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PARALLEL TRACKS TOWARDS A GLOBAL TREATY ON CARBON PRICING

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Energy Sustainability

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ABSTRACT: We argue that a global carbon price is the only way to effectively tackle free riding in international climate policy, required to substantially reduce greenhouse gas emissions. We briefly review the main reasons behind the essential role of carbon pricing, address common misunderstandings and scepticism, and identify key complementary policy instruments. Negotiating global carbon pricing is argued to be much easier than negotiating binding country-level targets, especially if it includes equitable revenue recycling. Moreover, a global carbon price can be more readily adapted to new data and insights of climate science. We propose a political strategy towards a global carbon price that consists of two tracks. The first entails assembly of a carbon-pricing club, a specific case of a climate club, to gradually move towards a full participatory agreement on carbon pricing. The second track involves putting time and energy into re-focusing UNFCCC negotiations on a carbon-pricing agreement. The two tracks reinforce one another, increasing the likelihood of a successful outcome.

JEL Codes: Q54, Q58, Q48
Keywords: Carbon tax, carbon market, cap-and-trade, tradable permits, equity, climate agreement, climate club

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The scientific consensus is that substantial reductions in global carbon dioxide emissions must begin very soon if dangerous climate change is to be avoided.[1] While many regard the Paris climate agreement as a landmark in international climate cooperation, others have warned it will be unable to drive the necessary emission reductions due to inherent shortcomings that are difficult to overcome without further international negotiations.[2] Three main shortcomings are: (1) The Nationally Determined Contributions (NDCs) do not add up to something even close to the 2°C target, let alone the more ambitious 1.5°C target.[3,4,5,6] (2) Their voluntary character may encourage countries – including those within the relatively ambitious EU – to free-ride, developing weak national policies that do not meet their pledges.[7,8] (3) The lack of global coordination of national climate policies is likely to cause various adverse systemic effects: carbon leakage due to a shift of carbon-intensive production to countries with less stringent climate policies[9], triggered by differing ambitions of NDCs among countries; and rebound of energy conservation under lax climate policies due to additional uses of high-carbon goods/services.[10,11,12]

An optimistic stance is that reviewing and revising NDCs every 5 years, as planned through the "ratcheting mechanism" of the Paris Agreement, will increase their ambition. That may be true, but it will not undo their voluntary character, inviting non-compliance and free-riding. Because emission reductions are expected to be costly and climate change is a shared global externality in both its causes and effects, there are strong economic incentives for countries to free-ride on emission reductions taken by others. It can only be overcome through a global agreement that binds countries to implement consistent and effective climate policies, which will also avoid the aforementioned systemic effects. Many countries are unlikely to implement sufficiently stringent and mutually consistent measures unilaterally because domestic climate benefits are generally small and outweighed by the costs of a weaker competitive position. Benefits will, moreover, mainly arise in the long term, while costs are incurred at more short notice. While the Paris agreement has undoubtedly taken an important step forward to act cooperatively on the threat of climate change, because of the free-rider problem, targets are much harder for countries to commit to than

internationally agreed-upon policies. In the long run, the target approach is much less effective than policy coordination, especially if the latter includes a form of carbon pricing.

This article hence argues that a logical next step in international climate negotiations is to move the UNFCCC in the direction of global carbon pricing. This involves two mutually reinforcing tracks: first, setting up a specific type of climate club, namely on carbon pricing; and second, directing UNFCCC negotiations towards global carbon pricing. While many countries have implemented a carbon tax or market[13,14], the absence of international climate policy coordination and legitimate fears of loss in competitive position[15] prohibit such unilateral initiatives from resulting in sufficiently high carbon prices. The parallel tracks define a course along which the international community can more rapidly achieve globally consistent and high carbon prices, essential for averting dangerous climate change.

