Introduction

It is difficult to predict the likelihood that the U.S. Congress will enact climate legislation in the coming years, especially given the current volatile and polarized political atmosphere. However, for the first time since cap and trade legislation failed in the Senate in 2010, there has been a modest increase in interest in climate legislation on Capitol Hill. In addition, a new wave of advocacy groups is joining the traditional environmental groups in pushing for climate legislation, and private companies, including some oil companies, are expressing support for a carbon price. Democratic presidential candidate Bernie Sanders made a carbon tax a key plank of his campaign platform in 2016, and climate change is emerging as a priority for Democratic primary voters in the 2020 election. The 115th Congress saw a surge of legislative action, with seven separate proposals introduced, including the first Republican-sponsored carbon pricing bill in nearly a decade (the MARKET CHOICE Act, introduced in July 2018) and a bipartisan bill (the Energy Innovation and Carbon Dividend Act, introduced in November 2018). Updated versions of the latter two bills have been reintroduced in the 116th Congress, along with several other proposals.

Notably, most of the recent proposals would impose a tax (or fee) on carbon emissions, which would typically be levied upstream on the carbon content of fossil fuels. This is in stark contrast to the Waxman–Markey bill that passed the House in 2009, which included a cap and trade program as its centerpiece. Moreover, all eleven U.S. states that have carbon pricing policies rely on emissions trading. Emissions trading has also been the dominant, although

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not sole, form of carbon pricing in other parts of the world, including in the European Union,
New Zealand, South Korea, and China.

The economics literature on climate policy has generally expressed a preference for carbon
taxes over emissions trading, based on the view that the marginal benefits of abatement are
likely to be flat relative to the marginal costs—implying that a price instrument (a tax) will be
more efficient in expectation than a quantity instrument (emissions trading), given uncer-
tainty about marginal costs (Weitzman 1974; Hoel and Karp 2001, 2002; Newell and Pizer
2003).1 But policymakers are not constrained to choose between pure price and pure quantity
instruments. Indeed, several articles in the economics literature have proposed hybrid
approaches that include price-based provisions in emissions trading programs, either in
the form of a price ceiling or a reserve of allowances (Wilcoxen and McKibbin 1997; Pizer
2002; Newell, Pizer, and Zhang 2005; Murray, Newell, and Pizer 2009). In practice, most
existing emissions trading policies include such provisions,2 which have arisen in response to
political concerns that a pure emissions trading program could result in considerable uncer-
tainty about the price of emissions allowances.3

Just as emissions trading programs have included price-based provisions (often referred to
as “price containment” measures), carbon tax policies can include quantity-based provisions
or, as we will refer to them here, “environmental integrity mechanisms” (EIMs), which are
designed to provide greater certainty about the resulting quantity of emissions. A prototyp-
ical EIM automatically adjusts the carbon tax level upward when emissions exceed a target
level. Indeed, several such hybrid mechanisms have already been proposed in the economics
literature (e.g., Metcalf 2009; Aldy 2017; Hafstead, Metcalf, and Williams 2017; Murray,
Pizer, and Reichert 2017) or even implemented. Switzerland, for example, has a carbon tax
that was designed to increase over time, with the magnitude of the increase being greater if
covered emissions exceed prespecified targets.4

Qualitatively similar hybrid approaches have also been included in recent U.S. legislative
proposals. For example, the 2018 MARKET CHOICE Act included a provision to automatic-
ically increase the tax by $2 every 2 years if emissions were above a specified cumulative
trajectory. The Energy Innovation and Carbon Dividend Act includes a similar provision, but

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1See Keohane (2009) for an opposing view.

2Examples of hybrid mechanisms include California’s cap and trade program, which features both a price
floor and an Allowance Price Containment Reserve that serves as a de facto price ceiling. The Regional
Greenhouse Gas Initiative (RGGI) also includes a price floor and an allowance reserve, and beginning in
2021, it will implement an Emissions Containment Reserve (ECR) to withhold allowances if prices fall below
predetermined levels. In the European Union Emissions Trading System (EU ETS), allowances will be
withheld from auction and placed into a Market Stability Reserve if the number of allowances in circulation
exceeds a predetermined level (or released from the reserve if volumes dip too low).

