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Comment

Roberton C. Williams III

Erin Mansur's chapter provides a concise, clear, and thorough description of the trade-offs between upstream and downstream regulation of an environmental externality, with a particular focus on regulation of greenhouse gases (GHGs). In my comments, I will begin with a brief summary of the chapter's main points and then will go on to describe one additional potentially important factor to consider and to provide further discussion of the immediate policy implications of these points for climate policy.

The comparison of upstream and downstream regulation is often presented as a dichotomous choice, but the chapter points out that there are many different stages in the production process that could be regulated. Nonetheless, the terms are still useful: "upstream" refers to regulation closer to the beginning of the value chain (the stage where polluting inputs first enter the economy) and "downstream" refers to regulation closer to the end of the chain (where consumers use polluting goods).

Regulation provides the most efficient incentives to reduce emissions when it is targeted at the stage where those emissions occur. Regulating upstream of this point provides less efficient incentives. There may be ways to reduce use of a polluting input without actually reducing emissions at all (perhaps by switching from a regulated polluting input to an unregulated but equally

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polluting input), and upstream regulation would provide an incentive to do so. There may also be ways to reduce emissions without reducing use of polluting inputs (by installing end-of-pipe abatement, for example), and upstream regulation would not provide an incentive for this. Thus, in either case, regulation at the stage where emissions occur would provide the correct incentives, and regulation further upstream would not.

Similarly, regulation downstream of the stage where emissions occur would also be inefficient. It might be possible to reduce use of a polluting final good without reducing emissions or to reduce emissions without reducing use of a polluting final good. In either case, regulating at the stage where emissions occur would provide the correct incentives, and regulation further downstream would not.

The chapter also outlines several other potentially important factors. By targeting regulation at the stage where it is easiest to enforce, regulators can minimize transaction costs. For example, the United States has almost 250 million cars and trucks but only 150 refineries that produce motor fuels, so targeting GHG regulation at the refinery level will likely lead to far lower transaction costs than targeting regulation at individual cars and trucks. Leakage—substitution away from regulated parts of the economy into unregulated but still polluting alternatives (such as industries exempt from regulation or foreign countries that do not regulate GHGs)—is also a concern. Targeting regulation at the stage of production where it is hardest to substitute to unregulated alternatives will minimize leakage. And targeting regulation at the stage at which a given regulated entity's contribution to emissions is easiest to measure will lower costs by improving the accuracy of regulation.[1]

Mansur's chapter does an excellent job of describing all of those issues and providing a simple and clear theoretical framework that incorporates all of them. However, I see one additional issue that could be quite important. In practice, environmental regulation often exempts some industries, firms, or consumers from regulation for primarily political reasons. For example, a politically powerful industry may be left unregulated (or regulated less stringently), as has often been the case for the coal industry. Another example is that older cars are often exempt from emissions rules. These exemptions tend to be quite inefficient. The likelihood of such exemptions depends greatly on which stage of production is regulated. A GHG regulation enforced at the refinery level would make it much harder to exempt older cars than would a regulation enforced at the vehicle level, for example. Thus, this represents

1. The chapter describes this last point as being about offsets, but it in fact applies more broadly. Offsets are commonly used in cases where measuring emissions is hard, so it is natural to think of this as being a point about offsets. But if it is difficult to measure a firm's emissions accurately, then this will lead to inefficiency in regulation, regardless of whether the regulation uses offsets or some other regulatory instrument such as tradable permits or an emissions tax.

another potentially important trade-off between upstream and downstream regulation.

My one substantive criticism of Mansur's chapter is that it does not put enough emphasis on the policy implications of all these issues for GHG regulation. For a generic pollutant, all of these issues are potentially important, and so it is not clear whether upstream or downstream regulation will be more efficient. But for the GHG case, some of these issues are likely to be very important, while others are likely to be insignificant. Thus, we can draw clearer conclusions about the relative cost-effectiveness of upstream versus downstream regulation of GHGs.

Carbon capture and storage technology is not yet economically viable and seems unlikely to become economically viable anytime soon. Therefore, carbon emissions are directly proportional to the use of fossil fuel inputs. As a result, there is no cost advantage at present to regulating GHGs at the stage where they are actually emitted versus regulating them further upstream. Conversely, the transaction cost issue is highly important. Upstream regulation entails several orders of magnitude fewer regulated entities than downstream regulation, and, thus, transaction costs will be far lower under upstream regulation.

These points might change in the future (if carbon capture and storage becomes economically viable, for example, or if new technology greatly reduces the transaction costs of downstream regulation). But at present, they imply that upstream regulation will enjoy a substantial cost advantage over downstream regulation.