1. Unique advantages of carbon pricing

Carbon pricing has been championed by a broad range of economists and policy-makers, including traditionally conservative as well as progressive ones, for a variety of reasons.[16,17,18,19,20,21,] Well-designed carbon pricing will quickly and effectively alter the composition of market-based consumption and production, the main sources of CO_2 emissions, from high- to low-carbon goods/services. Economic studies – using different methods – estimate that compositional changes alone contribute to more than 50% of required emissions reduction in coming decades.[22,23,24] Carbon pricing will in addition steer the direction of innovations towards energy-efficient and low-carbon production life cycles, which could achieve the remainder.[25,26,27,28]

Carbon pricing can be implemented either as a tax or a market for emissions permits. A single carbon price, defined per ton of C or CO_2, is able to modify trillions of decisions by consumers, producers, investors and innovators, by simply making high-carbon options more expensive than low-carbon alternatives. It is implemented where fossil fuel – whether coal, oil or gas – is taken out of the ground or imported from a country that has not implemented a carbon price. Any intermediate and

final product or service would then obtain a price that reflects all carbon dioxide emissions generated, namely by aggregating all carbon-pricing effects along the entire production cycle.[29] As illustrated by Figure 1, this unique systemic nature of global carbon pricing, i.e. its ability to cover the entire economic system, assures complete control of emissions, preventing excessive leakage and rebound, while steering innovations most effectively towards low-carbon technologies, goods and services. Because carbon pricing accounts for heterogeneity of abatement opportunities and costs among polluters, it further minimizes society's overall cost of pollution control.[30,31]

Carbon pricing does not rely on environmental consciousness or altruism of consumers and firms – price incentives would naturally steer them towards low-carbon options. This is not to deny that environmental consciousness should be fostered as well. Most importantly, perhaps, it will help to create political support for carbon pricing.[32,33,34,35] But even in the unrealistic case that the large majority of consumers in the world wished to reduce high-carbon consumption voluntarily, the massive amount of information required to accurately identify low-carbon goods would greatly handicap their ability to do so. The modern-day consumer can choose between a very large variety of goods produced by complex and highly varied life cycles with global coverage and distinct carbon intensities. Carbon pricing is essentially a form of decentralized public policy, meaning low information needs and costs for governments. This is a clear benefit compared to, for example, technical standards. The latter would need regular updating to keep up with future technological change, while they would have to be defined (and regularly updated) for millions of distinct products and services, to prevent carbon leakage due to producers or consumers shifting from regulated to unregulated technologies.

A carbon tax is arguably the easiest way to implement a carbon price, and entails the lowest bureaucratic costs. It is not to be confused with currently existing fuel taxes that typically do not reflect the carbon content of a fuel. In the absence of carbon capture and storage, currently still very expensive, of highly uncertain potential[36], and enjoying low public acceptance[37], any carbon extracted from the ground in the form of fossil fuels intended for energy use will eventually end up in the

atmosphere in the form of CO_2. Therefore, rather than directly taxing hard-to-monitor CO_2 emissions, it is much easier to tax fossil fuels in relation to their carbon content as this translates proportionally to CO_2 emissions through their combustion. This way, only a handful of firms need to administratively pay the carbon price, instead of millions of polluters further on in the supply-demand chain. The resulting cost of carbon is then straightforwardly included in the price of intermediate and final goods/services and passed on through existing markets and cost-accounting from firm to firm and to final consumers.

The ability to gradually adjust emissions reductions through a single, centralized price mechanism also offers a uniquely powerful device to keep reductions in tune with advances in natural and social climate sciences. Carbon pricing allows simple adjustments to account for variations in global emissions and atmospheric concentrations, uncertainty about the precise impact of emissions reduction on climate change, and new scientific insights about climate change. While difficult to respond to these in an agreement based on targets (as Paris), it could be achieved fairly easily by adapting and fine-tuning a global carbon tax or a global ceiling (cap) to emissions.

