Carbon Pricing

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Funding Inclusive Green Transition through Greenhouse Gas Pricing[1]

THE NEED FOR AN INCLUSIVE GREEN TRANSITION

2015 was a special year. During a few months the political stars aligned and made it possible for the international community to agree on the Agenda 2030 for Sustainable Development and the Paris Agreement to limit global warming. Now the signatories need to find ways to implement these agreements, which not only imply a deep decarbonization of the economy but must also meet the Sustainable Development Goals. In this article we discuss the importance of pricing greenhouse gas (GHG) emissions[2] to make this happen. Climate abatement is a truly global public good and so we actually have to have a functioning policy in all countries. Our interest is thus on pricing in all countries but in particular the developing countries that are bigger and most crucial to the struggle for a green transition.

The transition to a sustainable economy will require massive investments in renewables, electricity and transportation networks, buildings, and industry. To wean the world off fossil fuel, massive deployment of renewable energy will be needed. We must rethink our main consumption patterns: Buildings must become largely carbon neutral (energy for heating/cooling drastically reduced and decarbonized). Transport systems must be largely electrified and the electricity come from non-fossil sources. Industry must become carbon neutral – even in really difficult sectors such as steel and cement. Agriculture must transform both with respect to its own production technologies (including methane and nitrous oxide) and, in rich countries, consumption patterns (for example, shifting towards less ruminant meat and dairy products). Deforestation must halt and be reversed worldwide. This list is far from exhaustive, but makes the point that a sustainable climate policy will require *literally thousands of changes in current economic activities.* For economists, the need to simultaneously influence all these activities makes a strong argument for a *price on carbon*. This one policy will incentivize all the changes that can reduce GHG emissions and make carbon-neutral activities more profitable and thus more likely. A carbon tax is a parsimonious policy. Deforestation, for example, would be reduced if the embodied carbon in products like palm oil and beef were properly priced. Decarbonization is crucial but will most likely not be enough: we will also need carbon capture and storage and combined technologies such as bioenergy with carbon capture and storage (Fridahln and Lehtveer 2018) that will be supported by a carbon price.

Engineers and planners prefer to think in terms of providing, in an inclusive, fair, and sustainable way, the necessary technology for transition. This transition includes the weatherization of homes, clean public transport, access to green energy, and many other services. This is a challenge that decision makers in the Global South understand, but they also know it must be funded, in part by public spending. Some of the funding in low-income countries can – and should – come from richer, high carbon-emitting countries. However, a significant part of the funding must also come from within each country. Such funding can in part be obtained by charging for the damage done by emitting greenhouse gases. There are, however, limits to such policies, since people in most developing countries are more concerned about current problems related to poverty than future climate threats.

THE CASE FOR GREENHOUSE GAS PRICING

Economists are convinced of the superiority of carbon pricing: they know it is important to get a consistent, high-price signal to reduce the overall costs of transition, encourage the right choices, and incentivize innovation. Economists know that a price on carbon (through taxes or permit trading schemes) can reduce costs as they equalize the marginal costs of

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[2] We intend to analyze all greenhouse gases. Carbon dioxide is the most important of these and then comes methane. For simplicity we sometimes speak of carbon, carbon dioxide or CO_2 pricing but in fact we must eventually deal with all the climate gases.

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abatement across different sectors of the economy. It is akin to the message that specialization and trade enhance welfare.

The difficulty is that economic adaptation in response to a carbon tax increase takes time. Popular perception is that higher fuel prices have no effect on consumption: they are "just a tax". This is understandable: the short-run response is quite inelastic. However, the long-term elasticity is sizeable: higher fuel prices do eventually lead to much lower consumption (Sterner 2007). Consumers tend to see only the short-run response. They do not buy the argument that expensive fuels are good for the climate because they force you to economize on fuel. Instead, the only mechanism they see is that money is collected, and they think that the only way a fuel tax will help against climate change is if the revenues collected are spent directly on mitigation.

