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Carbon Taxes, the Federal Budget, and Climate Change

By Marc Hafstead

The United States faces a significant long-term fiscal crisis. According to the Congressional Budget Office's June 2011 projections of the federal deficit (before the passage of the Budget Control Act), the total deficit between 2011 and 2021 would be an estimated $7.6 trillion under an extended baseline estimate that assumes current law stays fixed. Under an alternative fiscal scenario that would occur if expected modifications to current law take place, the total accumulated deficit would be $13 trillion. These deficits would lead to a national debt–GDP ratio of 76 percent in 2021 in the extended baseline estimate and 101 percent under the alternative fiscal scenario.

The Budget Control Act signed into law by President Obama on August 2 provides a down payment for fiscal reform by cutting spending by $0.9 trillion over the next 10 years and providing a minimum of $1.2 trillion in deficit reductions to be negotiated by a bi-partisan congressional committee (automatic across-the-board spending cuts would kick in if Congress failed to pass the committee's recommendations). However, additional long-term fiscal reform is needed as the total $2.1 trillion in deficit reductions reduces the total accumulated deficits, between 2012 and 2021, only by 27.6 percent under the extended baseline and by 16.2 percent under the alternative fiscal scenario.

The United States also faces the distinctly different yet equally important long-term policy challenge of climate change. Although considerable uncertainties remain, there is strong consensus among scientists that the accumulation of greenhouse gases in the Earth's atmosphere through the burning of fossil fuels, deforestation, and other human activities in both the past and present threatens to significantly change climates around the

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world.[1] The concentration of carbon dioxide (CO_2) in the Earth's atmosphere of 387 parts per million (ppm) in 2009 is historically unprecedented and represents a 38 percent increase in the ppm of CO_2 from the start of the Industrial Revolution. And emissions continue to increase in the United States and across the globe; according to the U.S. Environmental Protection Agency (EPA), carbon dioxide emissions increased 16 percent in the United States between 1990 and 2008 and 31 percent globally between 1990 and 2005.

There are already significant signs that climate change is under way, with higher air and water temperatures, more heavy precipitation, more frequent heat waves, and rising sea levels.[2] While the economic costs of continued climate change caused by greenhouse gases are unknown, there is a non-negligible risk that the costs could be very large and potentially catastrophic.

A Carbon Tax Solution

The fiscal crisis and climate problems are extremely daunting, yet there exists a relatively simple and effective policy that can address both, simultaneously. A simple carbon tax levied on the sellers of fossil fuels combined with fossil fuel border adjustments (tariffs and subsidies to ensure U.S. companies are not penalized relative to foreign companies facing differential carbon taxes) can increase federal tax revenues while mitigating the risk of serious climate change. By establishing a tax on carbon and gradually increasing the level of the tax over time to a level approximating the externalities generated by a ton of carbon, the U.S. government can reduce annual deficits, without raising distortionary income tax rates, while considerably reducing the negative externality of carbon dioxide emissions.

Why a Carbon Tax?

There exists a wide range of potential policy instruments the government can use to address climate change and reduce carbon dioxide, but from both a revenue and environmental standpoint, however, a broad carbon tax is the best policy instrument.

Command-and-control policies such as emissions standards, renewable or clean energy standards, and increased fuel efficiency standards create zero revenues and most likely reduce other tax revenues as well. Additionally, these command-and-control policies typically target just one source of emissions. While electricity generation and transportation represent 32 percent and 27 percent of U.S. greenhouse gas emissions, respectively, policies that target only one of those sectors will fail to induce significant emissions reductions in the rest of the economy.

