

Analysis of a Carbon Tax

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Why a Carbon Price?

- A cost-effective way to achieve given emission reductions
 - Trading under Acid Rain Program reduced costs of SO₂ emission cuts by nearly one-half compared to command and control approach
- An alternative to cumbersome and potentially contentious regulatory instruments
 - Using the Clean Air Act to regulate carbon dioxide could delay meaningful steps to reduce emissions
 - An endangerment finding for carbon dioxide could be especially costly

Why a Carbon Tax?

- Revenue
- Allocation
- Administration
- Efficiency
- Price Volatility
- Induced Innovation
- International Trade

Revenue

- Revenue obscured under a cap & trade system
 - \$80 billion annually with a \$15 per ton CO₂ price
 - Order of magnitude larger than Acid Rain Program
- Including the revenue in the budget process explicitly instills some budgetary discipline
 - Revenue from cap & trade only included in federal budget if auctioned
 - Free permits are a hidden transfer

Allocation

- Permits are valuable assets
 - Big incentive for rent seeking activity
- Current focus on allocation has perverse distributional results
 - Emphasis should be on compensating affected parties, not regulated sectors
 - Carbon Tax Swap addresses this problem

Administration

- IRS in place to administer a carbon tax
- Cap & trade system will need to establish administrative structure
- Considerable lead-time may be needed to establish allocations (CBO, 2008)

Efficiency

- Pure cap & trade fixes quantity but not price
- Pure tax fixes price but not quantity
- Economic modeling consistently shows that tax more efficient to achieve given expected GHG reductions under abatement cost uncertainty

Price Volatility

- EU-ETS prices highly volatile
- Makes planning by firms difficult
- Need for complicated schemes (e.g. Carbon Market Efficiency Board)
- Safety valve mechanisms address upside risk
 - But if binding, converts system to a tax
 - Why not start with the optimum design?

Induced Innovation

- Downside risk also a concern with cap & trade
 - Phase I ETS prices traded for less than €5 throughout 2007
 - Concern in RGGI that initial permit allocation may be too high
- Low permit prices deter induced innovation

Border Tax Adjustments

- Legality under WTO?
- Implementation
 - How do we know the carbon content of an imported good?
 - Focus on goods with substantial carbon content
 - Use U.S. data as a rough guess.
- Combination of origin/destination system

Designing a Carbon Tax

- Four key issues:
 - Base
 - Rate
 - Revenue
 - Distribution

Tax Base

- Upstream collection for energy:
 - Impose carbon price on almost all fossil fuels with fewer than 3,000 taxpayers
 - 80 percent of GHG emissions
- Non-energy
 - Quickly becomes more difficult
 - Metcalf and Weisbach (2008) estimate that US can capture 10 percentage points more at a modest cost

Fossil Fuel Combustion

- Natural gas:
 - Almost 400,000 gas wells in the US but only 530 NG processors. Virtually all NG is processed
 - Tax the processors and 55 import points
- Coal:
 - 1,438 operating coal mines in the US
 - Coal bed methane can be included at the mine
 - Tax the mines
- Petroleum
 - 149 refineries
 - Tax the refineries and import points for refined product

Tax Rate

- Trade-off between initial tax rate and growth of tax rate to achieve a 50 percent reduction in cumulative emissions: 2012-2050:
 - \$15 in 2012 growing 10% real per year (CO₂ only)
 - \$13 in 2012 growing 10% real per year (all GHGs)
 - \$38 in 2012 growing 4% real per year (all GHGs)

Cumulative Welfare Cost:
\$15: 1.21 percent
\$13: 0.96 percent
\$38: 0.78 percent

Source: Metcalf et al. (2008)

