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Comment Gilbert E. Metcalf

In comparison to the large literature on instrument choice, comparatively little has been written on the rationale for multiple policy approaches for reducing greenhouse gas emissions. Thus Arik Levinson's chapter is a welcome addition. Levinson starts from the simple observation that existing approaches to reducing greenhouse gas emissions rely on a patchwork of overlapping policies of various forms. Is this efficient? Are the policies mutually reinforcing or do they work at cross-purposes? Levinson provides a framework for thinking about these questions.

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As Levinson notes, the simultaneous reliance on cap and trade and other regulations has been termed a "belts and suspenders" approach. One view is that the policies are mutually reinforcing. Another is that they are redundant. A third—and this is the most troubling—is that they work at cross-purposes and raise the cost of reducing emissions. To put it differently, the suspenders may get tangled in the underwear.

The first part of Levinson's chapter provides a framework for sorting out these different views of multiple policy approaches. Put simply, if the marginal cost of abatement of the binding cap-and-trade policy—in equilibrium equal to the permit price—exceeds the marginal cost of achieving the regulatory standard layered on top of the market-based approach, then the regulatory standard is nonbinding and can be viewed as redundant. Conversely, if the marginal cost of abatement from the regulation exceeds the permit price, then the textbook model tells us that we will achieve no additional emission reductions and the cost of meeting the cap in the cap-and-trade system has just been increased. The explanation is straightforward. Consider a cap-and-trade system that limits emissions to one hundred. Now add a regulation stating that some sector must reduce emissions by fifty and assume that in the absence of the regulation this sector would have reduced emissions by twenty to achieve the cap in the cap-and-trade system. The additional thirty units of emission reductions in this sector free up permits that allow an increase in emissions elsewhere in the economy. The result is emissions are limited to one hundred but we have substituted thirty units of high-cost emission reductions for low-cost emission reductions.

Levinson limits his analysis to regulations such as renewable portfolio standards, low-carbon fuel mandates, appliance standards, and other technology mandates. But cap-and-trade policy interacts as well with tax policy, federal loan guarantees, and other subsidies to clean energy production. His analysis can be easily extended to incorporate these other government initiatives. Generally the result is to raise the cost of reducing emissions. As an example, the most recent US budget analysis of tax expenditures shows a jump of nearly three-quarters of a billion dollars per year for the federal technology tax credits (Office of Management and Budget 2010). Some of this is due to California's implementation of a Renewable Portfolio System with a 20 percent mandate by 2010 and 33 percent mandate by 2020.[1]

Levinson's framework for assessing multiple policies can identify situations in which the additional regulation is redundant or counterproductive but it cannot provide any theoretical support for multiple policies being beneficial. Recognizing this, he next considers possible reasons for why multiple policies could be beneficial focusing on two reasons: logistical complexity and other market failures.

1. The California RPS program is described at: http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm.

Levinson cites as examples of complexity price uncertainty and the attendant call for cost containment mechanisms in cap-and-trade legislation, spatially differentiated damages, and technological barriers to the use of some market-based instruments (e.g., a tax on automobile tailpipe emissions). But none of these are relevant in the climate change realm. As Levinson notes, cost containment mechanisms like price collars are not really multiple instruments. They are in fact hybrid instruments, as has been previously discussed by Roberts and Spence (1976), among others. Hot spots that call for spatially differentiated permit prices are not relevant in the climate change literature.[2] And the technology example he provides is relevant for road pollutants but not for greenhouse gas emissions. One of the appealing characteristics of coal, for example, from a regulatory standpoint, is that the carbon emissions per ton of coal are unaffected by where you impose the carbon-pricing burden.[3] Thus we do not need to price carbon emissions at the electric socket (taking the downstream approach to its limit) but rather can impose the carbon price at an intermediate level (coal-fired electric generating plants) or upstream at the coal mine.[4]

The existence of other market failures is a compelling reason for multiple-policy instruments, but whether the appropriate additional instruments are being proposed is another matter. While perhaps overly simplistic, the Tinbergen view that one needs at least as many instruments as policy goals (and in many cases an equal number of instruments as goals) is relevant here. Take the example that Levinson discusses from Bennear and Stavins (2007) on fishing catch limits and gear restrictions. There are two goals here: to limit overall catch and to limit the catch of certain species. This could be reframed as goals on the catch of specific fish species—and the attendant need for multiple instruments.

