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GETTING TO AN EFFICIENT CARBON TAX

How the Revenue Is Used Matters

*Results from an innovative model run by **Jared Carbone, Richard D. Morgenstern, Roberton C. Williams III, and Dallas Burtraw** reveal the most efficient uses of the trillions of dollars in revenue a carbon tax could raise over the next decade.*

Despite the widespread view among economists and policymakers that the US federal tax system needs reform over the long term, there is little consensus on the specifics. The system is inefficient, excessively distorting the economy for the amount of revenue raised. The notion of lower marginal tax rates and a broader base has wide appeal, but no politically feasible path to achieve such goals is apparent. Further, short of substantial cuts in federal programs at a scale and scope

not being seriously considered, the need for at least some more tax revenue over the long term seems almost inevitable. How those revenues should be raised is an open question.

Accounting for recent tax hikes, the sequester, and other spending cuts, current projections by the Congressional Budget Office (CBO) show a substantially lower near-term federal deficit, now projected at \$560 billion for 2014 and \$378 billion for 2015. Nonetheless, the long-run fiscal forecast is quite gloomy. CBO expects

the federal deficit to start rising again in 2016—with debt levels reaching 73.6 percent of gross domestic product (GDP) by 2023, almost twice the 2000 ratio—and to continue growing thereafter.

At the same time, the world faces the challenge of reducing emissions of carbon dioxide (CO₂) and other greenhouse gases to limit the effects of global climate change. Introducing a carbon tax as one element of tax reform can both provide revenue and reduce carbon emissions.

To analyze these scenarios, we created a new modeling framework (see About the Model) that enables the consideration of the budgetary, economic, distributional, and environmental implications of including such a measure as part of a fiscal reform initiative. Our focus is strictly on federal tax policy and the effects that alternative sources of revenue have on economic activity. The analysis does not consider the benefits of reducing greenhouse gas emissions. We examine three general directions for tax and deficit changes involving a carbon tax at three levels:

\$20, \$30, and \$50 per ton of CO₂ (in 2012 dollars), beginning in 2015, and remaining constant in real terms thereafter.

In a first set of modeling simulations, we generate “revenue-neutral tax swaps,” by substituting a carbon tax (in a revenue-neutral manner) for existing capital, labor, and consumption taxes or by returning carbon tax revenues via lump-sum rebates to households. In a second set of simulations, we study the effect of including a carbon tax in a package of measures to reduce the budget deficit. In a third set, we look at the carbon tax as a deficit-reduction tool by itself, with the tax revenue serving as a down payment on deficit reduction.

The results of our analysis show that holding all other taxes in the economy constant, the imposition of a carbon tax represents a potentially substantial revenue source for the United States, on the order of \$160 to \$360 billion in gross revenues per year, or \$1.6 to \$3.6 trillion over the decade (2012\$). How these revenues are used has a huge effect on the efficiency and fairness of a carbon tax policy.

About the Model

To run this analysis, we built a dynamic general-equilibrium, overlapping-generations (OLG) model of the US economy, which includes detail on government taxes and expenditures and substantial energy-sector information. As described in a previous *Resources* article on early results of this model (see Further Reading), a key feature is its more realistic depiction of households’ decisions about work, savings, and consumption over their lifetimes. It contrasts other frameworks, which either model people as living forever or involve a one-time snapshot of households.

The OLG model has several advantages. First, it is well suited to examining the effects of changes in the timing of taxes or spending because, unlike most other models, which imply that government borrowing is fully offset by private-sector saving, this is not the case here. Second, the OLG model enables a more realistic analysis of the effects of tax policy on capital accumulation. Third, it lets us examine how different generations—baby boomers, new workers, and even future generations—are affected by policy reforms, including how they respond to those changes. No other model combines these three features, as is needed to address key questions about carbon taxes and fiscal policy.

A Revenue-Neutral Tax: Using the Revenues to Cut Other Taxes

Among the revenue-neutral tax reform options (which ignore the growing debt burden), we find that using the carbon tax revenues to cut noncarbon taxes has a range of effects.

Cutting capital taxes—corporate taxes or personal income rates on interest, dividends, or capital gains—produces the largest economic efficiency benefits, roughly offsetting the economic cost of the carbon tax. Without considering the environmental benefits from CO₂ emissions reductions, the net social costs are close to zero, depending

We find that using carbon tax revenues to fund lump-sum transfers or cuts in sales tax rates benefits older generations at the cost of younger generations. Using the revenues to fund cuts in labor tax rates has the opposite effect: younger generations do better than older generations under this option. And using carbon tax revenues for capital tax cuts yields net costs that vary relatively little across generations.

Impacts on Households

Distributional impacts in the near term are especially important to understand because the citizens alive today are the ones who

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on which measure of cost is used. We find that GDP rises slightly, but a more comprehensive measure shows a slight cost. Either way, the net costs are close to zero.

Another approach is to recycle the revenues by reducing labor taxes—in the form of payroll or personal income tax reductions. This option is less economically efficient than recycling via capital tax cuts, though the differences are relatively modest.

Recycling the revenues via lump-sum rebates to lower-income households (which are likely to be the most disadvantaged by a carbon tax) is worse for economic efficiency than any of the options that involve tax rate cuts. At the same time, as we discuss later, such rebates are most progressive in terms of their income distribution impacts.