3Regulated entities, particularly in the United States, have generally expressed concern about high allowance
prices, leading to a price ceiling or reserve of allowances designed to prevent prices from rising to unex-
pectedly high levels. On the other hand, environmental groups and stakeholders that are interested in the use
of revenue from allowance auctions, as well as in maintaining healthy market function when prices are lower
than expected, have supported some form of price floor.

4The Swiss tax went into effect in 2008 at a rate of 12 Swiss francs (CHF) (US$11), which increased to 36 CHF
(US$38) by 2012 and to 60 CHF (US$67) in 2014. The tax was subsequently increased two more times after
emissions benchmarks were missed: from 60 CHF to 84 CHF (US$60 to US$84) in 2016, after emissions in
2014 exceeded the target of a 22–24 percent reduction from 1990 levels, and then to 96 CHF (US$98) in
2018, after emissions exceeded the 2016 27 percent reduction target (Szabo 2017; Federal Office for the
Environment 2018).
emissions would be assessed every year and the price increase (if triggered) would be $5. Both of these bills also included provisions allowing or directing the U.S. Environmental Protection Agency (EPA) to resume regulating greenhouse gas (GHG) pollution under the Clean Air Act if the price increase did not result in emissions goals being met—another form of EIM that provides a regulatory backstop if needed. The price ceiling in California’s cap and trade program is itself a kind of EIM: regulated entities may purchase an unlimited amount of allowances at the price ceiling (as under a tax), but the state must use the resulting revenue to purchase emissions reductions from qualifying programs that are equal to the number of additional allowances sold. In this way, emissions in excess of the cap will be offset on a ton-for-ton basis, thus providing assurance that the state’s emissions target will be met.

In terms of the economics of policy design, hybrid policies are generally superior to a pure price or a pure quantity policy (Roberts and Spence 1976; Weitzman 1978) because they allow the effective “demand” for emissions reductions created by the policy to more closely approximate the underlying marginal benefits of abatement. However, we argue that political economy considerations also help to explain both the prevalence of price-based provisions in emissions trading systems and why any politically successful U.S. carbon tax is likely to be a hybrid policy as well.

This article, which is part of a symposium on options for adding mitigation certainty to a U.S. carbon tax, examines the political economy dimensions of EIMs from the point of view of two policy experts who have been directly involved in the design and advocacy of U.S. climate legislation. In the next section we describe three political economy considerations—as well as one practical reason—that together suggest that EIMs are likely to be an important component of any politically successful U.S. carbon tax (or fee) legislation in the U.S. Congress. We conclude with some reflections on the deeper uncertainties that characterize climate policy and the important role that research can play in informing the design of EIMs.

**Political Economy Considerations**

The politics underlying the potential passage of U.S. climate legislation depend heavily on the preferences of two distinct stakeholder groups: the environmental community and regulated industries. Of course, neither group is monolithic. The U.S. environmental community ranges from groups that work across political party lines, partner with businesses, and tend to champion market-based mitigation policies, to groups that are focused on grassroots mobilization and supply-side policies aimed at keeping fossil fuels in the ground. Overlapping with these environmental groups are environmental justice stakeholders who are concerned with issues of equity and fairness for local communities. Often skeptical of market-based approaches and focused on local rather than global impacts, these groups may prefer policies that enforce reductions at particular polluting facilities in vulnerable areas.

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5Both bills included provisions to suspend the implementation of EPA regulations of carbon dioxide emissions from certain pollution sources covered by the tax, such as large stationary sources, but would allow the agency to resume regulation of those sources if emissions goals were not met.

