

Should We Abandon Cap-and-Trade in Favor of a CO2 Tax?

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With widespread agreement that global warming is occurring, the birth of carbon permit trading in Europe, and various state-level mitigation initiatives, federal government action to control CO2 emissions is long overdue. Where people disagree is how stringent these policies should be, and what instruments should be used. Following the success of the sulfur-trading program imposed on the power sector, the momentum in Congress is clearly for some form of cap-and-trade permit system. But before Congress passes new legislation, there is a serious alternative to consider, namely a CO2 tax.

The CO2 tax has a number of advantages over pure emissions trading systems. In particular, if the revenues from the tax are used to reduce other taxes, the policy might actually benefit the economy overall, and the tax also avoids problems that might be caused by permit price volatility under an emissions trading regime.

How to Design a CO2 Tax

Ideally, a CO2 tax would be imposed on fossil fuel suppliers according to the amount of carbon that will be released into the atmosphere when the fuel is combusted. As with the permit price under the alternative cap-and-trade system, the tax would be passed forward into the prices of coal, natural gas, and petroleum products, and therefore ultimately in the price of electricity and other energy intensive goods. Higher prices would encourage the adoption of fuel- and energy-saving technologies across the economy and a shift from carbon intensive fuels like coal to natural gas and renewable fuels. A system of tax credits could also be incorporated to encourage forestry expansion to sequester CO2, or the incorporation of carbon capture and sequestration technologies in the construction of new power plants.

From an economist's perspective, the tax should reflect the costs to the world from the future global warming potential of CO2, which encompass damages to agriculture, the costs of

protecting valuable coastal land against sea level rises, health impacts from the spread of tropical diseases, the risk of extreme climate change scenarios, and so on. Obviously, estimating these costs is a formidable and controversial challenge, given the enormous uncertainty over future climate change scenarios and disagreement over how the wellbeing of those most at risk from future climate change should be valued. According to a highly regarded climate expert, William Nordhaus (Yale University), the current cost of carbon is about \$6 per ton of CO₂ (or \$20 per ton of carbon, as some people prefer to express it). Others have argued for a far more aggressive tax because, for example, they believe the damages from CO₂ are larger, or a higher tax is needed to induce investments in carbon capture and sequestration technologies. The damage per ton of CO₂ increases over time, meaning that the tax should automatically ramp up by a fixed percentage each year; Congress could periodically review this CO₂ tax “escalator” and adjust it in light of new evidence on the seriousness of global warming.

If the more modest CO₂ tax of \$6 per ton were implemented now, it would reduce annual CO₂ emissions by roughly 10 percent and raise annual revenues of about \$30 billion, or about 3 percent of federal receipts from individual income taxes. Suppose, for the moment, that all CO₂ tax revenue is recycled in an across-the-board cut in income taxes, how would this affect the economic impact of the CO₂ tax?

A “Win-Win” Policy?

Income taxes impose costs on the economy as they distort household and firm behavior in a variety of ways. For example, by lowering take-home pay they can encourage some people (such as married females) to stay home rather than go out to work, and they may discourage people from going to college or making other investments to raise their skills and earnings potential, because the government taxes away some of the benefits from these investments to the individual. Taxes also encourage too much spending on goods that receive special tax preferences. For example, the deductibility of mortgage interest from income taxes encourages people to spend more on housing than they otherwise would, while the exemption of employer-provided medical insurance from income and payroll taxes leads to an excessive amount of workplace compensation provided in the form of these fringe benefits.

Leaving aside the benefits from slowing climate change, CO₂ taxes also distort the economy in different ways. In particular, they induce costly investments throughout the economy

to conserve on energy and they induce industry to use cleaner, but more expensive fuels than they otherwise would. In addition, by driving up energy costs, CO2 taxes would also have a harmful impact on economic activity and employment, which exacerbates some of the distortions created by income taxes.

Nonetheless, recent research studies suggest that, up to a point, raising extra revenue from CO2 taxes involves smaller overall economic costs than raising that extra revenue from income taxes. This means that shifting some of the tax burden off income and onto CO2 would reduce the overall distortions created by the tax system, providing a positive economic benefit (in addition to the climate benefit); in this regard, moderate CO2 taxes, up to around \$15 per ton, can be a win-win policy.

But the debate over what to do with the revenues from a CO2 tax goes beyond offsetting incomes taxes. Some analysts have suggested that the revenues should instead be used to reduce the federal budget deficit, which would lower the burden on future, rather than current, taxpayers. However, when new revenue sources accrue to the Treasury, rather than being automatically offset by tax reductions elsewhere, there is a risk that some of the extra revenue will ultimately finance more public spending, which may not have the same social value as cutting distortionary taxes. Moreover, cutting the deficit might have the perverse effect of reducing pressure for badly needed reforms to the entitlement system.

Is it Feasible?

