The Carbon Tax Option: A New Look at an Old Idea

Federal Reserve Bank of Chicago, Detroit Branch

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Outline of Talk

• The problem
• Market based incentives as part of the solution
• Carbon tax or cap and trade?
• Concerns with a carbon tax
• An illustrative proposal
“Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture”

IPCC (2007)
Atmospheric CO₂ at Mauna Loa Observatory

1974-2006 NOAA ESRL/GMD
Policy Choices

- A carbon tax and a cap and trade system are examples of *market based instruments*
- Both put a price on carbon emissions
- Raising costs provides the incentive to reduce emissions
- Efficient policy instruments
Why Choose a Carbon Tax?

• No precedent for large-scale auctioning of permits in cap and trade programs
• Permit allocation and rent seeking
• Administrative costs
• Efficiency
• Price volatility
ECX Futures Contracts Settlement Prices

Source: European Climate Exchange
Concerns with a Carbon Tax

- Stability of tax base
- No guarantee of emission reductions
- Efficiency and expediency
- Clinton’s BTU tax
Carbon Dioxide Tax Rates

Source: Metcalf et al. (forthcoming)
Carbon Tax Revenue As a Percentage of GDP

Source: Metcalf et al. (forthcoming)
No Guarantee of Emission Reductions

- Economic and ecological consequences of GHG concentrations matter – not reductions per se
- No definitive scientific evidence yet on the precise amount of emission reductions required to prevent large economic and ecological losses
- To give primacy to specific emission reductions regardless of the cost is to suggest a greater certainty in the climate science than currently exists
Efficiency and Expediency

• Pressure in cap and trade to grandfather some or all emissions
• Large revenue and efficiency cost
• Pressure in carbon tax to provide industry exemptions
• Large revenue and efficiency cost
• Which is worse? Empirical question
Past Experience with Energy Taxes

• Clinton’s BTU tax
• Passed the House but failed in Senate
• The BTU tax did not have a sharply articulated focus
• Lessons:
  – need for a clearly articulated rationale
  – need to address distributional concerns
A Carbon Tax Swap

- Initial $15 per ton of CO$_2$e tax on emissions
- Refundable tax credit for sequestered GHGs and other approved sequestration activities.
- Border tax adjustment on carbon emissions
- An environmental earned income tax credit in the personal income tax equal to the employer and employee payroll taxes on initial earnings.
Results are for a $15 per ton CO$_2$e carbon tax in 2015. The tax is in year 2005 dollars.

### Short-Run Emissions Reductions With a Carbon Tax

<table>
<thead>
<tr>
<th>Source</th>
<th>Reference</th>
<th>Carbon Tax</th>
<th>Percentage Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emissions (mmt CO$_2$e)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenhouse Gases</td>
<td>8201.5</td>
<td>7049.8</td>
<td>14.0%</td>
</tr>
<tr>
<td>CO$_2$ Emissions</td>
<td>6995.2</td>
<td>6408.8</td>
<td>8.4%</td>
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<tr>
<td>Other GHGs</td>
<td>1206.3</td>
<td>641.0</td>
<td>46.9%</td>
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<tr>
<td><strong>Primary Energy Use (EJ)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>25.8</td>
<td>22.0</td>
<td>14.7%</td>
</tr>
<tr>
<td>Petroleum Products</td>
<td>49.6</td>
<td>46.8</td>
<td>5.6%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>26.8</td>
<td>25.9</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Source: Metcalf et al. (forthcoming). Results are for a $15 per ton CO$_2$e carbon tax in 2015. The tax is in year 2005 dollars.
Carbon Tax Impact

Change in Disposable Income

Metcalf (2007)
Environmental Tax Rebate Impact

Metcalf (2007)
Net Impact on Income Distribution

Metcalf (2007)
Protecting the Elderly

Metcalf (2007)
## Regional Distribution

<table>
<thead>
<tr>
<th>Region</th>
<th>Net ($)</th>
<th>Net (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>17</td>
<td>0.0</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>−9</td>
<td>−0.2</td>
</tr>
<tr>
<td><strong>East North Central</strong></td>
<td>30</td>
<td>−0.2</td>
</tr>
<tr>
<td>West North Central</td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>24</td>
<td>−0.1</td>
</tr>
<tr>
<td>East South Central</td>
<td>−75</td>
<td>−0.5</td>
</tr>
<tr>
<td>West South Central</td>
<td>−12</td>
<td>0.0</td>
</tr>
<tr>
<td>Mountain</td>
<td>17</td>
<td>0.1</td>
</tr>
<tr>
<td>Pacific</td>
<td>5</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Metcalf (2007)
Conclusion

• Carbon tax and cap and trade examples of market based instruments

• A carbon tax can be designed to be revenue and distributionally neutral

• Economic efficiency and administrative advantages to a carbon tax

• Public opinion supports a tax increase to combat global warming