6The other articles in the symposium are Aldy (2020), which presents a process for reviewing and updating a U.S. carbon tax; Hafstead and Williams (2020), which assesses various carbon tax adjustment mechanisms and their trade-offs; and Metcalf (2020), which proposes an emissions assurance mechanism to add environmental certainty to a U.S. carbon tax.
Regulated industries include not only fossil energy–related companies that spend large amounts of money to block climate action, but also energy companies and manufacturers that support climate policy because it offers them predictability and a competitive advantage. Nevertheless, if presented with a choice of policy, regulated industries overall tend to favor flexible market-based approaches such as carbon taxes and emissions trading over more prescriptive command-and-control policies such as facility-specific emission standards.

Despite the different interests within and across these stakeholder groups, there is one basic political economy point that consistently holds: no climate legislation is likely to pass the U.S. Congress unless it is acceptable to a significant portion of both the environmental advocacy community and regulated industries. In general, the environmental community is focused on ensuring emissions reductions, while the regulated industry is focused on limiting costs. The former’s strong preference for such environmental certainty helps to explain why existing market-based climate policies are overwhelmingly quantity-based; the latter’s insistence on some degree of cost certainty helps to explain why these policies generally also include price containment mechanisms. Moreover, these preferences and their interplay also provide the foundation for hybrid approaches to a carbon tax, which balance the industry’s preference for cost certainty (in the form of the tax) with the environmental community’s preference for environmental certainty (provided by the EIM). Put another way, in the “market” for environmental legislation, these two groups are the major sources of demand, and their aggregate demand is likely to be greater for hybrid instruments than for either a pure carbon tax or a pure emissions trading system.7

In the remainder of this section we explore this proposition in greater detail by describing three political economy considerations that in particular help to explain why some form of EIM is likely to be an important component of any politically successful carbon tax in the United States. We also discuss a fourth, more policy-oriented and practical, rationale for an EIM.

**Breadth of Political Support**

The first political economy consideration that helps explain why an EIM is likely to be included in the design of a carbon tax is simply that it can attract broader support for a carbon tax than would otherwise be possible. This is because, for a number of reasons (including concerns about the environmental performance of—and political opposition to—a carbon tax, as well as the difficulty of increasing the level of a tax once it has been passed), the environmental community has typically preferred policy instruments other than emissions taxes (Keohane, Revesz, and Stavins 1998). An EIM can address many of these concerns. At the most basic level, the greater assurance of environmental performance provided by an EIM is a central objective of environmental groups.

Moreover, an EIM also provides a strategic benefit to environmental stakeholders. That is, by creating an explicit link between a carbon tax and pollution reductions, an EIM may help shift the focus of the carbon tax negotiation towards potential emissions reductions (and away from increased energy prices), thus potentially favoring the objectives of environmental

7See Keohane, Revesz, and Stavins (1998) for a discussion of the “market” for environmental legislation as it applies to environmental policy instrument choice more generally. For an excellent overview of the literature on the political economy of environmental policy, see Oates and Portney (2003).
groups. Framing the policy debate in terms of limits on pollution may also help to focus the political conversation on the damages of climate change to human health and ecosystems, while framing the policy debate in terms of a tax may lead to a focus on energy prices and household costs. Of course, the initial framing of the debate does not preclude other considerations from creeping in; for example, a major reason for the defeat of U.S. cap and trade legislation in 2010 was likely that opponents were able to successfully label it as “cap and tax” (Broder 2010). In any case, the way a policy is framed clearly has important strategic implications and may even be a significant determinant of the outcome.

Interaction of Climate Legislation with EPA Authority

A second political economy consideration involves one of the most contentious issues in debates about federal climate legislation: namely, the interaction of any new climate policy with the EPA’s existing authority to regulate GHG emissions under the Clean Air Act. Efforts by the Trump administration to roll back Obama-era regulations have encountered significant delays and legal setbacks; even if specific regulations are ultimately repealed, the underlying statutory authority remains intact. This means that future administrations could still use the EPA’s authority under the Clean Air Act to promulgate regulations to reduce GHG emissions in a wide range of sectors.

Some observers have proposed the elimination of this statutory authority to regulate GHGs in exchange for a carbon tax or other new climate legislation (Morris and Mathur 2014; Taylor 2015; Aldy 2016; Rorke 2017; Bailey and Bertelson 2018). It should come as no surprise that these proposals have faced strong opposition from the environmental community (e.g., Doniger 2017).