Carbon pricing makes consumers and firms adopt more efficient technologies and consume goods/services with lower emissions when they choose between investments in fossil or renewable energy. GHG pricing can also promote radically new technologies, but sometimes their fixed costs are so high that even a high carbon price will not change production patterns fast enough. Examples include fossil-free cement or steel, which require major industrial innovations and dedicated industrial policies.

Another argument for carbon pricing is that it may facilitate international treaty negotiation. It has been suggested that it should be simpler and less contentious to agree on one single carbon price rather than mandating emission reductions for each country (Weitzman 2017).

There is a further advantage in choosing carbon taxation for fossil-importing countries. If they *collectively* tax imported fossil fuels, they may attain a triple dividend: (i) they reduce carbon emissions efficiently; (ii) they collect revenue for the state in a way that is less distortive than other forms of taxation; and (iii) they effectively recover some of the rent that oligopolistic fuel exporters would otherwise get. Efficient revenue collection is important. Governments in the Global South have a long list of services that they are expected to provide to their citizens (health, education, infrastructure, security, etc., before considering green investments). But due to a large informal sector and widespread corruption, tax collection is problematic, particularly in rapidly industrializing countries. In such cases, fossil fuel taxes can be more efficient than value added and income taxes, as they lower evasion (World Bank 2015) and cover the informal sector.[3]

ILLUSTRATING SUITABLE LEVELS OF GREENHOUSE GAS PRICE

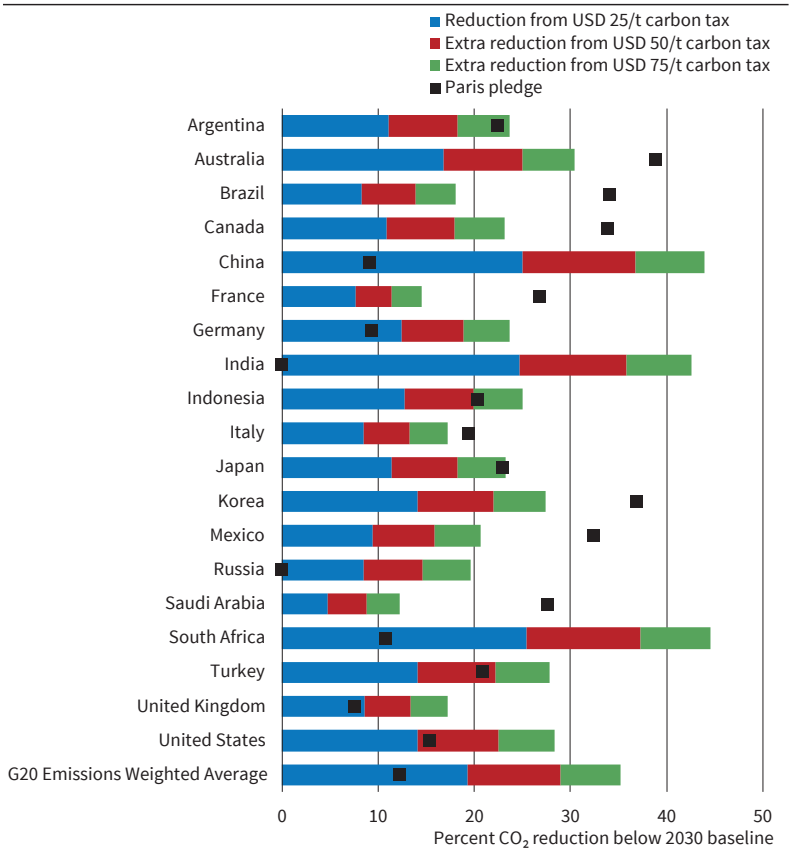
The IMF has developed a spreadsheet tool for projecting fuel use and carbon emissions for the power, transport, household, and industrial sectors. Based on plausible assumptions about the price responsiveness of fuel use by sector, the model can be used to quantify carbon emissions, tax revenues, and economic welfare. The model shows the advantages of carbon pricing compared to other policy instruments. A USD 25 carbon price in 2030 would, by itself, exceed the level needed to meet mitigation commitments in such countries as China and South Africa. In contrast, a carbon price as high as USD 70 would be insufficient in some countries like Australia or Canada, see Figure 1. There are multiple reasons for these differences. One of them is the natural resource base and other features of the economy (does it have fossil or hydro resources, heavy or light industry, etc.) as well as the history of earlier policy making including the level of earlier proactive abatement investments. Finally, the price level needed also reflects the level of ambition in the mitigation commitments.

