Climate Change Policy – Potential Impacts on Indiana

Wally Tyner
Purdue University
July 7, 2009

- Residential: 28%
- Commercial: 17%
- Industrial: 19%
- Transportation: 36%
EPA Ruling April 17

• “. . .greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations.”

• “The action, if finalized, would not itself impose any requirements on industry or other entities.”

• My reading is that EPA would prefer that Congress take action, but holds out the possibility of future regulations if Congress fails to act.
Cap and Trade vs. Carbon Tax

- With cap and trade, the government establishes the emissions level (the cap) annually, which normally falls over time.
- The trade part of cap and trade means that firms can either meet their cap, or they can buy and sell permits if they are under or over the cap.
- The price for emissions is determined by this emissions permit trading market.
Cap and Trade vs. Carbon Tax

- With a carbon tax, the government sets the **price** of emissions (the carbon tax), and the **level** of emissions is determined by market adjustments to this carbon price.

- The carbon tax leaves the **level** of emissions uncertain, while cap and trade leaves the **price** uncertain.

- Carbon tax and cap and trade can achieve similar results. However, the welfare implications differ if the permits under cap and trade are given away instead of being auctioned.
Cap and Trade vs. Carbon Tax

• Scope – most argue that high fraction of emissions should be covered

• Design issues
  – Should the tax (or cap) be leveled upstream (fuel producers) or downstream (fuel users)?
  – For ease of administration, an upstream tax (or cap) would probably be more efficient – easier to identify collection points and to collect the tax

• For cap and trade, there is significant political pressure to give away at least part of the permits as in HR 2454.

• Use of revenue from permit auction or tax
Cap and Trade and Carbon Tax Issues

• Both likely would need to have a refundable tax credit for sequestered GHGs
• Both could have a refundable credit for the carbon embedded in exported goods in proportion to the export fraction of a company’s sales.
• Both could have an import tax on the carbon embedded in import goods.
S. 2191 CO₂ Emission Allowances and Auction %
Emission Offsets

- Credits for emission reductions for sources not covered under standard regulations
- Examples include methane reduction from waste management and feedlot operations and forest and soil carbon sequestration
- Must be verifiable, additional, permanent, and enforceable
- Most bills limit use of international offsets.
Cap and Trade and Carbon Tax Issues

• Two important criticisms of either approach are:
  – The increase in energy cost would stymie economic growth – most studies indicate this effect is likely to be very small, especially if other taxes are reduced.
  – The increase in energy cost under either approach would be equivalent to a regressive tax since poor people spend a greater fraction of their income on energy that the rich do.

• With either carbon tax or cap and trade, the energy tax could be offset by a reduction in income taxes targeted towards lower income families.
## Consumer Price Impacts of a $15/ton Tax on CO₂

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Price Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity and Natural Gas</td>
<td>14.1</td>
</tr>
<tr>
<td>Home heating</td>
<td>10.9</td>
</tr>
<tr>
<td>Gasoline</td>
<td>8.8</td>
</tr>
<tr>
<td>Air travel</td>
<td>2.2</td>
</tr>
<tr>
<td>Other commodities</td>
<td>0.3 to 1.0</td>
</tr>
</tbody>
</table>

These price increases include both direct and indirect effects.

## Carbon Tax with Tax Rebate

<table>
<thead>
<tr>
<th>Decile</th>
<th>Carbon Tax</th>
<th>%</th>
<th>Net Cost*</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-276</td>
<td>-3.4</td>
<td>112</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>-404</td>
<td>-3.1</td>
<td>125</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>-485</td>
<td>-2.4</td>
<td>114</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>-551</td>
<td>-2.0</td>
<td>70</td>
<td>0.3</td>
</tr>
<tr>
<td>5</td>
<td>-642</td>
<td>-1.8</td>
<td>54</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>-691</td>
<td>-1.5</td>
<td>66</td>
<td>0.1</td>
</tr>
<tr>
<td>7</td>
<td>-781</td>
<td>-1.4</td>
<td>35</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>-883</td>
<td>-1.2</td>
<td>-61</td>
<td>-0.1</td>
</tr>
<tr>
<td>9</td>
<td>-965</td>
<td>-1.1</td>
<td>-95</td>
<td>-0.1</td>
</tr>
<tr>
<td>10</td>
<td>-1,224</td>
<td>-0.8</td>
<td>-332</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