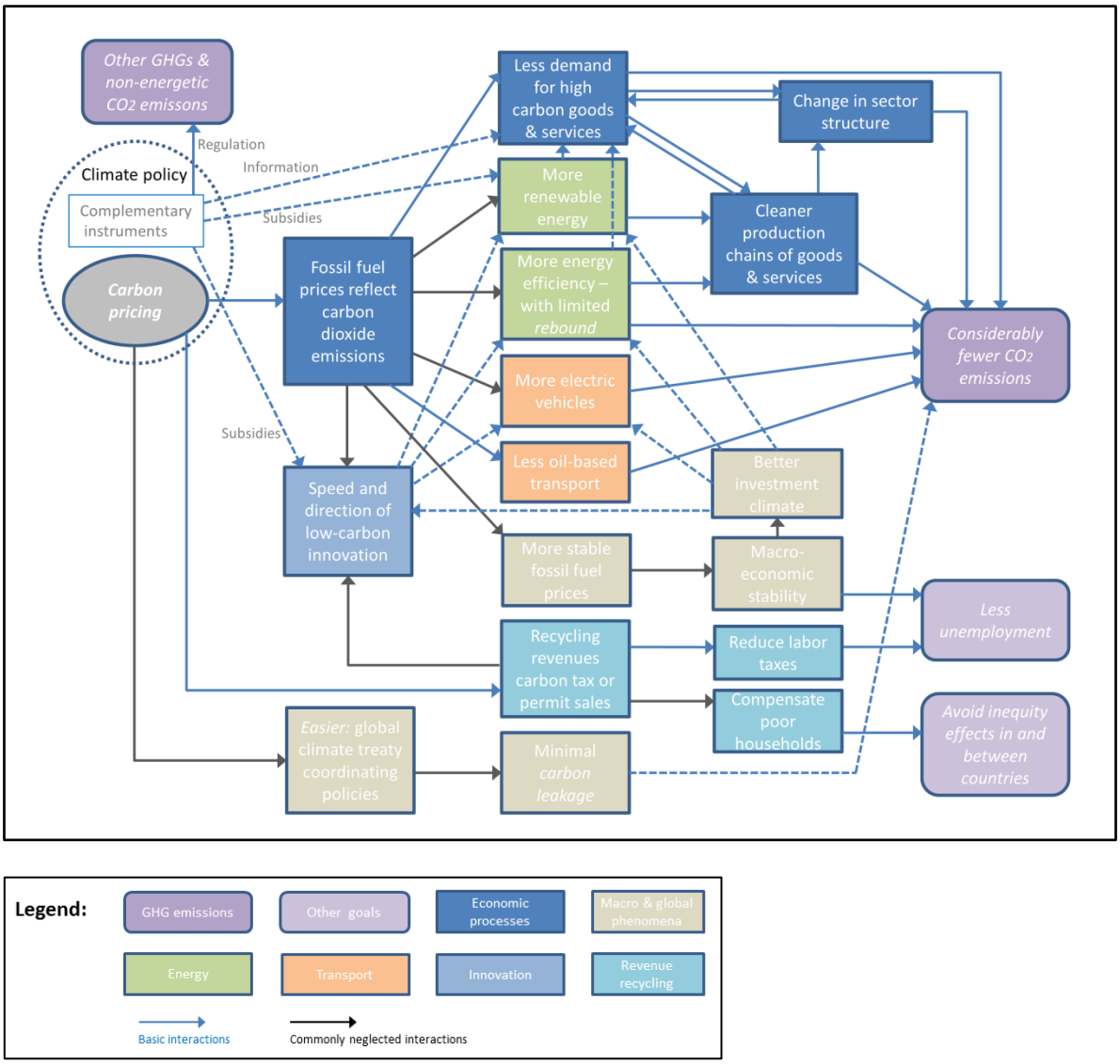

Figure 1. Systemic effects of carbon pricing guaranteeing substantial CO_2 emissions reduction

Notes: (i) Some complementary instruments are shown for illustrative purposes – others are mentioned in the text. (ii) Black arrows indicate interactions that are often ignored, leading to an underestimation of the effectiveness of carbon pricing. (iii) Some arrows are dashed to avoid confusion about the direction of crossing arrows.

2. Unfounded scepticism and absence of effective alternatives

Despite broad-spectrum support by most economists, many climate policy studies by social scientists ignore the unmatched effectiveness of reducing emissions through carbon pricing.[38,39,40,41] This could

be called 'carbon-pricing denial'. Instead, they tend to suggest some form of bottom-up solution through voluntary and local action[42], or a rigid scheme of person carbon limits intended to promote global equity.[43] Under the latter approach consumption by rich and poor would become equally limited. While ethically admirable, it would face immense political resistance.

A widespread idea is that eco-labelling, supported by LCA studies, will allow consumers to voluntarily reduce their carbon footprint.[44] However, limited human capacities of altruism and information processing mean this approach cannot deliver large-scale emissions reduction.[45] In achieving local, bottom-up climate solutions, also cities are frequently mentioned.[46,47] Not denying their potential contribution, they only exert direct control over a limited portion of total emissions generated by industry, electricity production and consumption. Moreover, the implementation of uncoordinated policies at the subnational level may generate carbon leakage. Complementing subnational initiatives with carbon pricing will reduce their detrimental systemic effects, which will improve their effectiveness.