Three practical arguments are made against the CO2 tax shift. First is that influential producer groups—refineries, steel companies, airlines, electric utilities, etc.—must be compensated if climate legislation is to go forward, and that this compensation is easily provided by giving away free permit allowances to firms under a cap-and-trade system. Second is that voting for any new tax—even if offset by tax reductions elsewhere—can be electoral suicide for members of Congress; the first Clinton Administration failed to implement a broad energy tax (or Btu tax), despite a major effort. Third, even if a tax regime does go forward, based on how Congress has used new revenue sources in the past, an important concern is that CO2 tax revenues may end up being wasted in special interest spending, rather than being used to substitute for other taxes.

Tax relief and exemptions could also be provided to adversely affected industries under a CO2 tax. However, such compensation schemes open up the floodgates to any number of lobby groups claiming to be deserving of compensation. One of the key arguments for CO2 taxes over cap-and-trade is seriously undermined, if accompanying legislation fails to specify economically efficient use of the new revenue. Perhaps the revenue-neutral CO2 tax will be in the wilderness for some time, though no one can predict what might be politically feasible down the road with different leadership and perhaps more concern among the general public about global warming. Al Gore, at least, argues for using CO2 tax revenues to lower payroll tax rates. But in the meantime, it is critical that policymakers fully appreciate the potential disadvantages of cap-and-trade compared with a tax-based approach, and how those disadvantages might be partly overcome in various “hybrid” permit systems.

Taxes versus Permits

If a cap-and-trade system is implemented with all permit allowances given away for free, instead of a revenue-neutral CO2 tax, the cost to society is the economic efficiency gains that could have been realized from recycling new revenues into income tax reductions. I would put this extra cost at roughly \$12 billion per annum, for a 10 percent emissions reduction, and \$25 billion for a 20 percent emissions reduction (assuming the larger reduction would require a \$15 CO2 price). Clearly, there is an awful lot at stake in obtaining new revenues, and using them productively.

Another advantage of using CO2 tax revenues to lower personal income taxes is that the benefits are spread over most households as compensation for them facing higher electricity and fuel prices. And the tax cuts could be tilted in favor of lower income groups by extending the earned income tax credit, for example. In contrast, studies have shown that freely allocated permit systems can be highly inequitable; the reason is that firms receiving allowances reap windfall profits, which ultimately accrue to individual stockholders, who are concentrated in relatively high-income groups.

The potential volatility of carbon permit prices (if not addressed through other design features) is another potentially serious problem with emissions trading programs. Price volatility can arise because the supply of permits is fixed by the government but the demand for permits may vary considerably year-to-year with changes in fuel prices and the demand for energy. In

contrast, a CO₂ tax fixes the price of CO₂, allowing the amount of emissions to vary with prevailing economic conditions. Uncertainty over the future price of CO₂ may deter CO₂-saving investments with high up-front capital costs, such as carbon-capture and sequestration technologies; CO₂ price volatility may also deter applied R&D efforts at firms to develop cleaner technologies for the future.

Moreover, on a year-to-year basis, emissions abatement ideally should occur until the marginal cost of future abatement equals the environmental damage per ton of carbon. This equality is achieved under a CO₂ tax that reflects environmental damages because firms reduce emissions until the cost of extra abatement equals the savings in tax payments. However, it is not achieved under a permit system where the marginal cost of complying with the cap can exceed the damage per ton when the permit price is high, and vice versa when the permit price is low. In this regard, an influential study by my colleague William Pizer suggested that the net benefits over time (climate change benefits less emissions compliance costs) under a cap-and-trade system might be only a small fraction of the net benefits under an appropriately scaled CO₂ tax. Imposing strict limits on nationwide emissions makes economic sense only if we are rapidly approaching a threshold in atmospheric greenhouse gas concentrations beyond which there is a risk of extreme climate change.

At first glance then, the economic arguments for abandoning cap-and-trade in favor of a CO₂ tax shift appear to be overwhelming. However, there are ways to design permit systems that can partly overcome some of their handicaps. Revenues can be raised under a permit system if the government auctions allowances rather than giving them away for free. Most climate bills now under consideration envision a transition—albeit a slow one—to more permit auctioning over time. As for permit price volatility, this can be contained to some extent by including a “safety valve” provision, and allowing firms to bank unused permits. With a safety valve, firms can buy additional permits from the government in periods when the permit price reaches a trigger level; this keeps a cap on prices when the demand for permits is high. And with permit banking, in periods when the demand for permits is slack because abatement costs are low, firms have an incentive to hold over some allowances for use in future periods when they expect higher permit prices; this mechanism helps to create a floor under permit prices.

An Opportunity for American Leadership

Although appropriate design of cap-and-trade systems can help to blur some of the differences between the permit- and tax-based approaches, most economists would still favor the CO2 tax shift, political considerations aside. Given the United States is the world's largest producer of CO2, and that it is not part of the Kyoto system, it would be the obvious country to lead the world into a CO2 tax-based alternative to Kyoto.

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Further Reading

For more discussion of the differences between CO2 taxes and cap-and-trade, particularly as part of an international agreement, I would recommend William D. Nordhaus, 2007. "To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming." *Review of Environmental Economics and Policy*, forthcoming.