A cap-and-trade program can also raise revenue through the auctioning of allowances to emitters. However, certain features of a cap-and-trade approach make it less desirable as a means of creating carbon revenue. First, the price of an allowance will vary widely over time under a cap-and-trade program and therefore the carbon revenues will be much more volatile than revenues from a carbon tax. Second, cap-and-trade programs have become associated with significant free allocation of permits to emitters and other stakeholders, and any free allowances introduced to a cap-and-trade program would erode the revenue created by the policy. A well-designed cap-and-trade program can reduce carbon dioxide emissions just as efficiently as a carbon tax, but the price uncertainty of a cap-and-trade program could distort the investment decisions of large emitters. A well-defined carbon tax, on the other hand, provides a clear signal as to the price of carbon both now and in the future.

When implementing a carbon tax, policymakers must determine where to implement the tax and what sources are to be covered. Both decisions directly affect the potential to generate revenues and reduce carbon dioxide emissions.

Taxing the producers of fossil fuels at the mine-mouth or wellhead is easy to enforce and ensures that all carbon (and the subsequent downstream CO_2 emissions) is taxed by the policy. Taxing emitters (through a direct tax on emissions or a tax on

1 Source: IPCC, 2007.

2 Source: U.S. EPA, 2011, "Climate Change Indicators in the United States."

the implicit carbon content of purchased fossil fuels) is more difficult to enforce, as there are many more buyers of fossil fuels than sellers. As a result, small emitters may be omitted from the tax for enforcement reasons, thus reducing both the carbon tax base and potential for emissions reductions. Finally, the import tariffs guarantee the policy equally taxes domestic and foreign production of fossil fuels while the export subsidy protects the international competitiveness of U.S. fossil fuel exporters.

Carbon Tax Revenue and the Federal Budget

The overall revenue provided by a carbon tax depends on the initial level of the tax and its rate of increase over time. Consider two carbon tax policies: In policy (1), the tax on carbon is conservatively set to $36.67 per metric ton in 2012 (equal to a tax of $10 for one metric ton of CO_2 emissions) and increases at a real rate of 10 percent per year until 2035; in policy (2), the initial price is doubled to $73.34 per metric ton and the tax increases at the same rate.

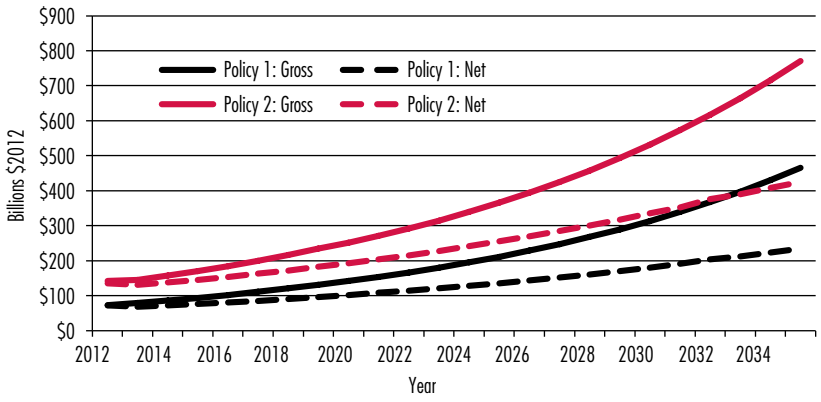
Figure 1 shows estimates for the gross and net real revenue created by the implementation of the carbon tax in each policy.[3] Gross real revenue is simply equal to the implicit tons of carbon extracted through oil, natural gas, and coal production times the real carbon tax. Net real revenue accounts for the reductions in other government receipts caused by the negative effect of the carbon tax on the non-carbon tax base.

Under the first carbon tax policy, gross revenues would be $465.4 billion (in 2012 dollars) in 2035. Even after accounting for the negative effects of the carbon tax on the tax base, the carbon tax contributes a large sum of net carbon revenue each period; federal receipts would increase by $234.1 billion (in 2012 dollars) in 2035. With an initial tax rate that is double that of the first policy, the second carbon tax policy would generate $771.0 billion and $424.4 billion (in 2012 dollars) in gross and net revenues, respectively, in 2035.