The pure public good nature of research and development is an example of a secondary market failure that merits additional instruments. As Levinson himself notes "nothing about the R&D market failure is particular to the environment, and there is no reason a sensible R&D policy shouldn't be economy-wide." In general this is true but it must be qualified. Acemoglu et al. (2009) show that it can be optimal to combine a carbon price with directed environmental research subsidies. The subsidy provides a stimulus to clean environmental technology while avoiding an overly high tax on the dirty technology that would otherwise be needed to stimulate the new technology with its attendant efficiency costs. While this argument may be rele-

2. But see Borenstein, chapter 6 in this volume, for a challenge to the view that the location of greenhouse gas emissions is irrelevant. As Borenstein notes, our understanding of spatial differences in impacts is highly rudimentary.

3. This abstracts from carbon capture and storage. My point is unaffected by the ability to capture and store carbon emissions from burning fossil fuels.

4. Metcalf and Weisbach (2009) discuss the administrative details of implementing a carbon tax including the advantages and disadvantages of imposing the tax on fossil fuels at different levels.

vant for R&D policies that complement carbon pricing, it does not justify the sorts of technology mandates or renewable portfolio standards that are commonly proposed as complementary policies to carbon pricing.

Another example of a market failure that could justify multiple policies cited by Levinson is the "energy paradox," the unwillingness of households and firms to make investments in energy-saving technologies that have apparently high rates of return. One must be cautious before relying on this observation to justify policy. If the source of the energy paradox is the interaction of volatile returns to efficiency investments and irreversibility, then there is no paradox at all (Hassett and Metcalf 1993). The rates of return measured that do not take these factors into account are upwardly biased. Similarly, the paradox may be due to mismeasured returns to efficiency investments (Metcalf and Hassett 1999). In either case there is no market failure and no need for additional instruments. If, on the other hand, investments are being passed up because of principal-agent problems (e.g., landlord-tenant issues), then there is a role for directed policies at rental structures (Levinson and Niemann 2004). But again this would not suggest the sorts of policies that we in fact see being proposed.

The point to all this is that we do have multiple market failures. At the simplest level, our use of fossil fuels entails many other environmental damages beside greenhouse gas emissions (see the detailed treatment of the social cost of energy in National Research Council [2009]). But the existence of multiple market failures does not justify the array of policies that we now observe. This is not meant as a criticism of Levinson's chapter. If there is a criticism at all it is that he is being too generous to the advocates of the current mix of policies that are being proposed. His theory and framework for thinking about multiple policies is quite helpful. The chapter could push a bit more on the question of whether the policies currently being advocated are sensible given the multiple market failures that we observe.

One could take another approach altogether and argue that the policies that are being proposed are not driven by market failures other than climate change at all but rather by the political expediency of needing to build a coalition to pass energy legislation. This is an entirely different tack that leads to a whole different assessment procedure. If this is the motivation for the constellation of policies we see being proposed, then the right way to assess a policy portfolio is whether this portfolio is the least-cost way to build a successful coalition to pass climate change legislation. But that is a different chapter altogether from the one that Levinson has set out to write. His focus is on efficiency. And even if one believed that political coalition building is the rationale for multiple policies, the sort of analysis that Levinson undertakes is important for measuring the costs of different political coalition proposals.

To sum up, this chapter is a valuable addition to the literature on the design of optimal policy with multiple instruments. It is a clearly written

and thoughtful analysis of this critically important issue. It goes beyond the standard textbook treatment of policy interventions to address environmental problems by adding some policy realism. It deserves to be widely read and carefully studied.

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