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CRITICAL ISSUES IN NATIONAL CLIMATE POLICY DESIGN[†]

Challenges from State-Federal Interactions in US Climate Change Policy

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Throughout most of US history, state and local governments have had the primary responsibility for environmental protection (Richard L. Revesz 2001). However, since the passage of the National Environmental Policy Act in 1969, the federal role has increased significantly. But while federal environmental laws establish various standards, they typically leave states free to adopt more stringent requirements. Some states have adopted tighter thresholds for automobile emissions; others have created their own "Superfund" programs; and others have implemented their own state-based environmental protection acts (Revesz and Robert N. Stavins 2007).

The coexistence of state and federal programs is likely to continue in the context of US climate change policy. Although Congressional proposals for cap-and-trade or other forms of carbon pricing have stalled, federal climate policy moves forward, in part through greenhouse gas (GHG) regulation by the US EPA under the Clean Air Act, called for by the 2006 US Supreme Court decision in Massachusetts versus EPA, the Obama administration's subsequent "endangerment finding" that carbon dioxide (CO_2) and other greenhouse gases endanger public health and welfare, and the consequent designation in 2010 of CO_2 as a pollutant under the Clean Air Act.

Outside of the Clean Air Act, there is support in Congress and the administration for increasing the stringency of federal motor vehicle fuel efficiency standards (so-called Corporate Average Fuel Economy or CAFE standards). And there is ongoing interest in a "national renewable electricity standard" (RES), which would mandate that a given share of an electric company's production come from renewable sources (most likely wind power) or, in the case of a "clean energy standard" (CES), from an expanded list including nuclear and hydroelectric power.

At the state level, there is considerable climate policy activity as well. As of 2010, climate policies were being contemplated, developed, or implemented by more than half of the 50 states. At latest count, 30 states have implemented RES or CES programs.

The coexistence of federal and state policies raises important questions about how these policies will interact. In the presence of federal policies, to what extent will state efforts be cost effective? And how does the coexistence of state- and federal-level policies affect the ability of state efforts to achieve emissions reductions beyond those implied by federal policy?

I. Problematic Interactions from Overlapping Regulations

Some important interactions stem from the overlap of federal and state regulations. We examine such interactions as applied to two pairs of federal and state policies: state-level RES/CES and federal RES/CES programs; and California's Pavley II fuel-efficiency standards and federal CAFE standards. The first pairing is likely to occur; the second pairing will almost definitely occur.

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A. *Renewable Electricity or Clean Energy Standards*

Background.—Under the typical design of an RES or CES, generators earn tradable certificates or credits for each unit of renewable or clean energy they produce. At the end of the accounting period, each firm must surrender RES/CES certificates equivalent to its required level of renewable/clean energy production, defined as a specified share of its total production. Among the 30 states with such programs, most have targets of 15 to 20 percent of total electricity production by 2020. Some, such as California, have targets as high as 33 percent. Interest in Washington, DC in federal renewable electricity standards has been increasing. Key proposals in the Congress for a federal RES have targets ranging from 3 to 15 percent.

A renewable electricity standard with trading is closely related to the cap-and-trade approach to pollution control. Many state RES programs are intended as climate policies. Hence these can be thought of as CO_2 cap-and-trade systems where the difference in carbon intensity among the three fossil fuels—coal, petroleum, and natural gas—is ignored and (depending upon the treatment of other fuel sources) the zero-carbon properties of hydro and nuclear are ignored. The disregard for differences in carbon content limits the cost effectiveness of the RES. Cost effectiveness is also compromised because the RES does not directly put a price on the externalities associated with fossil-based electricity generation; instead it focuses on the ratio of renewable-to fossil-based generation.[1]

In assessing the implications of overlapping regulations, the simplest case to think about is where the federal RES (or CES) embraces all entities or activities covered by the states that are also adopting an RES.[2] Suppose the federal policy is already in place, and that a given state now introduces a policy that is more stringent that the federal one—in the sense that it requires reductions from sources within the state that are greater than would be achieved under the national program alone. How does this affect emissions reductions *nationwide*, as well as cost effectiveness?

Outcomes When Trading Is Allowed.—The answer depends on whether the federal program includes provisions for trading federal renewable energy credits. Consider the case where the federal program includes such provisions—which is the case with all existing proposals. And suppose that, prior to the imposition of the "green" state's tighter requirement, a firm was just meeting the federal requirement. In this case, by increasing its commitment to renewable electricity to comply with the tighter green state requirement, this firm will have more than met the federal requirement. It now has excess federal renewable credits and will wish to sell these credits to firms operating in states with a less stringent state-level RES (or none at all). The price of the federal credits will fall to coax out demand for the excess credits, and by purchasing these excess credits, firms in other states will not need to rely as much on renewable-sourced electricity.

