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Addressing policy credibility problems for low-carbon investment

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ABSTRACT

A combination of characteristics of the climate change problem make the credibility of future commitments crucial for climate policy: the long lifetimes of carbon dioxide in the atmosphere and of energy infrastructure requires a long term perspective; the inherently global aspects of the atmosphere as a public good requires international coordination; decarbonizing the global economy depends on the incentives for investment in innovation; and persistent uncertainty— both about the problem and potential solutions—necessitate adapting to new information. Even in a first best world, climate policy design needs to navigate a tradeoff between making commitments that are sufficiently credible to stimulate transformation and retaining flexibility to adjust. The goal of this paper is to use the experience in other policy areas to assemble a broad set of possible remedies for addressing credibility problems and then characterize the advantages and disadvantages of each. We first review the theory and practice of addressing credibility problems in monetary, fiscal, and trade policy. From this we derive a taxonomy of four policy design categories. As a preliminary example, we then apply this framework to assess the credibility of climate targets made by selected developing countries as part of the United Nations Framework Convention on Climate Change process. Finally, we evaluate the items in the taxonomy as policy alternatives in terms of their effects on incentives for investment in low-carbon technology.

1. The importance of credibility for low carbon investment

Several characteristics of the climate change problem make policy credibility crucial for private incentives for low-carbon investment. The decades-long lifetimes of CO_2 in the atmosphere and of energy infrastructure require a long-term perspective. Decarbonizing the global economy requires innovation and investments in novel technologies that may take several years to pay off—and likely decades to make a material difference to reducing emissions. Stabilizing global average temperatures involves still longer time horizons. Because a stable climate is a public good and because innovation involves knowledge spillovers, investment in low-carbon technology will be suboptimal without government intervention. The investments required for decarbonization thus depend on expectations about the existence of policies several years after decisions about those investments are made. As a result, the credibility of policy commitments in the future is central to incentives for low-carbon investment.

It is quite clear though that policy commitments are far from fully credible. For example, work in the U.S. has found that energy policy commitments with timelines of more than 5 years have been met at best three-quarters of the time (Nemet et al., 2014). Credibility problems are well established in the climate policy literature, with previous work pointing to the costs of weak credibility (Bosetti and Victor, 2011), the role of the long term (Convery, 2009; Dietz and Stern, 2008; Böhringer, 2014), and the importance of perceptions (Bosetti and Frankel, 2011). A particular focus has been the effect of credibility on carbon prices (Dinan and Stocking, 2012; Koch et al., 2014) and the consequent need for complementary policies (Ulph and Ulph, 2013; Faehn and Isaksen, 2016). As an example, we fit probability distributions to a recent survey of expected future carbon prices (Nordeng, 2015) and found wide dispersion in expectations, even among individuals' point estimates in the near term (Fig. 1). While issues other than credibility problems can produce dispersion in expectations, credibility clearly plays an important role, as a recent study of the EU ETS found (Koch et al., 2016).

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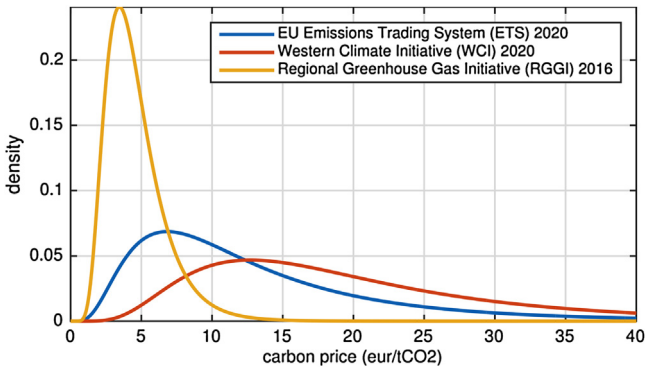

Fig. 1. Log normal distributions of carbon prices fitted to survey results (Nordeng, 2015).

In this paper, we define policy credibility as the level of confidence that non-government actors have that governments will fulfill future commitments as specified in policies. From a climate change perspective, long-term expectations matter crucially, as the "future" involves time scales in decades. A review of previous US energy targets found a range of 5–21 years (Nemet et al., 2014), the German Energiewende uses a 40-year target, and we know that adoption timeframes of new energy technologies are on the scale of 10–20 years for new technologies and 5–8 decades for new infrastructures (Grubler, 1998). Assuming a lifetime of 50 years, a construction time of 2 years, and a discount rate of 8% for low-carbon investment, it would take 16 years for investors to receive half the present value of the associated full lifetime benefits. The credibility on which we focus in this paper thus focuses on expectations about future policies 5–40 years in the future.