It is often taken for granted that subsidies for research and deployment of new technologies contribute to reducing emissions. Without carbon pricing, however, we cannot ensure that the full life cycle of new innovations will actually use less carbon.[48] For instance, the production cycles of particular batteries for electric vehicles or specific solar PV panels might be unnecessarily intensive in carbon dioxide emissions, often relying on cheap coal power for manufacture, which would delay a low-carbon transition. More generally, production of cleaner technologies generates emissions in an economy that is still running mainly on fossil fuel energy. To limit the carbon-intensity of such production, subsidies fall short – we need to penalise the dirty next to rewarding the clean if we aim for a quick low-carbon transition. One can see this by considering the Kaya identity[49]: *CO_2 emissions = carbon intensity of energy (CO_2/energy)* x *energy intensity of the economy (energy/GDP)* x *income level (GDP/population)* x *population*. Subsidizing renewables will only affect the first factor, i.e. the *carbon intensity of energy*, while a carbon price will simultaneously influence the first and second factors, i.e. also the *energy intensity of the economy*.

These remarks do not deny the need for a broader policy package going beyond carbon pricing. Information provision can garner understanding of, and support for, carbon pricing. Behavioural nudges can address informational failures and bounded rationality, for example, by presenting a low-carbon product as the default option for consumers.[50] Non-price regulatory instruments are needed to control certain non-energy GHG emissions, such as from land conversion, deforestation and landfills. Innovation policies are required as well, to ensure further development of promising low-carbon technologies which are still too expensive to compete in markets. The main justification of public sector support is well-known, namely that R&D has positive externalities and knowledge spill-overs. But it cannot address the climate externality – for this, carbon pricing is the most effective climate policy. That is, subsidies for technological innovation and adoption cannot stand alone.[51,52]

3. Ensuring equitable outcomes with carbon pricing

There is much confusion about the equity dimensions of climate policy in general and carbon pricing in particular. While the concern is often expressed that carbon pricing is inherently inequitable, if well designed, it can actually be one of the most equitable instruments of climate policy. Contrary to other regulatory instruments like quotas, technology standards or renewable energy subsidies, carbon pricing generates revenues that permit compensation of low-income households or international transfers from rich to poor countries. This holds true not only for carbon taxation, but also for emissions trading, as revenues can be raised by selling or auctioning permits. Compensating for inequitable consequences of carbon pricing does not mean eliminating pre-existing inequality. It would evidently be unfair to impose such an ambitious condition on any climate policy.

Public perception studies indicate that the use of revenues can be critical for social and political acceptance of carbon pricing.[53,54] The specific context of a country may determine which recycling scheme is the best choice to enhance acceptance.[55] For example, if equity concerns are paramount, a uniform lump-sum recycling may be most appropriate. On the other hand, earmarking

revenues for green expenditures might be fitting when citizens question the environmental benefits of carbon pricing. It would be preferable, though, to explain to them that its main effectiveness lies in emissions reduction.

The discussion about an international redistribution of revenues from a global carbon price could take place within the already agreed approach for financial support to low- and middle-income countries decided in Conferences of the Parties (COPs) to the UNFCCC and confirmed in Paris. This commitment involves mobilizing US$100 billion per year in climate finance during the period 2020-2025. Considering that annual CO_2 emissions from fossil fuel use represent more than 30 billion of tons[56], a global tax of, e.g., 30US$ per tonne of CO_2 would generate revenues close to 1% of Gross World Product (GWP). The carbon price to stabilize global emissions to remain within 2°C warming by 2105 could even generate revenues up to 6% of GWP. Hence, carbon pricing can deliver huge funds for potentially reducing inequality and poverty.[57] Of course, as time goes by, households and firms will shift away from carbon-intensive products and services, causing revenues to decrease, unless the tax rate is revised upward. But there will then also be less need to correct for inequity as, along with reduced revenues, inequality effects will diminish.