As in a standard bargaining game, negotiations over the design of climate legislation depend on each side’s outside option (i.e., the best option each side could pursue if negotiations failed; see, e.g., Sutton 1986). Of particular relevance here, the environmental community’s outside option is a status quo under which the EPA maintains its regulatory authority. Thus any legislative proposal that seeks to trade the regulation of GHG emissions under the Clean Air Act for a carbon tax will likely also have to provide sufficient assurance to the environmental community that the tax program will achieve emissions reductions that are equal to or greater than what would be achieved under EPA GHG regulations.

These underlying features of the negotiation reinforce the political relevance and importance of EIMs. For the environmental community, an EIM offers greater assurance that

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8While this argument is based largely on our own professional experience and intuition, there is some evidence in the behavioral sciences literature that appears to provide at least indirect support for this idea. For example, there is research indicating that once the concept of money is introduced, people tend to become less altruistic, more risk averse, and more tolerant of inequality (Vohs, Meade, and Goode 2006). Similar reasoning suggests that shifting the debate about a tax away from prices and costs and towards environmental performance (through an EIM) would lead to a greater focus on the importance of protecting future generations through strong climate policy. Other research suggests that people are more supportive of policy they perceive to be directly addressing the pollution problem (Hardisty et al. 2017)—e.g., “carbon permits” rather than “carbon taxes”—which suggests that an EIM, which refocuses the discussion on the quantity of pollution reduced, may help garner more support than a pure tax without an EIM.

9In Massachusetts v. EPA, 549 U.S. 497 (2007), the U.S. Supreme Court ruled that EPA has a duty to regulate GHG emissions if the administrator finds that they endanger public health and welfare—a finding the agency subsequently made in 2009.
emissions reduction goals will be met even if the initial tax fails to reduce emissions as much as expected. Even those environmental groups that would generally oppose market-based policies are likely to prefer a carbon tax with an EIM to a pure tax. In contrast, industry groups will tend to prefer a pure tax because it offers the greatest certainty over cost, while their least preferred option would be command-and-control policy. If the inclusion of an EIM provides sufficient assurance to the environmental community so that a carbon tax becomes a politically viable alternative to more restrictive approaches, regulated industries will certainly prefer such an outcome. In this way, EIMs can bridge the gap between these two sets of stakeholders by balancing their respective concerns and preferences.

The Price Trajectory Under a Carbon Tax

The third political economy consideration involves the price trajectory under a carbon tax. In the absence of an EIM, a high carbon tax is the only option for providing sufficient assurance of environmental performance to environmental groups. However, the higher the carbon tax, the greater the political opposition and thus the lower the likelihood of passage. By enabling the legislation to specify a lower initial carbon price trajectory while ensuring that the tax will rise if necessary to reduce emissions, an EIM can provide insurance against environmental performance risk while also reducing political risk.

We are not suggesting that an EIM should be used to justify imposing an emissions target that is fundamentally inconsistent with the specified carbon tax. As an illustration, consider a carbon tax that starts at $10/ton and rises 1 percent annually. Economic modeling suggests that such a tax would be extremely unlikely to achieve a target of reducing emissions 50 percent below 2005 levels by 2030 (e.g., Resources for the Future’s Carbon Pricing Calculator, which utilizes the Goulder–Hafstead E3 Model [Goulder and Hafstead 2017]). Thus, establishing an EIM that is tied to such a target would effectively impose a tax that is much higher than the stated price path, because the EIM would be triggered with near certainty. This likely outcome—that is, an EIM triggered at the first possible opportunity and repeatedly thereafter—would also put the political durability of the program at risk.

Recognizing that an EIM should be consistent with the carbon tax with which it is paired does not, however, negate its potential political value. Indeed, given the inherent uncertainty of economic models, there will always be a range concerning the emissions reductions that any particular price path may be expected to achieve. Including an EIM can enable policymakers to set an initial price path that is at the lower end of this range, thereby reducing political opposition while also providing greater assurance that the tax will meet its goals.