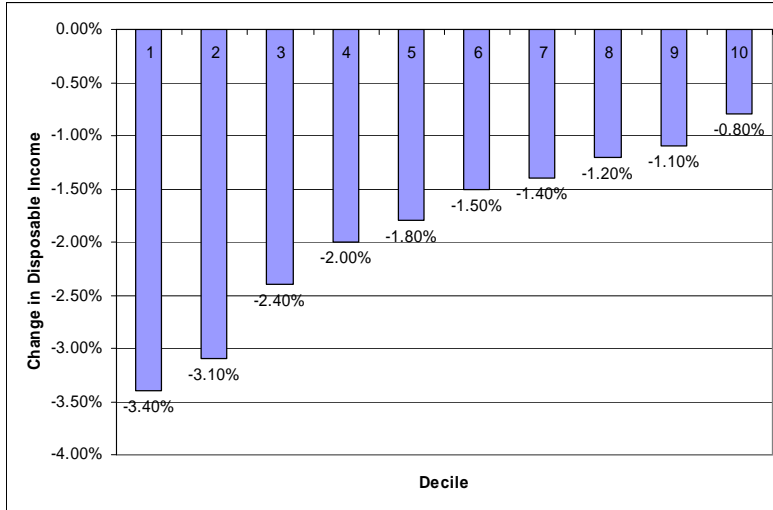
A Carbon Tax Swap

- A tax on emissions at an initial rate of \$15 per metric ton of CO₂ equivalent and gradually increasing over time
- A refundable tax credit for sequestered GHGs and other approved sequestration activities
- Border tax adjustment for fossil fuels
- An environmental earned income tax credit in the personal income tax equal to the employer and employee payroll taxes on initial earnings up to a limit.
 - For 2003 emissions and earnings, the credit would offset payroll taxes paid on the first \$3,660 of earnings per worker up to a maximum credit of \$560 per covered worker.

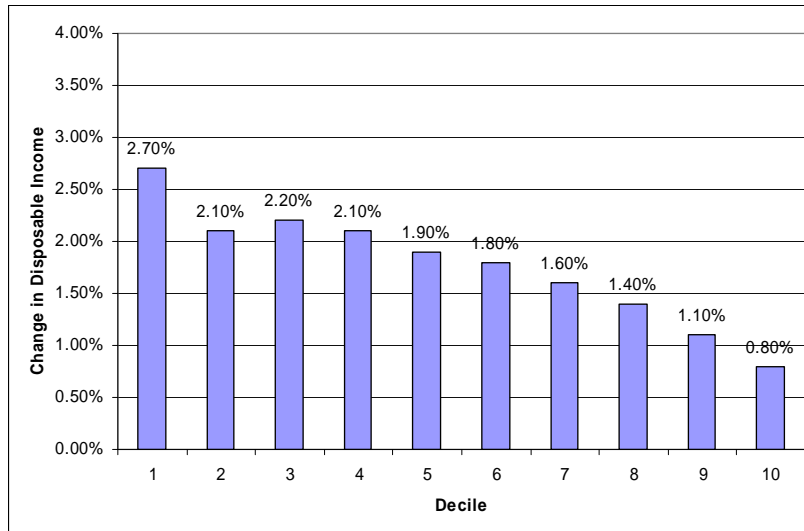
Important Design Elements

- Upstream system provides comprehensive coverage at low administrative cost
- Capped environmental earned income tax credit achieves distributional neutrality
- Revenue neutrality important on political grounds
 - Should not let carbon policy get caught up in debate over size of government and tax revenues
 - Shifts from taxing “goods” (labor, capital) to “bads” (emissions)