Suppose there is a USD 50 tax in 2030. Carbon pricing could also mobilize significant revenues, typically around 1–2 percent of GDP. And the pure economic welfare costs (the value of foregone fossil fuel consumption to fuel users) is generally equal to or

[3] For more arguments concerning the role of GHG taxes as a means of resource mobilization, see Besley and Persson (2014) and Franks et al. (2018)

Figure 1

Reduction in Fossil Fuel CO_2 from Carbon Taxes in 2030



Note: Paris pledges indicate the percent reduction in CO_2 emissions below the baseline (that is, no mitigation) levels in 2030 if countries' mitigation pledges submitted for the Paris Agreement are met. Bars indicate the percent reduction in CO_2 emissions below baseline levels under carbon taxes with alternative tax levels.
CO_2 = carbon dioxide; G20 = Group of Twenty.
Source: IMF.

less than 0.5 percent of GDP (in emissions-intensive countries) – much less than the expected damage costs of climate change. Moreover, the domestic environmental co-benefits (such as reductions in local air pollution, traffic congestion, and accidents) can be large enough that net economic effects are neutral or strongly positive in high-pollution countries like China, India, and Russia (IMF 2019).

THE IMPLEMENTATION CHALLENGE

Although economists have argued for carbon taxes for decades, adoption has been slow. It has been difficult to achieve the necessary public backing to make it politically feasible. People have protested against even small changes in carbon taxes or fuel subsidies. A major source of public concern is that tax proceeds will be ill-spent or appropriated by corrupt politicians. Often *any* price change seems unacceptable, perhaps because of general disapproval of the government. In France, there were big protests when the liter price of gasoline was around USD 1.7, but not in Norway with USD 1.9. Citizens protest price hikes even when prices are extremely low, as in Ecuador (USD 0.50) or Iran (USD 0.12). We will discuss three categories of problem that lead to resistance: carbon leakage, fairness, and lobbies.

CARBON LEAKAGE

Current carbon prices vary considerably from large subsidies in some countries to taxes as high as USD 120/tCO_2 in Sweden. This creates distortions that drive industry concerns over competitiveness and carbon leakage – when companies move production (and emissions) abroad. To date these concerns have been small. Despite current policy heterogeneity, most countries have low taxes or (as in Sweden) have protected some industrial sectors that would be affected. Thus, empirical investigations have not found significant evidence of carbon leakage – but if carbon prices rise significantly, the issue will become more acute. Already today there are many discussions about border tax adjustment and other mechanisms to mitigate the adverse effects of carbon taxes. Certain basic material sectors that are highly emissions-intensive and trade-exposed – e.g., steel, aluminum, cement, and chemicals – are particularly at risk of carbon leakage and this may cause protests concerned about jobs.

REGRESSIVITY, FAIRNESS, AND PERCEPTIONS AFFECTING PUBLIC ACCEPTANCE

Consumer protesters, often motorists (sometimes homeowners with fossil fuel heating) say fuel taxes are unfair. There have been a number of studies concerning the income distribution effects of carbon taxation. While some early US-based studies found regressivity (e.g., Poterba 1991), a more recent, large survey covering transport fuel taxes in over twenty countries found that in a majority of cases, in particular in low income countries, they were progressive (Sterner 2012). In most European countries, they were rather neutral (Sterner 2012). In countries where the existing fuel tax is neutral or regressive, it would furthermore be possible to use the tax revenue collected to create a progressive package. Bureau et al. (2019) considered five different proposals in France ranging from equal repayment per person to schemes that subsidize energy investments in households – or schemes that refund primarily to the poorest deciles

of the distribution. They showed that most people in the lower deciles can be made better off, but not all. There are always a few individuals who have very high energy bills (for transport or heating) who are not compensated. Importantly, some protesters fall in the middle of the income distribution and do not necessarily approve of measures of redistribution targeted to the very poorest.