Alignment with the Framework of International Climate Agreements

The fourth and final consideration that supports the use of an EIM is a practical one. International climate agreements are structured around quantitative emissions targets. This focus on quantitative targets may be due in part to the political economy considerations we have discussed here, but it also reflects the fundamental fact that climate change is driven by the quantity of pollution released into the atmosphere. Under Article 4 of the Paris Agreement, countries are required to submit “Nationally Determined Contributions” (NDCs) every 5 years, expected to increase the ambition of each successive NDC, and urged
to specify economy-wide absolute emissions reduction targets—immediately if they are developed countries and more gradually over time if they are not. While the latter two provisions are not strictly legal obligations under the agreement (the relevant paragraphs use “will” and “should,” respectively, rather than “shall”), they reflect the broad understanding among the parties to the agreement that the NDCs should be quantitative targets. Indeed, in the initial round of intended NDCs (submissions were required by April 2016), more than three-quarters (145 of 189 parties) were quantified emissions reduction targets, while nearly one-third (60 of 189 parties) included an economy-wide absolute emissions reduction target (United Nations Framework Convention on Climate Change 2016). In light of this context, the use of an EIM provides U.S. policymakers with a way to align federal climate legislation with the policy framework and international expectations established by the Paris Agreement.

Conclusion

The political economy and practical considerations we have presented here provide insights into why EIMs are increasingly making their way into U.S. carbon tax proposals and form the basis for our argument that an EIM is likely to be a critical component of any politically successful carbon tax. We conclude by briefly discussing two issues that are related to these considerations: the deeper uncertainties that characterize climate policy and the urgent need for further research to inform the design of EIMs.

Our discussion of EIMs has focused on the way that such mechanisms can address uncertainty about emissions outcomes under a carbon tax.10 On a broader level, however, the very exercise of establishing any climate policy objective—whether defined in terms of emissions or price—is fraught with uncertainties, especially for individual countries over multidecadal time horizons. These include scientific uncertainty about the links between anthropogenic emissions, atmospheric GHG concentrations, temperature increases, and physical impacts; economic uncertainty about the likely costs of those impacts; and political and socioeconomic uncertainty about the appropriate “share” of needed reductions that should be undertaken by any one country, including the United States. All of these uncertainties are compounded by the fact that our understanding of climate change will change over time. This pervasive uncertainty underscores the importance of maintaining flexibility to adjust emissions targets over time as our understanding of the science improves. One option for achieving such flexibility would be for climate legislation to include a requirement for periodic expert review of its performance, perhaps by the executive branch, along with recommendations to Congress for adjusting the tax program (including any EIM and associated emissions benchmarks).11

As the concept of EIMs is beginning to be embraced by the environmental policy community and Congress, there is an urgent need for rigorous research and analysis of EIMs. Congressional staff interested in including an EIM in legislation must grapple with numerous design choices that have significant implications for both abatement costs and the level of

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10We are grateful to a referee for pointing out the relationship between outcome uncertainty under an EIM and the broader uncertainties inherent in setting climate policy targets.

11To expedite the process, the recommendations could be referred to Congress for a simple up or down vote (Aldy 2017).
environmental assurance the mechanism provides. How often should a tax adjustment be triggered? Should such adjustments be based on annual or cumulative emissions? How large should the adjustment be, and how far away should emissions be from a desired trajectory for such an adjustment to be triggered? Should the tax be adjusted both up and down, or should the EIM be “one-sided”? These design choices should ideally be grounded in rigorous analysis that includes an assessment of their respective trade-offs.

Despite this critical need for information, research on EIM design is still in its nascent stages—at least relative to research on including price containment provisions in cap and trade policy. It is only in the last few years that the broader economics research community has begun to dig more deeply into the EIM issue. The articles presented in this symposium represent an important step toward improving the policy community’s understanding of EIM design options and their trade-offs, and in helping to ensure the efficient and effective use of EIMs in U.S. climate policy.

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