In judging distributional effects of carbon pricing, one should further take into account that other climate policy instruments can have considerable inequitable consequences. For instance, technical standards make products more expensive equally for those with low and high incomes, so creating a relatively higher cost for low-income households, without generating revenues to compensate for this. In addition, subsidies for renewable energy use up public revenues rather than generating them, so cannot compensate for any adverse distributional effects they cause. Inequitable effects depend on their specific design, in terms of beneficiaries (e.g., car or home owners) and financing arrangement (e.g. general budget vs. taxes on electricity consumption). While one cannot generalize, there is evidence that untargeted subsidies for solar PV result in a transfer of income from society to relatively well-off homeowners, with private benefits in the latter group further biased towards wealthy households with large houses.[58] Similarly, subsidies for wind energy favour land

owners, particularly those holding large parcels suitable for wind mills, while subsidized electric vehicles disproportionately benefit households who can afford relatively expensive cars.

4. Track 1: Design of a carbon-pricing club

One promising route towards a carbon-pricing agreement which overcomes political barriers is to establish a 'carbon-pricing club' among countries with an ambition to implement effective policies.[59] This is a special case of what in the literature is known as minilateralism[60] or providing club goods[61]. A carbon-pricing club would coordinate policies or carbon markets[62] in member states and apply a border carbon tariff on imports of goods and raw materials from non-members and possibly reimburse carbon expenses for exports. Domestic firms would then not face a competitive disadvantage in domestic and world markets vis-à-vis competitors from countries outside the club.[63] Non-member countries would feel an incentive to join the club and implement a carbon price. Moreover, non-cooperation could stimulate citizens and environmental NGOs to lobby with their government to join the club.[64] History offers successful cases of clubs expanding to a global agreement, such as the General Agreement on Tariffs and Trade, covering 23 members at its start in 1947, transforming into the World Trade Organization with 164 country members.[65]

Two recurrent critiques have been levied at border carbon tariffs. The first concerns its legal feasibility under WTO-GATT rules. While several authors have argued that carbon border tariffs can fit with WTO rules, others disagree.[66] The only way to resolve this is having the WTO rule on an initiative undertaken to form a climate pricing club. It is likely to generate media and political attention, which as a beneficial side effect might stimulate international debate on how to align the WTO with the need for environmental/climate protection. The second critique relates to practical implementation. At first glance, designing an effective border tax adjustment seems a very complicated task. It should take into account the total emissions associated, directly and indirectly, with the production of each good. Ideally, such emissions should be measured by accounting for the technology of foreign countries. However, taxing emissions based on the domestic technology, easier

to assess by the countries in the club, is already a good step towards levelling the playing field. That is, it would be enough to estimate the 'avoided emissions' for the club members when they import a good instead of producing it.[67]

To circumvent the complexity of designing carbon border tariffs, Nordhaus proposes a uniform percentage tariff on all imports from non-participants, which would serve as a sanction on non-participation in the club. [68] Model simulations indicate that this proposal would provide incentives for many countries to join the club and implement a carbon price, although it would not solve the problem of distinct impacts on competitiveness for different economic sectors. In this light, we think it is important to investigate more how carbon border tariffs can be designed to reflect – at least approximately – the heterogeneous carbon intensities of goods, as this could help to reduce free riding, avoid leakage and protect competiveness.[69]

By applying a uniform carbon price in its member states and some type of border tariff for other countries, the club could serve as a transition vehicle toward a full participatory agreement on a global carbon price. The larger the club – in terms of people, trade power and emissions – the more attractive for non-members to enter it, as more countries would regulate carbon-intensive imports and so free-riding would become less beneficial. Club membership could further be encouraged by creating specific membership benefits, as far as allowed under WTO rules – such as close mutual financial support and cooperation in trade, low-carbon innovation and science – creating positive spill-overs between members.[70]

To signal that the carbon border tariffs would be motivated by concerns about climate change and not serve as a disguised protectionist measure or a source of public revenues, one could complement them with 'revenue recycling offsets'[71]: tariff revenues would be returned to non-member countries from whence the imports originated, to signal that the tariffs are to protect climate policies and not generate revenues in the club. The tariffs would then reduce import demand for carbon-intensive goods in the club member countries, while minimizing financial effects on import source countries. Possibly, these countries could be encouraged to prioritize the returned money for

assisting their affected industries in adopting low-carbon production technologies.[72] More generally, club members could monitor the use of revenues by non-member countries, to ensure that this provision does not create perverse incentives. Other suggestions for use of the money are provided by the literature on climate finance.[73]

The club and its goals could be promoted, and new members invited, during UNFCCC COP meetings. This would also allow for the club to put pressure on UNFCCC climate negotiations, involving all countries, to make progress and move towards carbon pricing. In this way, the parallel tracks might exert mutual positive feedback. This is graphically illustrated in Figure 2.