Long time horizons and deep uncertainty combine to provide political actors with strong incentives and ample opportunities to influence the policy process, potentially undermining incentives for low-carbon investment. Many actors with heterogeneous stakes are involved and policies will create winners and losers (Jenkins-Smith et al., 2014; Meckling et al., 2015; Carraro et al., 2012). Further, because these policies entail short-run costs and only yield benefits at a later stage, policy makers frequently favor shifting these costs to the future, which results in time-inconsistent policies (Gerlagh and Michielsen, 2015). Hence, for policies to be efficient in the long run, policy makers need to consider second best solutions taking into account the limitations of governments (Staub-Kaminski et al., 2014).

While credibility of commitments is crucial for incentives, it also requires a balance with flexibility. Less attention has been paid to the question of how persistent uncertainty—both about the problem and potential solutions—necessitates reacting to new information (Haasnoot et al., 2013). Climate policy design thus needs to navigate a tradeoff between making commitments that are sufficiently credible to stimulate transformation and retaining flexibility to adjust (Brunner et al., 2012; Jakob and Brunner, 2014; Whitesell, 2011). This tradeoff however is quite familiar in other policy areas, such as monetary policy.

The issue becomes in particular important when considering the international aspects of climate policy. In the recent Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) (UNFCCC, 2015a,b) countries committed themselves to Intended Nationally Determined Commitments (INDCs), that, while voluntarily pledged, will eventually become binding commitments. Although recent analyses have concluded that achieving the targets laid down in the INDCs could constitute a significant departure from current trends (UNEP, 2015), the targets will not be evaluated prior to 2020. It is an interesting question to understand whether countries are truly committed to their INDCs, and how this can be measured.

The goal of this paper is first to generate a broad set of possible remedies for addressing credibility problems and then characterize the advantages and disadvantages. We review the theory and practice of addressing credibility problems in three policy areas—monetary, fiscal, and trade policy—to develop a taxonomy of approaches to enhancing credibility. This process leads us to arrive at 13 policy design elements that fit within four policy design categories. We apply this framework to assess the credibility of climate targets made by four developing countries as part of the UNFCCC INDC process. Finally, we apply the taxonomy of approaches to future climate policy by evaluating the advantages and risks of credibility-enhancing policy alternatives in terms of their effect on incentives for investment in low-carbon technology.

2. Addressing policy credibility in other sectors

As highlighted by Weitzman (1980), any future policy that is contingent on the present state will be anticipated and hence distort incentives. A salient climate policy example is the (expected) allocation of emission permits by grandfathering, which provides an incentive to firms to increase emissions today in order to obtain more permits in the future (Martinez and Neuhoff, 2005). Keeping such 'ratchet effects' under control requires effective commitment devices, e.g. regarding the scheme by which emission permits are distributed (Requate, 2005). Similar challenges arise in numerous policy areas, and policy makers have collected experience in how to enable commitment over decades. For this reason, we briefly review three areas—monetary, fiscal, and trade policy—in which the necessity for firm commitment as well as commitment devices has been extensively discussed in the literature. From this analysis, we identify policy design elements that can serve as successful commitment devices in general to guide the formulation of effective climate policies.

2.1. Monetary policy

The central problem of time-inconsistency problem has been famously diagnosed in the seminal article by Kydland and Prescott (1977). Their contribution demonstrates how policy makers who are concerned about inflation as well as short-term unemployment will form time-inconsistent monetary policies. That is, they have an incentive to announce stringent monetary policies, but deviate from their announcements by relaxing them once market actors have formed expectations of low inflation rates and have formulated wage contracts accordingly. The resulting unanticipated inflation would then boost employment. However, if market actors have rational expectations, they will already anticipate the government's reaction and set their prices in accordance with high inflation rates. As a consequence, the economy will end up with higher inflation but without higher employment.

In order to circumvent this problem, central bank independence has been proposed as the most straightforward solution. Recognizing that monetary policy can only have short-term effects on economic output and employment, price stability has been identified as the overarching objective to be pursued by central bank managers. Central banks' constitutions usually contain statements calling for price stability and maintenance of macroeconomic stability, but without including exact definitions of these terms, arguably in order to provide some room for flexibility. Empirical evidence suggests that central banks' actions are well approximated by the so-called Taylor rule (1993). This monetary policy rule indicates how central banks should set interest rates as a function of the deviation of economic output from potential output and the deviation of the inflation rate from the inflation