Under these circumstances, "emissions leakage" could approach 100 percent: the increase in renewable electricity and the reduction in emissions achieved in the green state could be largely or fully offset by reduced renewable electricity and increased emissions in other states. Moreover, the green state's efforts would cause a worsening of the cost effectiveness of the nation's overall emissions-reduction efforts. In the absence of the green state's RES, the federal program would cause marginal abatement costs to be equated across states and sources. The green state's action now eliminates this equality, leading to higher marginal abatement costs in that state than in other states. Thus, overall costs rise with very little or no accompanying reduction in nationwide emissions. The same problems would arise if the federal program allowed a firm with operations in more than one state to meet the federal standard by averaging

[1] Because of its focus on a ratio or input intensity, the RES/CES is equivalent to the combination of a subsidy to electricity production and tax on emissions. As shown by Stephen Holland, Jonathan Hughes, and Christopher Knittel (2009), the subsidy component impedes cost effectiveness. For a broad examination of the interaction of overlapping policies intended to encourage the use of renewable sources of energy, see Carolyn Fischer and Louis Preonas (2010).

[2] Where national and state policies involve imperfectly overlapping coverage, the interactions depend upon which policy is more comprehensive in its scope of coverage, and which is more stringent for the sources covered by both policies. On this, see Goulder and Stavins (2010).

its performance across states with tighter and more lax state-level requirements.[3]

In principle, there are two ways in which the leakage described above can be avoided. One is for the federal government to allow a state (or group of states) a "carve out" from the federal program if it implemented or maintained a state program at least as stringent. There is abundant precedent for this in federal policy. The result would be two separate and distinct fuel-efficiency or RES/CES programs, with the federal system applying only to states that do not carve themselves out. The shadow price on fuel efficiency and the price of renewable credits will be different in some states than in the federal system, and so cost effectiveness will be compromised.

Another way to avoid these problematic interactions is through federal rules that preempt (that is, essentially, prohibit) state-level programs in the presence of a federal program. There is precedent for this approach as well. In this way, leakage is prevented, as well as the attendant loss of cost effectiveness. Also, this is a way of assuring that private industry does not face multiple standards. However, to the extent that a greener state's actions raise costs, those costs are borne by that state alone; therefore such states might oppose preemption on the grounds that states should have the freedom to decide whether to impose higher costs on themselves.

Outcomes When Trading Is Not Allowed.—An alternative federal design would involve no provision for renewable energy credit trading. A main virtue of trading is to encourage increased use of renewable energy sources where it is cheapest to do so. The alternative design would not have this virtue and thus would sacrifice cost effectiveness. In this case there is no longer a channel through which a firm facing a new and tighter state-level standard can reduce pressure on the federal constraint by selling excess federal credits. Here the more stringent green state standard does not cause emissions leakage to other states; hence it yields a reduction in nationwide emissions. However, a tightening of the federal standard instead of a tighter requirement in an individual state could accomplish the same reduction in emissions at lower cost.

[3] This result of near-100 percent leakage and the related cost-effectiveness outcomes are analyzed in more detail by Goulder and Stavins (2010). Similar outcomes apply in the context of a federal cap-and-trade system (Meghan McGuinness and A. Denny Ellerman 2008; Dallas Burtraw and Bill Shobe 2009; Goulder and Stavins 2010).

B. *Motor-Vehicle Fuel Efficiency Standards*

Nested federal and state regulations lead to similar problems in the context of automobile fuel-efficiency standards or limits on greenhouse gas emissions per mile. By 2009, 14 states had moved to limit GHG emissions per mile. These so-called "Pavley standards"—named after Assemblywoman Fran Pavley, sponsor of the California legislation—require manufacturers to reduce per-mile GHG emissions by about 30 percent by 2016 and 45 percent by 2020 (California Air Resources Board 2008).

Since CO_2 emissions and gasoline use are nearly proportional, the Pavley standards effectively raise the fuel economy requirements for manufacturers in the states adopting the limits. These state-level actions are quantity-based regulations that can interact significantly with the existing Corporate Average Fuel Economy (CAFE) standards at the federal level. Consider an auto manufacturer that prior to the imposition of the Pavley limits was just meeting the CAFE standard. Now it must meet the (tougher) Pavley requirement through its sales of cars registered in the adopting states. In meeting the tougher Pavley requirements, its overall US average fuel economy exceeds the national requirement: the national constraint no longer binds. Hence the manufacturer is able to change the composition of its sales outside of the Pavley states; specifically, it can shift its sales toward larger cars with lower fuel economy.