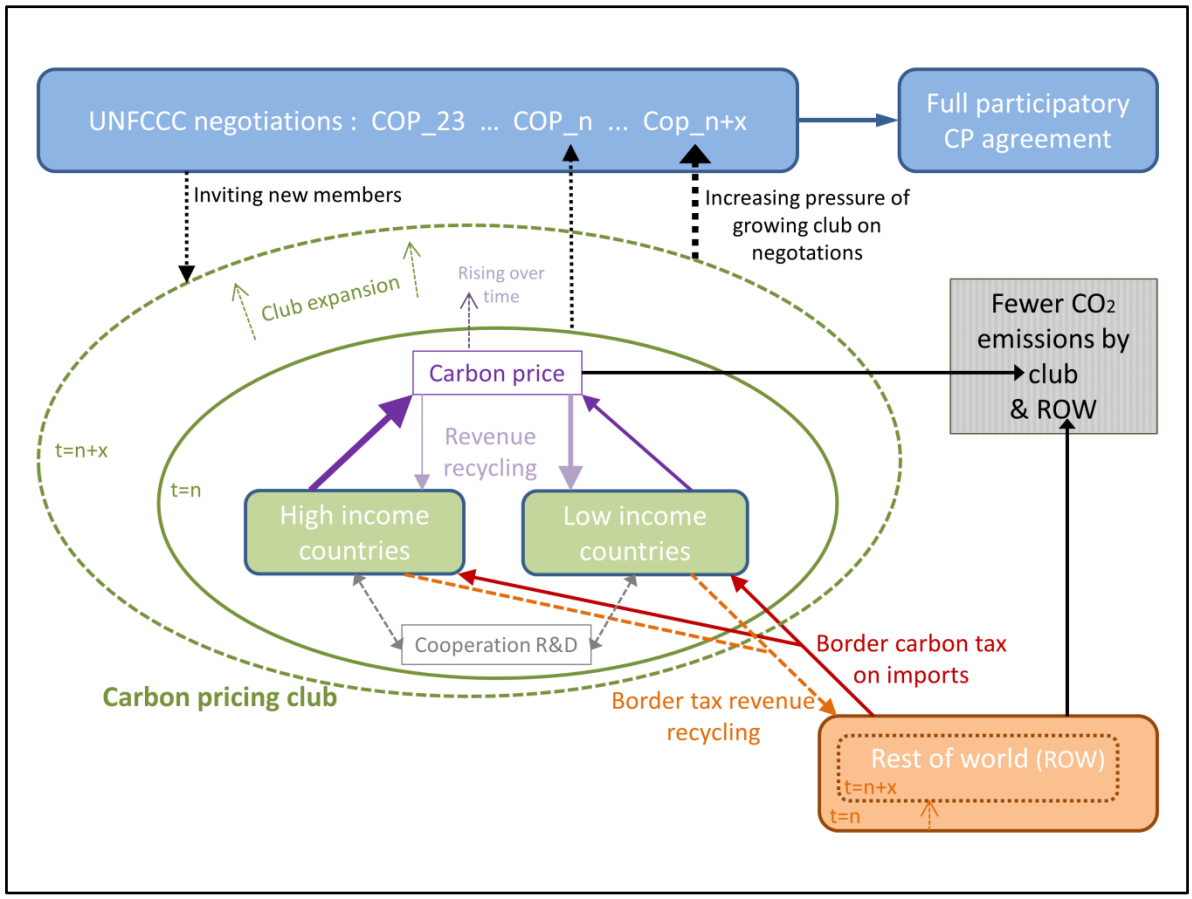

Figure 2. Parallel tracks

How could a carbon club take off? A few willing nations might start deliberations, such as

those which make up a considerable part of global emissions and have ambitious climate goals or some form of carbon taxes or emissions trading.[74] Some countries might be motivated to participate because of considerations related to national public finance or co-benefits.[75] In reality, a club may already be emerging. In December 2017, France hosted a climate summit to which were invited the heads of state of all countries with a climate agenda that was considered sufficiently ambitious. The meeting was facilitated by the World Bank, a potential catalyser in the formation of a carbon-pricing club.

