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Closing the emission price gap

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ABSTRACT

Even without internationally concerted action on climate change mitigation, there are important incentives for countries to put a price on their domestic emissions, including public finance considerations, internalizing the climate impacts of their own emissions, and co-benefits, such as clean air or energy security. Whereas these arguments have been mostly discussed in separate strands of literature, this article carries out a synthesis that exemplifies how policies to put a price on emissions can be conceptualized in a multi-objective framework. Despite considerable uncertainty, empirical evidence suggests that different countries may face quite different incentives for emission pricing. For instance, avoided climate damages and co-benefits of reduced air pollution appear to be the main motivation for emission pricing in China, while for the US generating public revenue dominates and for the EU all three motivations are of intermediate importance. We finally argue that such unilateral incentives could form the basis for incremental progress in international climate negotiations toward a realistic climate treaty based on national interest and differentiated emission pricing and describe how such an agreement could be put into practice.

1. Introduction and motivation

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change reaffirms the serious consequences of unabated climate change (IPCC, 2013). In order to avoid the adverse effects of 'dangerous anthropogenic interference with the climate system' (UNFCCC, 1992) and to close the 'emission gap' between emission reductions from unilateral pledges under the Copenhagen Accord (UNFCCC, 2009) and a trajectory that limits the risk of global mean temperature increase of more than 2 °C, a list of actions specifying low-cost mitigation options in different sectors has been proposed (UNEP, 2014). These include, for example, encouraging no-tillage practices and improved nutrient and water management in agriculture, appliance standards, building codes, or vehicle performance standards.

However, from an economic perspective, the perhaps most important prerequisite for cost-efficient climate change mitigation lies in imposing a globally uniform price on GHG emissions that approximates their social costs (Stern, 2008; IPCC, 2014) instead of determining abatement requirements for each economic sector and technology option. By means of a price on emissions the global externality associated with climate impacts would be internalized into the decisions of all individuals and organizations and market prices will ideally guide individual incentives toward socially optimal abatement efforts (but additional policies will be required to provide low-carbon public goods and target additional market failures). Yet, collective action theory has provided a pessimistic outlook regarding the feasibility of an optimal global emission price. It is argued that free-rider incentives would undermine incentives to participate in an international arrangement for the provision of the global public good of emission reductions (Barrett, 1994; Carraro and Siniscalco, 1993). Nevertheless, despite the lack of an internationally binding climate agreement, several countries (including 18 of the world's 20 largest emitters) have implemented policies that explicitly aim to reduce their GHG emissions (Dubash et al., 2013 (Townshend et al., 2013; IPCC, 2014, Chapter 15).

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This article argues that even in the absence of a global climate agreement there are various unilateral, and in part short-term incentives for policy-makers to introduce mitigation measures, and in particular emission pricing. We exemplarily discuss incentives for unilateral climate policies, including (a) carbon pricing as an efficient source of public finance enhancing (at least in the short-term) economic growth, (b) opportunities to invest the revenues from carbon pricing in productive domestic uses (e.g. in public infrastructure), and (c) Pigouvian GHG pricing to value the domestic climate impacts of a country's own emissions as well as co-benefits. Whereas these arguments have been mostly discussed in separate strands of literature, this article carries out a synthesis that exemplifies how policies which put a price on emissions can be conceptualized in a multi-objective framework, illustrated in Fig. 1 and discussed in detail below. Even though the domestic incentives will likely be insufficient to achieve the globally optimal price for GHG emissions, each of them could contribute toward closing the 'emission price gap' between current GHG prices and a level that is globally desirable. Addressing several of these incentives simultaneously would be unlikely to result in an emission price equal to the sum of each incentive being addressed in isolation.

Early action by some countries, regions or industries could facilitate international negotiations to close (at least some part of) the current GHG price gap (Keohane and Victor, 2011; Ostrom, 2010; Urpelainen, 2013). This article discusses how unilateral emissions pricing could promote cooperation on the international level. Even though the literature in this respect is not very comprehensive, it has been shown that unilateral efforts can not only increase the overall level of climate change mitigation, but also promote collective action. Possible channels through which cooperation can be enhanced are via (a) technology spill-overs, (b) social learning with regards to uncertain costs and benefits as well as asymmetric information, (c) reciprocity and (d) changing the political economy and institution building. We propose that international negotiations should embrace approaches that provide flexibility to incorporate country-specific considerations, for example, by means of a climate regime focusing on coordinating domestic policy packages instead of specific emission reduction quantities. Top-down metrics such as a global temperature stabilization goal could be applied to evaluate the expected global aggregate outcomes of such packages to inform international negotiations with respect to the needs for enhancing the levels of climate policy ambition.