*This option includes a $420 credit for workers and social security recipients.*
Waxman-Markey Clean Energy Bill

- Broad clean energy bill covering much more than GHG regulations
- GHG reduction targets – 97% of 2005 levels by 2012, 83% by 2020, 58% by 2030, and 17% by 2050.
- Cap and trade applied downstream
- Significant provisions for offsets
- Initially most permits are given away (82.5% in 2016), but more are auctioned in later years (71.7% in 2030)
- There is an income tax credit for low income consumers and a direct payment for the poorest households
Waxman-Markey Clean Energy Bill

• Clean transportation
• Smart grid advancement
• Energy efficiency
  – Building efficiency
  – Lighting and appliance efficiency
  – Transportation efficiency
• Lots of miscellaneous provisions
  – Biodiesel grandfathered
  – Indirect land use in GHG rules postponed 5 years
• Provisions for carbon leakage (export subsidies and import tariffs) if other countries fail to act
Focus on Indiana and the Mid-West

• Economies tend to be more reliant on manufacturing
• Declining population as a share of the national population
• States tend to use more coal in generating electricity
Midwest economy is goods intensive

3. Manufacturing as a percentage of total employment

Manufacturing grows with little or no added labor in the U.S. (and the world for that matter)
The Midwest is no different

Midwest

Note: Midwest comprises IL, IN, IA, MI, MN, OH, and WI. Source: Haver Analytics/BLS/BEA
Fuel Sources for Electric Power in 2005

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Indiana</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>50 %</td>
<td>96 %</td>
</tr>
<tr>
<td>Nuclear</td>
<td>20 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>15 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Petroleum</td>
<td>6 %</td>
<td>0 %</td>
</tr>
<tr>
<td>Renewables</td>
<td>8 %</td>
<td>0.4 %</td>
</tr>
</tbody>
</table>

- Indiana numbers do not include out-of-state generators that serve Indiana customers
  - Cook (nuclear) in Michigan
  - Madison (natural gas) in Ohio
  - Trimble County (coal) in Kentucky
U.S. Total Average Price per kilowatthour is 9.13 Cents
Likely Electricity Price Increase for Indiana

• The cost increase depends on the level of the carbon tax or price of tradable permits
• At $15/ton CO$_2$ price increase likely would be 15-20%.
• Our SUFG analysis of Lieberman-Warner put the permit price at around $30 by 2025, so the price increase was about 40%.
• In 2007, national average electricity price was 9.13 cents, and Indiana was 6.50 cents/KWH.
• Even at the higher end, Indiana price likely would be below national average, but less so than now.
Regional Disparity

• Hasssett et al. (Energy Journal 2009) argue that regional disparity is not as great as one might think because the price effects consist of direct and indirect:
  – The indirect are essentially the same for all regions regardless of coal intensity of electric generation. The range was 0.75 to 0.91% of income.
  – The direct vary between 0.73 and 1.19% of income.

• Electricity price increases vary from 5 to 21% for a $15/ton CO₂ tax assuming all costs are passed on to consumers.
Midwest is major emitter of GHG emissions

8 Midwest States emitted 1.5 billion metric tons of CO₂ equivalent emissions in 2003

– About 25% of U.S. emissions
– About 5% of world emissions

If the Midwest were its own country, then it would be fifth largest emitter in the world.
Three sectors make up 75% of Midwest GHG emissions: electric generation, transportation, industry.
2004 Total CO2 Emissions per GDP
Midwest vs. U.S. (Index)

Index

0.8  1.0  1.2  1.4  1.6  1.8  2.0

Midwest  IL  IN  IA  MI  MN  OH  WI

U.S.=1.00
The 2020 abatement profiles of the MW differs from the national profile particularly in power and agriculture

Abatement potential by industry <$50/ton

%  

100% = 1570 Mtons 440 Mtons

AWF  

Industrial  

Transport  

Power  

EE  

US  

MW

21%  

24%  

16%  

16%  

23%  

38%  

16%  

13%  

12%  

21%  

MW could be a major supplier of domestic offsets, particularly in agriculture

MW has less renewable supply relative to the nation

Source: Team analysis
Thanks very much!

Questions and Comments