A recent agent-based model simulation of climate clubs and their long term impacts found that a club initiated by the EU and USA would be particularly likely to grow to a size that reduces emissions effectively.[76] Early participation of China and Japan would then almost guarantee success. A related study finds that clubs can function even without the participation of the US, as long as other major emitters show leadership.[77]

5. Track 2: Four challenges for UNFCCC negotiations

Working on a carbon-pricing club does not mean giving up on UNFCCC negotiations. On the contrary, these can be positively influenced by a successful club[78], which would speed up the formation of a global carbon-pricing agreement. Negotiating a global carbon price has been suggested to be very difficult or even impossible. We argue that it is feasible and may even be fairly easy, that is, if countries are willing to give it a serious try. Four main considerations are relevant in this context: the 'negotiation advantage' of focusing on a carbon price, the specific instrument choice, the level of ambition, and the use of revenues. We address each of these issues in turn.

Negotiating a carbon price is likely to be simpler than reaching agreements on climate technology standards or country-specific quotas. This is because carbon pricing, especially as a carbon tax, requires relatively little information for policy makers and polluters to act upon and, unlike the alternatives, reduces the potential for free riding. For instance, with binding national quotas, countries are rationally motivated to push others to accept a serious burden while trying to negotiate

a lax burden for themselves. With technology standards, countries try to weaken these for sectors that are important to their economy, such as emission norms for cars. If all countries face incentives to free ride in these ways, it is unlikely that negotiations result in sufficient emissions reduction. This is well illustrated by the Paris Agreement: despite some ambitious NDCs, many countries offered rather weak ones, overall making it impossible for the Agreement to limit the temperature increase to 2°C above pre-industrial levels.[79,80]

In contrast, when negotiating a unique global carbon tax, countries would know that a strong policy in the form of a high price would equally apply to all other countries. This would then reduce the incentive to free ride, making it possible for a fairly high price to emerge. In addition, whereas negotiations involving quantity pledges among some 200 countries means dealing with a 200-dimensional coordination problem, focusing on a global carbon tax comes down to a simple one-dimensional negotiation challenge.[81] On the other hand, negotiating technical standards would mean an n-dimensional challenge with n denoting the number of carbon-intensive technologies in the world. Moreover, if not all n technologies would be part of the agreement, market distortions would result, hampering its effectiveness.

In terms of instrument choice, the question is whether implementing a global carbon price is best achieved through a carbon tax or emissions trading. Each has its advantages and disadvantages. Many economists favour the tax because it is easier to implement, involves low bureaucratic costs, generates revenues on a regular basis, and can deliver a more stable price signal than a cap-and-trade scheme. Furthermore, one can then implement a steadily rising carbon price over time to allow for anticipation and adaptation by all economic agents. On the other hand, carbon trading guarantees a ceiling on overall emissions within a given time frame, is arguably less sensitive to political whims, and can automatically respond to economic changes in demand, technologies or abatement costs.

A particularly strong argument in favour of emissions trading is that it does not suffer from a green paradox. This denotes a mainly theoretical insight that in response to an announced or expected increase in the carbon tax over time, forward-looking resource owners will expand the short-term

supply of fossil fuels, provoking lower prices and larger demand. The cap in a carbon market will provide a hard limit to any intertemporal leakage.[82] An alternative option to avoid the green paradox – though politically more difficult perhaps – is compensating a fall in the market price of fossil fuels by a higher carbon tax, to assure a non-decreasing price after taxes. Recent studies further argue that a divestment effect will weaken or even undo a green paradox effect.[83,84] Here divestment signifies that forward-looking investors refrain from funding technologies and infrastructures with high carbon emission intensities as their use will become un-economic at some future date once stringent climate policy is implemented. This will alter the composition of the capital stock, in turn reducing derived demand for fossil fuels, especially under non-decreasing carbon prices. Hence, even if under the influence of an expected future rise in the carbon price short-term fossil fuel supply increases, fuel demand cannot fully respond as it is restricted by the divestment effect, in turn moderating the magnitude of the green paradox effect. An additional moderating effect is that short term supply of fossil fuels is limited by the time needed for investment in additional extraction capacity.[85] Incidentally, a green paradox can also occur without carbon pricing, namely in the presence of subsidies for renewable energy adoption.[86] In this case, the compensating divestment effect is likely to be weaker.

