Jobs and Environmental Regulation

Proposal for *Environmental and Energy Policy and the Economy*

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Effects on jobs carry great weight in political debates, especially for environmental policy. Opponents of regulation decry the "job-killing" EPA, while proponents point to "green jobs" to be created by regulation. Moreover, job effects could have significant aggregate welfare and/or distributional implications. While economists are generally skeptical of the idea of counting job losses as social costs, the effects on laid-off workers are large (e.g., Davis and von Wachter (2011 *BPEA*) find a protracted decline in labor earnings for laid-off workers). Thus, being able to measure and predict job effects of regulation is important. Indeed, it is required in some cases (e.g., the Clean Air Act requires the EPA to evaluate "potential loss or shifts of employment" that regulations may cause).

However, existing research falls short in evaluating these questions. Partial-equilibrium empirical work cleverly identifies effects on directly regulated industries, but ignores potential spillover effects, which could be negative (e.g., effects on the steel industry from regulation-induced increases in the price of electricity) or positive (e.g., increases in demand for output from unregulated firms as consumers substitute away from the output of regulated firms), making the total effect of the policy potentially quite different from the effect on regulated firms. Perhaps more seriously, many empirical studies use unregulated firms as a control group, so spillover effects on those firms will bias estimates of the effect on regulated firms. General-equilibrium analysis can address those problems, but nearly all computable (CGE) models of environmental regulation assume full employment, which is obviously a severe limitation when analyzing employment effects.

In two recent papers (Hafstead and Williams (2018, *JPubE*) and Hafstead, Williams, and Chen (2018, NBER WP)), we address those problems by introducing employment search frictions into an otherwise-standard environmental CGE model. The first of those papers uses a highly stylized model to show that the effect of environmental taxation is largely a reallocation of jobs (from more-polluting to less-polluting industries), with very little net job loss. Among other implications, this suggests that prior difference-in-difference studies have substantially overestimated job losses in regulated industries, and overestimated net job losses by even more. The latter paper expands the model to be more detailed and realistic (e.g., extending it from 2 to 22 sectors) and shows that explicitly modeling employment frictions yields much smaller estimates of job losses than prior CGE work that attempted to use full-employment CGE models to estimate effects on jobs.

For *Environmental and Energy Policy and the Economy*, we propose to take the approach from those papers and extend it, making three key contributions relative to those earlier papers.

First, we will focus on modeling regulations that better correspond to those that environmental regulators are typically considering. Hafstead and Williams (2018) and Hafstead, Williams, and Chen (2018) look at economy-wide carbon taxes, tradable permits, or tradable

intensity standards, whereas the vast majority of existing and likely future environmental regulations apply to a relatively small set of industries, and typically take the form of unit-level technology or performance standards, which implicitly require end-of-pipe controls or process changes. Such policies are difficult to represent precisely in a CGE model, but we can approximate them fairly closely as additional required inputs per unit of output in the affected industries. These policies may well have quite different implications for both net changes in jobs and job reallocations, making it important to explicitly model their effects (and to contrast them with the effects of economy-wide incentive-based regulations).

Second, we will target the paper at a less-technical audience, writing it in a more accessible manner. CGE models are notorious for complexity and difficult-to-follow "black-box" results. But by focusing on the intuition behind the results and doing extensive sensitivity analysis, we can get across the key forces at work to readers without expertise in this area. Further, we can reference our previous modeling to avoid putting off less-technical readers with a large number of equations.

Third, we plan to discuss a broader range of questions about how to handle effects on jobs in policy analysis. These include not just what the job losses or gains are and the extent to which those are shifts across industries or net changes (issues covered heavily in our two papers cited above), but also more challenging questions such as the resulting distributional effects and the conditions under which job losses (or reallocations) would or would not generate significant social costs (that would need to be considered in benefit-cost analysis of regulations). Modeling isn't yet sufficiently advanced to be able to fully address all of those questions, but we can summarize existing evidence and provide an intuitive discussion of the key effects at work.

We believe our proposed paper will interest a broad policy audience, especially professional staff at agencies that need to evaluate the employment effects of regulation.

Revenue-Positive Emissions Pricing

Short Proposal for *Environmental and Energy Policy and the Economy*

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The vast majority of economic modeling of emissions pricing looks at revenue-neutral policies: those that return the revenue to households and firms via tax cuts or transfers. But policymakers are increasingly interested in revenue-positive carbon pricing: policies that spend at least a significant portion (in many cases, all) of the carbon pricing revenue rather than returning it. This trend is particularly evident at the state/regional level (where both RGGI and California carbon permit systems are revenue-positive, as is the new carbon fee ballot initiative in Washington state), but also notable at the federal level (where the recent Curbelo carbon tax proposal devotes most of its revenue to increased infrastructure spending, for example).

We propose to use RFF's E3 computable general equilibrium (CGE) model and/or a new CGE model built to look at state/regional carbon pricing to look at the effects of revenue-positive policies. One might argue that we can already predict the effects of such policies without explicitly modeling them, because one can always view a revenue-positive policy as a combination of a revenue-neutral emissions price and a tax-and-spend policy. But a key result we expect to find is that the tax-and-spend portion heavily dominates the cost-benefit analysis (implying, for example, that the optimal carbon price and net benefits of any given price will be substantially more sensitive to the benefit per dollar of new spending than to the social cost of carbon). That implies that policymakers should be cautious in designing such policies, and that economists analyzing them need to devote much more attention to evaluating the spending portion of the policy.