Impacts on Different Generations

We also consider how the different options for revenue recycling affect individuals in different generations.

will decide the policy. Looking across the different policies, the outcome for any given expenditure quintile varies significantly.

Part of the effect of a carbon tax on households comes through higher product prices. For those price increases, roughly half of the cost increase can be attributed to direct consumption of natural gas, heating oil, gasoline, air travel, and electricity. The rest comes from the purchase of products that require energy to manufacture and increased costs of services provided by institutions, such as those by government agencies and hospitals.

The largest category of spending on energy is for gasoline, for which the diversity across states appears to be relatively small. The diversity in electricity expenditures is somewhat greater, and it is greatest in the categories of natural gas and other fuels (primarily heating oil). On a per capita basis, the greatest level of spending on direct energy consumption occurs in the northeastern states.



Authors Roberton Williams of RFF and Jared Carbone of the University of Calgary were among the presenters at RFF's seminar on the role of a carbon tax in tax reform and deficit reduction held on June 26, 2013.

Many of the states with the greatest use of coal in electricity generation currently have electricity (and overall energy) costs that are less than the average for the nation. They

to prevent capital tax increases) disproportionately helps higher-income households. Returning revenue via per capita rebates disproportionately helps lower-income

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might expect to see a relatively large increase in energy costs with a carbon tax, but the net effect is a price leveling across the nation.

Lower-income households spend a greater portion of their income on direct energy consumption and may be especially adversely affected by the carbon tax. The carbon tax also may affect household incomes by changing wages and returns to capital (particularly in energy-intensive sectors of the economy). These changes are important, though they are more difficult to model than changes in product prices.

The effects of revenue recycling on households are likely to be more important than the effects of the carbon tax itself. Using revenues to fund capital tax cuts (or

households. Cutting labor or consumption taxes falls somewhere in between.

Generating Revenue for Deficit Reduction

In the revenue-neutral scenarios we just described, we assume that federal expenditures will be cut and federal revenues increased in equal amounts, matching the 50–50 split embodied in the widely discussed Domenici–Rivlin Debt Reduction Task Force Plan 2.0. But the simulations focus strictly on revenue-side options: the use of carbon taxes versus capital, labor, or consumption taxes or lump-sum rebates to raise the required revenues.

The key difference in our next set of deficit-reduction scenarios is that we

compare a carbon tax to various noncarbon taxes and rebates as alternative means of raising revenues, recognizing the need for additional revenues. Unsurprisingly, the general pattern of results is very similar to that of the revenue-neutral scenarios.

Offsetting capital tax hikes provides the most economic benefits, followed by labor and consumption taxes and the provision of lump-sum dividends.

In terms of intergenerational impacts, using carbon tax revenues to offset increases in consumption tax rates benefits older generations at the cost of younger generations, using the revenues to offset hikes in the labor tax rate aids younger generations the most, and using carbon tax revenues to offset capital tax hikes yields net costs that vary relatively little across generations.

Parallel distributional impacts also arise in terms of distribution across income groups and regions of the country, although in the absence of household-level reductions in marginal rates or the provision of lump-sum dividends, the economic welfare impacts are all likely to be negative.

Paying Down the Deficit Earlier

Finally, we present initial results for a somewhat different approach, which might be described as an early down payment on debt reduction, involving an initial round of carbon taxes, which is followed by smaller increases in other taxes than would otherwise have been required to meet long-term deficit-reduction goals.

The results are quite striking: the carbon tax is consistently better for economic efficiency in this down-payment case than it is in the revenue-neutral case. Indeed, if the carbon tax down payment results in less need to increase capital taxes later, then the net cost of the carbon tax is negative (even ignoring any environmental benefits). This shows the substantial efficiency gains

from addressing the budget deficit sooner rather than later. The intergenerational consequences may make this politically difficult, however: although this case is good for economic efficiency, it also makes every generation old enough to vote today worse off, on average, while benefiting all future generations.

Using a Carbon Tax to Lessen Trade-Offs

Tax policy has various competing goals, such as generating sufficient revenues for government while promoting economic growth and fairness. Tax policies also can be used to enhance the environment. So far, despite recent efforts, calls for broad-scale tax reform and deficit reduction have failed to yield substantial results.

Introducing a carbon tax adds a new element to the mix, unambiguously augmenting revenues and reducing CO₂ emissions. How the new revenues are used matters a great deal. Some options can enhance economic welfare and GDP growth; others impede it. At the same time, some options, if not well designed, may introduce inequities across generations, income groups, or regions of the country. In fact, decisions on the use of the revenues can have bigger effects on the distribution of outcomes across households than would substantial changes in the carbon tax rate. But even though it comes with its own set of difficult decisions, a carbon tax arguably lessens the trade-offs among the multiple goals and unambiguously advances environmental objectives. ●

FURTHER READING

Corbone, Jared, Richard D. Morgenstern, Roberton C. Williams III, and Dallas Burtraw. 2013. *Deficit Reduction and Carbon Taxes: Budgetary, Economic, and Distributional Impacts*. Washington, DC: RFF.

Williams, Roberton C., III. 2013. Taxing Carbon: Potential Deficit and Emissions Reductions. *Resources* 182: 26–29.