Given that both carbon tax and market approaches have pros and cons, and that countries are experimenting with both, it is best to continue this path and learn more about both options. One can also combine the two instruments, to limit costs to carbon tax payers[87,88,89] or to assure a minimum price in a cap-and-trade scheme, such as the UK carbon price floor.[90] Critics of carbon pricing like to point out that early experiments with carbon taxes and emissions trading have not reduced emissions much. This was not due, though, to fundamental shortcomings of these instruments but to the lack of a global climate agreement that harmonises national policies. This then allowed for sub-optimal policies – taking the form of too low taxes, too high caps, or exemptions for various industries or excessive generosity in providing emission allowances. Such implementations have not followed economists' textbook recommendations on these instruments. Moreover, some schemes were

explicitly established with the objective to learn rather than achieve ambitious emission reductions. Witness the EU-ETS, which was initially designed to meet the rather unambitious Kyoto Protocol target. Indeed, politicians and policy makers in Europe have learned from experiences with existing carbon markets and are now proposing better implementation designs.[91] In addition, many businesses and even some universities are undertaking carbon-pricing experiments, generally delivering positive experiences.[92,93]

With regard to the level of ambitions, in the case of a carbon tax, we would propose to negotiate a carbon-pricing schedule starting with a global carbon price that is at least as high as the minimum of the carbon taxes or carbon market prices in the member economies. It would be desirable to aim for the highest of these prices, if the members were able to negotiate such an outcome. The starting price could then be increased regularly with an announced amount (e.g., US$10 every year), until emissions reduction conforms to the Paris climate target. The Swiss CO_2 Law has implemented this type of design, in which the carbon price is automatically revised if the emission targets are not reached. A gradually rising schedule provides time for anticipation of long term investment decisions, and also allows voters to revise their beliefs on the tax effectiveness. The 2017 Report of the High-Level Commission on Carbon Prices suggests that a carbon price necessary to reach the Paris objectives is in the US$40-80 range in 2020, rising to US$50-$100 by 2030.[94] Other reference points can be derived from studies estimating the social cost of carbon, suggesting a lower bound of US$125 per ton of CO_2.[95] In case of a global tradable permit system, the carbon budget consistent with the 2°C or even 1.5°C target should be guiding. One would best start with a lax ceiling (global cap) and then gradually lower this over time, resulting in a rising price schedule as well.

Revenues of carbon pricing can be used for equity, innovation support or employment purposes.[96] The precise balance between these is ultimately the outcome of political decisions and negotiations among countries. To increase acceptance and fairness of carbon pricing, one element is compensating inequity effects within countries. This could be done by using carbon price revenues to reduce labour taxes for low income groups or via lump-sum transfers. Another element is that rich

countries compensate low-income ones to assure these can socially handle a global carbon price.

6. A narrow time window

Since 2015, oil prices have been at a relatively low level compared with the period 2005-2014. This may have been due to oversupply, driven by fracking and shale oil exploration in the United States and other countries, and strategic over-supply by Saudi Arabia to reduce competition. An alternative explanation – associated with the aforementioned green paradox effect – is the threat of rapidly falling costs of renewable energy options and the striking of the Paris agreement, both of which signal to oil producers a possible approaching end of the fossil fuel era.

Carbon pricing would not just reduce emissions but also contribute to economic stability. A high carbon price would act as a buffer, leaving less room for oil price fluctuations, in turn providing a steady signal encouraging firms and individuals to undertake long-term investments in energy efficiency, renewable energy and electric vehicles, thus contributing to a rapid energy transition. In other words, we find ourselves in a unique time window with coexisting environmental and macroeconomic benefits to be seized.

Without carbon pricing there is no good chance to stop climate change at any reasonable global temperature. To achieve carbon pricing at a global scale, we should advance on parallel tracks: UNFCCC negotiations should create room for talking seriously about a global carbon price schedule, along with redistribution-of-revenues rules; and countries with the most ambitious climate goals and policies should together form a carbon-pricing club along the lines sketched, which can then grow over time in membership and positively influence the UNFCCC negotiations. Since the time window is likely to be narrow, we should act swiftly.

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