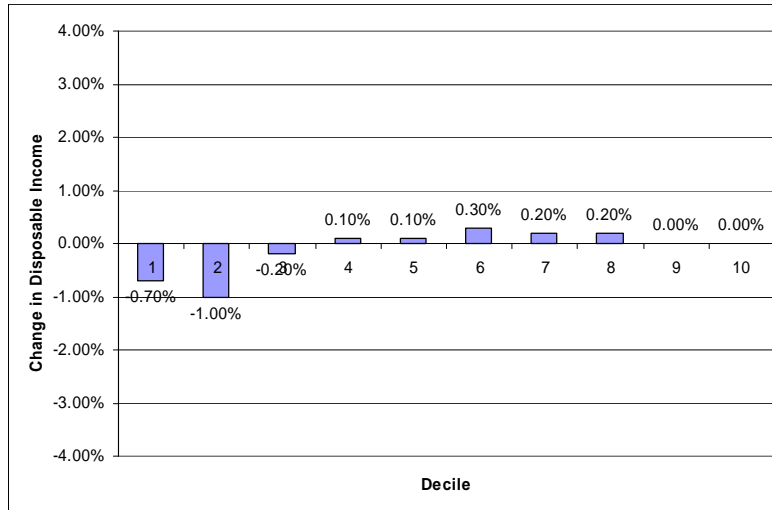
Impact of Carbon Tax on Income



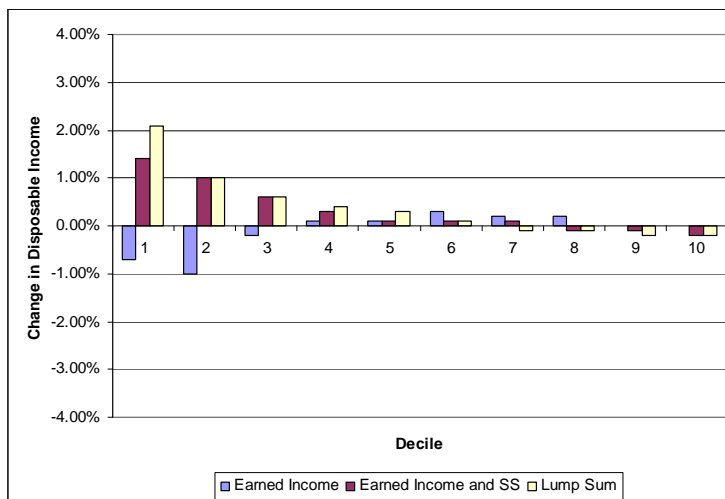
Impact of Tax Credit on Income



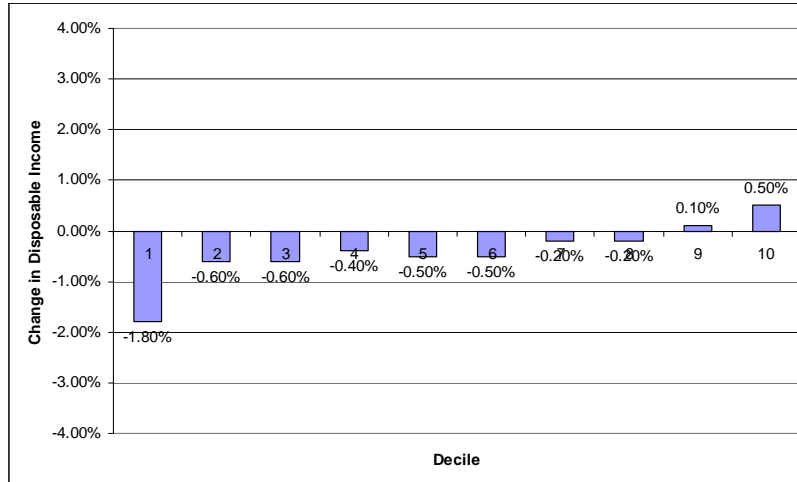
Net Impact



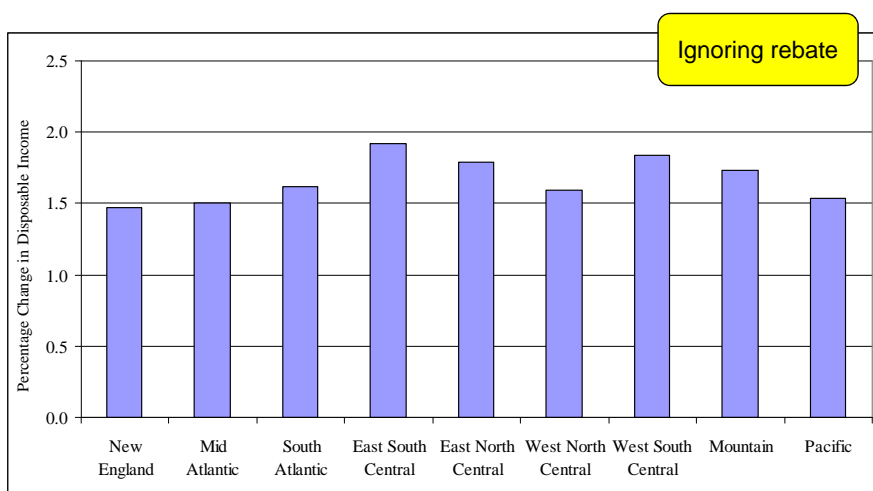
Alternative Rebate Options



Grandfathered Cap and Trade



Regional Burden



Hassett, Mathur, and Metcalf (2009)

Summary

- Carbon tax has a number of advantages over cap & trade
 - Price certainty
 - Efficiency
 - Trade considerations
 - Administration and speed of implementation
- Cap and trade dominates on political expediency grounds
 - But public opinion is shifting
- Any form of carbon pricing strictly preferred to a regulatory approach
- Hybrid cap & trade blurs some of the distinction between permits and taxes

Summary

- Carbon pricing is regressive
- Carbon tax neutral across regions
- Carbon tax swap can be designed to be distributionally neutral across income groups

Further Resources

- **Metcalf, Gilbert E.** 2007. "A Proposal for a U.S. Carbon Tax Swap: An Equitable Tax Reform to Address Global Climate Change," Washington, DC: The Hamilton Project, Brookings Institution.
- **Metcalf, Gilbert E.; Paltsev, Sergey; Reilly, John M.; Jacoby, Henry D. and Holak, Jennifer.** 2008. "Analysis of a Carbon Tax to Reduce U.S. Greenhouse Gas Emissions," Cambridge, MA: MIT Joint Program on the Science and Policy of Global Change Report No. 160.
- **Metcalf, Gilbert E. and Weisbach, David.** 2008. "The Design of a Carbon Tax," Tufts University and the University of Chicago.
- **Hassett, Kevin A.; Mathur, Aparna and Metcalf, Gilbert E.** 2009. "The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis." *The Energy Journal*, 30(2). 157-79.