In developing countries, not only fuel but indeed most carbon pricing actually tends to be locally progressive (Dorband et al. 2019). However, poor households can still be adversely affected by carbon pricing. For example, a USD 30 carbon price would cost two billion of the global poor (spending less than USD 3 per day) more than 2 percent of their income. A given tax of USD X will have a bigger impact in a low-income country. This could be used as an argument for somewhat lower tax levels in low income countries, but if the tax difference is large or permanent it will trigger the need for border tax adjustments or tariffs to avoid carbon leakage. Also, for countries where large parts of the population can turn to traditional biomass or charcoal, the pricing of fossil alternatives, such as kerosene, might have unintended side effects on health, the environment, and tax revenues (Olabisi et al. 2019).

Policy acceptability is, however, not tied to income progressivity in any simple manner. There is a good deal of research revealing support varying with policy designs (Drews and van den Bergh 2016). First, attitudes towards new policy measures are based on their perceived distributional effects. The extent to which the consequences of a policy instrument are perceived as *fair* substantially influences the degree of acceptance it receives (Johansson-Stenman and Konow 2010; Kallbekken et al. 2013). However, perceptions of fairness are not always tied to the specific nature of the policy instrument. Often more important is how the revenue generated will be used (Jagers et al. 2019).

Second, acceptance is determined by the extent to which a policy instrument is perceived to impact the individual's freedom of choice, and thus whether it necessitates a change in behavior. Here, the correlations with acceptance are both direct and indirect. Coercive push measures (direct) are generally less supported (Steg and Vlek 1997) and significant infringements of personal freedom of choice (indirect) are also perceived as less fair (Eriksson et al. 2006). Ironically, there may be a contradiction here with optimal taxation literature. The fact that energy taxes are hard to evade in fact makes them "good" taxes in a Ramsey framework – but opponents will often label them as "unfair."

Another strong determinant of support or opposition is the extent to which a policy instrument is expected to achieve its aims, which is often referred to as *effectiveness* (Jagers and Hammar 2009; Kallbekken and Sælen 2011). For more coercive measures, perceived effectiveness is clearly linked to perceived fairness.

Attitudes towards policy measures may also be ideologically constrained (Häkkinen and Akrami 2014; Jagers, Harring, and Matti 2018). Identifying oneself as liberal or left wing typically increases support for environmental policies, including those involving climate change mitigation (Feldman and Hart 2018; McCright and Dunlap 2013; Severson and Coleman 2015), whereas right-wing positioning is connected to skepticism towards government regulation and free-market interventions. Finally, differences in policy support also vary between countries due to differences in political culture (Cherry et al. 2014), wealth and quality of government (Harring 2014), and the political context in which policy decisions are implemented (Linde 2018).

In low-income countries, we face not only opposition from special interests, but also in many cases a lack of interest in future threats simply because the reality of everyday life is already harsh. There are exceptions in, for instance, low-lying coastal areas prone to flooding, but normally the challenges for people on low incomes in Africa or Asia are already so stark that there is little demand for measures to mitigate threats in the somewhat distant future. Hence the democratic mandate for expensive climate policies is limited unless there are significant ancillary benefits such as reduced urban pollution. In these countries, it is particularly important to explain pedagogically the *need* for climate policies.

LOBBIES AS OBSTACLES

Carbon pricing finally faces resistance from the organized interests of polluting industries and extensive lobbying. Clearly, fossil fuel companies lobby against climate policies; the challenge is to understand why they succeed. To some extent, lobbying efforts can be explained by the Stigler-Olson theory of special-interest behavior, which states that successful lobbies arise when special interests are concentrated and well-organized (Inchauste and Victor 2017). In the case of climate change, there are at least two different sets of lobbyists. First, we have lobbyists who represent coal mining, oil, and gas companies. But, second, on the demand side, we also have lobbyists who represent the energy-intensive industries such as fertilizer, aluminum, or transport. In both cases, their concentrated nature gives the preconditions for the formation of strong lobbies. In contrast, the benefits of climate mitigation are very dispersed and occur largely in the future. Despite energy's small share of overall GDP, the share of top 500 companies in energy-related industries is very high. More generally, governments' ability to commit to climate policy is undermined by these strong interest groups, rendering the introduction of carbon pricing difficult (Kalkuhl et al. 2019).

