Exploiting Synergy of Carbon Pricing and other Policy Instruments for Deep Decarbonization

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Recently, it has been questioned whether carbon pricing is an efficient and effective tool to foster deep decarbonization, culminating in the claim that carbon pricing actually hinders the achievement of such a transformation (Patt and Lilliestam, 2018; Ball, 2018). This criticism disregards what we believe has been the consensus for many years now, namely that the deep decarbonisation of our economies essentially requires a comprehensive policy package that includes carbon pricing amongst other measures, such as technology-specific support schemes. Here, we emphasize that carbon prices could and should be part of any effective policy mix, and that some of the arguments against carbon prices are flawed.

First, one argument often put forward is that carbon pricing and technology specific instruments differ in the way carbon emission reductions are delivered (Patt and Lilliestam, 2018). Carbon prices at socially acceptable levels trigger emission reductions by the cheapest currently available low(er)-carbon technologies, e.g. by inducing a switch from lignite and coal to natural gas in electricity production. In contrast, technology specific instruments can be tailored in a way to support technologies that are currently very expensive but which, due to technological and institutional learning, may become cheaper in the long-term, thus lowering long-term mitigation costs (Sandén

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and Azar, 2005). Neo-classical economics has taken this discussion into account by acknowledging the role of technological and institutional learning in their models for a long time (Nordhaus, 2009). A practical example of technological learning is solar PV in Germany, where costs decreased by a factor of 10 in less than 20 years as a result of support policies. Yet, success of technology-specific support schemes is far from certain. Expectations on emission reductions from EU biofuel mandates, for example, were far too optimistic (Overmars et al., 2011). In our view, targeted technology support alone therefore is no panacea.

A second argument against carbon pricing is that they would not work, inter alia, because they are currently too low (Ball, 2018). Setting them higher, however, allegedly won't work due to a lack of political acceptance – one of the reasons being that carbon taxes may hit poorer households more than richer ones. While we agree that distributional impacts of policies matter, we want to emphasize that any decarbonisation policy will have distributional impacts, and mostly these are going to affect low-income households particularly – as they spend a larger share of their income on energy than richer households. As an example, banning internal combustion engines, a measure proposed by some (Ball, 2018), would hit low-income rural households hard, as the costs for electric vehicles are currently prohibitively high. Also, it remains unclear to us why the acceptance of such policies would be higher than that of increasing carbon taxes to effective levels. Importantly, recent events such as the Yellow Vest protests in France show that climate policies may trigger strong protests if they are not accompanied by significant compensation mechanisms. However, a recent empirical analysis (Berry, 2019) highlights in detail how substantial and targeted compensation measures could have been implemented in the case of the France carbon tax. Theoretically, the distributional consequences of virtually any policy can be counteracted by introducing appropriate compensation mechanisms for losers, thus increasing acceptance levels (Kirchner et al., 2019). This has actually been the case in most countries that have introduced a substantial carbon tax in the past (e.g. British Columbia), which includes coal producing regions such as Alberta, Canada. The need for compensation mechanisms has been widely recognized by economists for a long time and now more than ever (Klenert et al., 2018).

Third, we see several positive effects of carbon prices which are not achieved by other policies: they allow harvesting "low hanging fruits". While a deep decarbonization requires to pick "high hanging fruits" as well (Patt and Lilliestam, 2018), we also see the benefits of carbon pricing in affected sectors such as power generation. While the carbon price in the European Union quadrupled from 2016 to 2018 to hover around 20 €/t, German power generation from hard coal and lignite fell by 12.5% compared to 2016, when carbon prices stood at 5 €/t. Such reductions in carbon emissions buy us additional time to develop the technologies required for full decarbonisation, thereby increasing the feasibility of climate change mitigation. Moreover using technology specific subsidies first to trigger technological learning when technologies are still very expensive and subsequently, once these technologies' costs have been significantly reduced, introducing carbon prices is a way of limiting the impacts on total mitigation costs – as first few high cost technologies are supported and after some time, (lower) carbon prices are sufficient to allow the competitive market participation of these technologies (Patt and Lilliestam, 2018). Thus, introducing very high carbon prices that (presumably) would hit the whole economy hard, can be prevented. In addition, if carbon revenues are recycled, macro-economic impacts will be very low, if not positive, even when one disregards the environmental (co-)benefits from less GHG emissions (Kirchner et al., 2019; Freire-González, 2018).

Fourth, carbon taxes and technology support instruments differ considerably in their effect on energy consumption. As carbon taxes are passed-through to energy prices (Fabra and Reguant, 2014), energy conservation is incentivised. Technology specific policies, on the other hand, may, depending on their implementation, even lower costs of energy intensive goods (e.g. by lowering prices on the wholesale markets for electricity, as occurred with renewable energies), effectively increasing demand for them. Such side effects should be considered carefully.

Fifth, the empirical evidence of carbon taxes with respect to short and long-term impacts on CO_2 emissions is questioned by some (Patt and Lilliestam, 2018; Ball, 2018). We believe it is too early to make any definite causal statements on existing carbon taxes. Most carbon tax schemes have been introduced only quite recently, at relatively low price levels and they often do not address all domestic CO_2 emissions. Furthermore, the scarce empirical evidence on the effect of carbon taxes available does indicate that emissions have been significantly reduced (often compared to counterfactual scenarios) (Tvinnereim and Mehling, 2018) and that carbon taxes did not curb economic growth (Murray and Rivers, 2015). What (relatively low) carbon taxes so far clearly failed to deliver has been a deep decarbonization. However, in our view, the lack of a substantial decline in CO_2 emissions in countries that have implemented carbon taxes does not provide a good case against carbon taxes but rather highlights the importance of introducing additional measures to realise synergies from a well-designed set of policies. Renouncing carbon prices limits the scope and impact of climate change mitigation measures. Exploring such synergies (and potential trade-offs) should become a high priority in research on deep decarbonisation.

If we are to succeed in limiting global warming, we will need a sensible mix of policies that foster significant technological innovation in the long-run – and an efficient allocation of resources in the short run. We'll therefore need carbon prices just as much as targeted support for technology diffusion, command & control regulation, institutional reforms or targeted infrastructure investment. To achieve the ambitious Paris Climate goals in time, we'll need them all.

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