If carbon tax revenues are used solely to reduce the deficit, the expected federal deficit would decrease by $853 billion from 2012 to 2021 if carbon tax policy (1) is implemented in 2012. If passed as part of upcoming deficit reduction negotiations, the bi-partisan congressional debt committee would only have to come up with another $346 billion in deficit reductions to prevent the automatic spending cut trigger; in other words, the carbon tax alone would account for 71.1 percent of the necessary deficit reduction. If the higher carbon tax policy (2) is implemented, the expected federal deficit would decrease by $1.62 trillion between 2012 and 2021. As a result, the bi-partisan congressional debt committee could implement carbon tax policy (2) without passing any other deficit reduction measures; the tax would contribute an additional $420 billion in deficit reduction over and above the $1.2 trillion required by the Budget Control Act.

Unlike raising distortionary taxes like labor or capital income taxes to generate revenues, the

Figure 1.
Carbon Tax Revenues, 2012-2035



Source: Author Calculation

3 The estimates come from simulations of a computable general equilibrium model used to analyze environmental policies. See Goulder, Hafstead, and Dworsky (2010) for a complete description of the model used in this report.

taxation of a market externality not only raises revenue but also reduces the costs associated with the externality. The taxation of carbon is a non-distortionary tax that reduces the externality of carbon dioxide emissions. To the extent that climate change will have a negative effect on the federal budget in the future, the carbon tax can achieve additional deficit reduction by reducing the impacts of climate change.

To compare the potential for deficit reduction under a carbon tax, Table 1 shows the level of deficit reduction for the two carbon taxes (excluding unknown climate change cost savings) and other fiscal reforms suggested by the National Commission on Fiscal Responsibility and Reform's report, "The Moment of Truth." Compared with the fiscal reforms suggested by the commission, carbon tax policy (1) could generate nearly as much deficit reduction as comprehensive tax reform and could generate much more revenue than the proposed gas tax increase or health care and Social Security reforms. With a higher initial carbon tax than carbon tax policy (1), carbon tax policy (2) can achieve nearly double the level of deficit reduction; only discretionary spending caps would achieve more deficit reduction than carbon tax policy (2).

Carbon Taxes and Emissions Reductions

The level of emissions reductions induced by a carbon tax also depends on how high the tax is. Figure 2 shows the estimated level of CO_2 emissions under business as usual and the two carbon tax policies explained above. The level of emissions in 2035 would be an estimated 35.9 percent below the level of emissions in 2012 with carbon tax policy (1) and 47.2 percent below the level of emissions with carbon tax policy (2). Cumulatively between 2012 and 2035, carbon tax policy (1) would prevent 42.5 billion tons of CO_2 emissions in the United States while carbon tax policy (2) would prevent 56.7 billion tons of CO_2 emissions.

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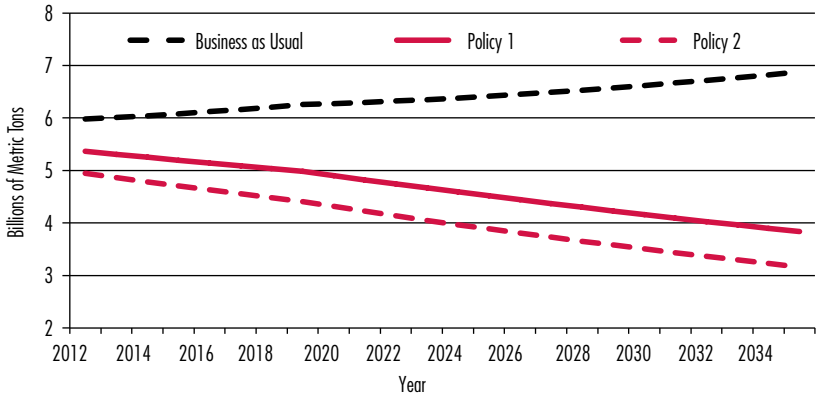
Table 1: Potential Deficit Reduction of Carbon Taxes and Debt Commission Fiscal Reforms (Billions of dollars)