The relative strength of industry opposition to carbon pricing across countries can be explained in large part by several factors: (i) *The share of emissions-intensive (and trade-exposed) industries in a country's economy.* Fossil fuel producing country governments often subsidize fuel, contributing to higher carbon emissions, the crowding out of other sectors and technologies in the economy ("Dutch disease"), and less investment in energy efficiency (Friedrichs and Inderwildi 2013). (ii) *The institutional and procedural structure of the policymaking apparatus.* Important structural properties include the type of government (e.g., democracy/autocracy); the incentive dynamics of party competition (e.g., single-party rule vs. multi-party coalitions); the professional quality of ministries and the civil service; the structure and ownership of energy/emissions-intensive enterprises (state-owned vs. private or joint venture); the interest group system (e.g., pluralist vs. corporatist).

CONCLUSIONS FROM A DEVELOPING COUNTRY PERSPECTIVE

For countries in the Global South, carbon taxes can be politically difficult, but there are multiple reasons why they can be attractive. From an environmental perspective, putting a price on carbon in developing countries is especially important to avoid future lock-in in economies where emissions are still growing fast. One salient example is the ongoing renaissance of coal in India, China, Indonesia, South Africa (Steckel et al. 2015; Edenhofer et al. 2018; Tong et al. 2019), and, more recently, poor countries in sub-Saharan Africa (Steckel et al. 2019). In addition, a carbon price will generally trigger ancillary benefits for other environmental goals such as air pollution. Furthermore, anticipation of stronger climate action including trade barriers from developed countries would mean that it is prudent for all countries to diversify out of risky fossil technologies.

From a fiscal perspective, it is usually difficult to raise taxes in developing economies because the informal sector is a large share of the economy (Besley and Persson 2014). Carbon prices help increase the tax base. A carbon tax could provide revenues for a substantial share of the funds necessary to finance the Agenda 2030 (Franks et al. 2018). Hence, carbon pricing can be an important tool to foster domestic resource mobilization.

Developing countries face challenges regarding the effectiveness of price instruments. The higher capital intensity of low-carbon technologies compared to those using fossil fuels can make moving to these newer technologies more difficult if developing countries face high capital costs. This inability to borrow at world market rates can render carbon pricing ineffective (Hirth and Steckel 2016). It suggests an important role for capital markets.

However, the combination of public skepticism and polluters' lobbying power will make implementation of carbon pricing difficult. For this reason, economists need to think carefully about suitable communication and public-education strategies so citizens better understand why carbon pricing is an appropriate instrument and why it is important to use the revenues collected in a manner that is honest, transparent, and visibly useful for combating climate change. Using revenue from carbon pricing to provide subsidies for weatherizing homes in low-income areas or improving access to affordable public transport is likely to be viewed favorably by the public. Such policies can help meet multiple goals in that they are redistributive in addition to promoting climate goals and reducing local air pollution by lowering emissions.

More fundamentally, for GHG pricing to be seriously considered in many developing countries, its implementation needs to be carefully designed and carried out. In order to predict and enhance acceptability, broad attitudinal surveys can be conducted. In low-income countries, the dire challenges of making ends meet generally imply that development and income opportunities are the prime focus of policy. In many instances, suffering and hardship are commonplace today and thus diverting resources to meet future problems is not necessarily popular. The fact that climate change could actually make lives much more difficult needs to be explained so that policies can be motivated to the general public. The political economy of climate policies needs to be mapped, in particular the identification of carbon lobbies. The effects on carbon emissions, and the distributional implications, of tax incidence and alternative recycling schemes for the tax revenues over time can be analyzed using general equilibrium models. We have argued that carbon taxes are an important part of the policy response, but other measures such as support for new technologies are also needed. We must collaborate with researchers in all countries to make sure everyone has the capacity to carry out appropriate analyses and design policies.

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