Indeed, if all manufacturers were initially constrained by the national CAFE standard, the introduction of the Pavley requirements would lead to emissions leakage of 100 percent at the margin, because the reductions within the Pavley states would be completely offset by emissions increases outside of those states. Empirical estimates indicate that from 2009 through 2020, about 65 percent of the emissions reductions achieved in the new car market in the Pavley states would be offset by increased emissions in

new car markets elsewhere (Goulder, Mark R. Jacobsen, and Arthur van Benthem 2009).[4]

In May 2009, the Obama administration reached an agreement with the 14 "Pavley states," according to which the United States would tighten the federal fuel economy requirements in such a way as to achieve effective reductions in GHGs per mile consistent with the Pavley initiative. In return, the 14 states agreed to abandon this first phase of the Pavley effort, which was no longer necessary, given the tightening of the federal standards. The Pavley states intend to introduce further tightening of the greenhouse-gas-per-mile standards after 2016. This would imply fuel economy standards more stringent than those applying at the federal level. Hence the leakage issue remains very much alive.

Despite this potential for leakage, the tougher state-level standards could conceivably accelerate the development of new technologies that auto manufacturers will eventually adopt throughout the nation, thereby leading to lower emissions and reduced fuel consumption. However, Goulder, Jacobsen, and van Benthem (2009) found that in the presence of the national CAFE standard, faster technological progress exacerbates the adverse fleet compositional impacts of state programs. As a result, in this case, greater technological progress yields relatively little benefit in terms of reduced fuel consumption.

C. *Price-Based Policies*

The problematic interactions identified above are specific to quantity-based regulations—whether market-based, such as cap-and-trade or renewable energy standards, or command-and-control, such as technology or performance standards. The situation is very different with price-based regulations. Suppose, for example, that a carbon tax were imposed at the federal level. If a state decided to impose new regulations requiring in-state reductions beyond what the federal tax would yield, the additional state-level reductions would not lead to offsetting increases elsewhere (apart from the usual "economic leakage"): the reductions in other states would remain governed by the federal carbon tax. Thus, price-based regulation at the federal level can avoid the types of problems discussed earlier, despite the regulatory overlap. However, it may be noted that the greener state's more aggressive action described here does not achieve nationwide reductions in the most cost-effective way: the same aggregate reductions could be achieved at lower cost with an increased federal carbon tax.

II. Potentially Positive Interactions

State and federal policies can interact along other dimensions, which may lead to positive outcomes. First, strategic interactions can arise between states and the federal government. In particular, state efforts can create pressure for more stringent federal policy. There is, in fact, a considerable history of California air standards having precisely this effect on federal policy developments, because industry is reluctant to face different standards in different parts of the country. For example, the California-led state-level tightening of greenhouse-gas-per mile standards helped bring about the subsequent tightening of federal CAFE standards.[5] Of course, such triggering of stronger federal policy is desirable only if the previous federal policy was insufficiently stringent.

Second, states can serve as laboratories for experimenting with innovative policy approaches. Approaches that prove successful on cost effectiveness or other dimensions could later be adopted at the federal level. The interaction here is one of information transfer. The case for state-level experimentation needs to be considered carefully: why the laboratories should be at the state, rather than national, level is not clear, and—in any event—there is some question regarding whether state authorities will allow their "laboratory" to be closed after the experiment has been completed and the information delivered.

[4] The same study found that another 5 percent of the emissions reduction would be offset by increased emissions from used cars, as the Pavley effort leads to lower scrap rates of older, less fuel-efficient automobiles.

[5] Similarly, there is broad agreement that the California-led state-level tightening of greenhouse-gas-per mile standards brought about the subsequent tightening of federal CAFE standards. Automakers did not wish to face different standards at the federal and state level. Hence they were willing to support tighter federal standards so long as the state standards were removed.

III. Rationales for State Action when Policies Do Not Overlap

When state and federal efforts do not overlap, the problems from nested regulation do not apply. In these circumstances, states can fill the regulatory gap. For example, states may address market failures not confronted by federal policy. One important such failure is the principal-agent problem of inadequate incentives—even in the face of efficient energy prices—for either owners or occupiers of rental properties to invest in energy-efficiency technologies, such as thermal insulation. This market failure is best addressed through building codes or zoning, both of which are probably better implemented at the state or local level, because of geographic differences in climate.

More broadly, the case can be made for state-level action when action that arguably is best taken at the federal level is not politically feasible. Since the externality from greenhouse gas emissions transcends national boundaries, climate change ideally should be addressed at the global level. However, just as political and institutional obstacles to a "world-government" initiative make national policies the best available option, so too can political obstacles to national efforts leave room for subnational efforts. In the United States, subnational efforts will remain critical in the absence of meaningful federal policy.

IV. Conclusions

The coexistence of state and federal policies raises questions about their interactions. Problems arise when state and federal policies overlap. Two regulatory contexts stand out: renewable electricity and clean energy standards; and automobile fuel-economy standards. Because of problematic interactions, state-level efforts may fail to reduce greenhouse gas emissions nationally and may reduce the cost effectiveness of the overall national effort. The difficulties from overlapping regulations can be avoided through price-based (as opposed to quantity-based) federal policy.

At the same time, the possibility exists of some specific positive interactions between state and federal climate policies. And more broadly, rationales exist for subnational actions when national policy is politically infeasible.

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