Recent years have witnessed the development of a vast literature related to proposals how to investigate international cooperation on climate change mitigation (Aldy and Stavins, 2007; IPCC, 2014) from a 'top-down' as well as a 'bottom-up' perspective

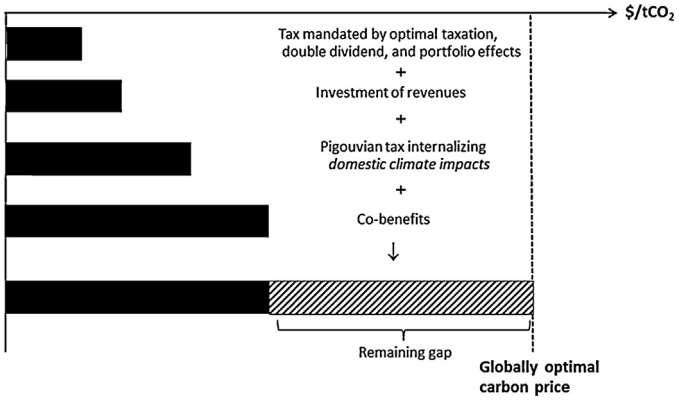

Fig. 1. Incentives to introduce unilateral emission prices and their relationship to international negotiations.

(Aldy et al., 2003). This is echoed in Chapter 13 of the recent Fifth Assessment Report of IPCC Working Group III on international cooperation (IPCC, 2014), which observes that "existing and proposed international climate agreements vary in the degree to which their authority is centralized", ranging from strong multilateral agreements to harmonized national policies and decentralized but coordinated national policies.

Top-down climate agreements start with a global temperature or concentration target. To define how this target should be achieved, it is broken down into actions by individual countries. A prominent example is the 'targets-and-timetables' approach under the Kyoto Protocol, which spells out binding national commitments to limit GHG emissions to a specific quantity for the period 2008–2012. Bosetti and Frankel (2011) and Den Elzen and Höhne (2010) are examples for analyses of alternative options for specifying a future targets-and-timetables regime. In a similar vein, the so-called 'budget approach' (WBGU, 2009), which aims at limiting cumulative global emissions for a certain time period (e.g. until 2050), is another top-down proposal for allocating emission quantities across countries. In contrast to quantitative limits, several authors have suggested to alternatively crafting a top-down regime by negotiating a globally harmonized carbon price (Nordhaus, 2007; Cooper, 2007; Weitzman, 2013).

However, top-down approaches to regime design have frequently been criticized as being overly optimistic in their assumptions about the viability of international cooperation and hence unrealistic, as no country has sufficient incentives to provide the amount of the global public good of emission reductions that would be optimal from a social planner's perspective (Carraro and Siniscalco, 1993; Barrett, 1994, 2006). For this reason, bottom-up approaches start from policies that can be put into place from the perspective of national interest and then pose the question of how such individual national policies and measures can be combined to result in an international agreement. Prominent examples of such a bottom-up structure are technology cooperations aiming to harmonize standards and engage in joint R&D (De Coninck et al., 2008; Barrett, 2006; Pizer, 2007), or the linking of emission trading systems (Flachsland et al., 2009).

Our article is not the first to discuss how national carbon pricing schemes introduced from a bottom-up perspective could lay the foundation for a global climate agreement. Victor (2011) emphasizes that domestic measures that are coordinated on the international level have the highest chance to result in a self-enforcing climate agreement over time and discusses how reciprocity and coordination might promote collective action. In a similar vein, Morris et al. (2013) propose international 'Carbon Pricing Consultations' in order to coordinate pricing policies and share experiences regarding implementation issues.

However, these bottom-up proposals do not specify why countries should have an incentive to implement a carbon price that would result in an ambitious level of atmospheric stabilization in the first place. By combining the work on unilateral incentives for carbon pricing with the one on bottom-up climate agreements, our article's contribution to the literature is twofold. First, by providing an overview of potential incentives for domestic carbon pricing policies, we exemplify how self-enforcing bottom-up carbon pricing schemes could be a first step toward achieving ambitious climate targets even if countries only act in their national self-interest. Second, we apply arguments in favor of a step-wise approach to introduce (unilateral) climate measures to the case of carbon pricing to demonstrate how unilaterally implemented pricing schemes might be strengthened and extended over time by means of international coordination. By emphasizing domestic incentives, our article is similar to Stewart et al. (2013), who propose to put actions that are not primarily aimed at climate change mitigation, but nevertheless reduce