socio-economic purposes. For LMICs in particular, pricing might be an opportunity to raise tax revenues in general; however, challenges persist, e.g. related to informal cooking fuels or lacking trust in governments.

To be politically feasible, adverse welfare impacts on households from increased prices need to be well understood and managed by governments as they also affect public perceptions. There is a growing body of evidence on how additional compensatory policies would increase public support and reduce potential adverse effects of carbon pricing policies. Since direct or indirect carbon pricing policies would generate revenues, there is an opportunity to recycle them back to the most affected groups of the society. Since the effects of most carbon pricing policies are quite salient, governments should be sure to make the benefits from recycling schemes also salient through better and increased communication campaigns.

Beyond domestic efforts to implement effective and socially-balances climate policies, the international community needs to continue ramping up their efforts to effectively support LMICs. Considering the historically low emission contributions and the ongoing socio-economic challenges for LMICs and, conversely, considering the high-emissions from and wealth of HICs, there are strong arguments to increase financial support from HICs to LMICs.

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1 This definition refers to mostly countries identified by the World Bank as OECD High-income