Fiscal Reform	Total Deficit Reduction	
	2015	2012-2020
General Revenues		
Comprehensive Tax Reform[a]	80	785
Raise Gas Tax by 15 Cents[a]	12	114
Carbon Tax Policy (1)[b]	76	745
Carbon Tax Policy (2)[b]	146	1414
General Outlays		
Discretionary Spending Caps[a]	172	1661
Health Care Reforms[a]	30	282
Other Mandatory Savings[a]	25	275
Social Security Reforms[a]	19	238

a Source: The Moment of Truth: Report of the National Commission on Fiscal Responsibility and Reform: Figure 17
b Source: Author Calculations

Figure 2.
Carbon Dioxide Emissions, 2012-2035



Source: Author Calculation

The Economic Costs of Carbon Taxes

The simple carbon tax levied on the producers of fossil fuels combined with border adjustments reduces CO_2 emissions by increasing the prices of fossil fuels in proportion to their carbon content. In the short term, the burden of the new tax falls on both producers and consumers. The extent to which producers or consumers bear the burden of the tax depends on how much of the tax can be passed downstream through the supply chain to consumers.

Table 2 shows the increase in select prices relative to business as usual as a result of the carbon tax. The increases in gas and electricity prices are modest relative to the revenue gains and emissions reductions achieved through the carbon tax policies. The average increase in real gasoline prices relative to business as usual between 2012 and 2035 is 9.1 percent under policy (1) and 18.1 percent under policy (2). These increases imply an average increase in the real price of a gallon of gasoline of only $0.40 or $0.80, less than the $1.00 per gallon federal tax increase advocated by some politicians.

The increases in the price of electricity and natural gas are also relatively small; a household with an electricity bill of $100 per month would pay an additional $5.00 or $7.50 per month on average between 2012 and 2035.

Conclusion

The fiscal crisis and climate change are long-term domestic policy challenges with no easy solutions. A well-designed carbon tax with broad coverage can, nevertheless, be part of the solution to both problems without dramatically increasing energy prices for households. Carbon tax revenues alone cannot solve our fiscal crisis but can contribute significantly to deficit reduction through both carbon revenues and the avoidance of future environmental costs caused by climate change. By combining carbon taxes with sensible fiscal reforms including but not limited to general tax and entitlement reform, a solution to the nation's runaway debt can be found. And while climate change is a global challenge, the United States can provide global leadership on the issue by delivering meaningful emissions reductions through the implementation of a simple and well-designed carbon tax.

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Table 2: Changes in Selective Real Prices, 2012-2035 (in 2012 dollars)

Carbon Tax Policy (1)	Percent Changes			Level Changes[a]		
Good	2012	2020	Average 2012-2035	2012	2020	Average 2012-2035
Gasoline	4.0%	6.5%	9.1%	$0.14 / gal	$0.28 / gal	$0.40 / gal
Retail Electricity	2.4%	4.0%	5.0%	0.29¢ / kWh	0.47¢ / kWh	0.60¢ / kWh
Retail Natural Gas	2.3%	3.9%	5.4%	$0.27 / tcf	$0.54 / tcf	$0.76 / tcf
Carbon Tax Policy (2)	**Percent Changes**			**Level Changes[a]**		
Good	**2012**	**2020**	**Average 2012-2035**	**2012**	**2020**	**Average 2012-2035**
Gasoline	8.1%	13.0%	18.1%	$0.28 / gal	$0.56 / gal	$0.80 / gal
Retail Electricity	4.8%	6.7%	7.5%	0.58¢ / kWh	0.81¢ / kWh	0.90¢ / kWh
Retail Natural Gas	4.5%	7.8%	10.7%	$0.56 / tcf	$1.07 / tcf	$1.50 / tcf

a Assumes retail price of gasoline of $3.50 / gal, retail price of electricity of 12¢ / kWh, and retail price of natural gas of $12 / tcf in 2012

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