Setting a carbon tax trajectory

Adele C. Morris, Ph.D.
Senior Fellow
Policy Director, Climate and Energy Economics Project
The Brookings Institution

New Delhi
March 22, 2017
Carbon tax rates involve many considerations

- **Domestic**
  - Economic/fiscal/environmental/political/sectoral/regional
  - Co-benefits
  - Multiple objectives
  - Short run/longer run

- **International**
  - Achieve Paris NDC and subsequent UNFCCC commitments
  - Policies of neighbors and competitors
  - Other international agreements/tax treaties?
  - Avoid border carbon adjustments?
Carbon tax rate design criteria

- Simple
- Consistent across sources and sectors
- Transparent
- Politically durable
- Environmentally effective
- Enforceable
- Predictable
- Allow for orderly updates
• Need to balance predictability and adaptability.

  » Predictability and credibility
  – Easier adjustment for households and business
  – More efficient turnover of capital (lower costs)
  – Stable/predictable incentives to innovate
  – Easier to project revenue
  – Keep price politically feasible?

  » Adaptability
  – Maybe necessary to achieve specific emissions goal
  – Respond to new information on climate science, economic & emissions outcomes, actions by other countries
  – Adjust in light of new international agreements, new political priorities
Greenhouse Gas Abatement Cost Curve

$/\text{ton CO}_2\ \text{equiv}

Marginal abatement cost

Area under curve = Total cost of abatement

Reductions from Business as Usual
Carbon or GHG Tax: Firms/consumers reduce emissions up to point where it’s cheaper to pay the tax.

$\text{$/ton CO}_2\text{ equiv}$

Marginal abatement cost

Area = total cost of abatement

$P_{\text{tax}}$

Tax revenue (a transfer, not a cost)

(GHG reduction as a result of the tax) Remaining Emissions

Reductions from Business as Usual
Closer to the scale of actual proposals...
In early years, abatement is small relative to remaining emissions.

\[ P_{\text{tax}} \]

- **Total cost of abatement**
- Marginal abatement cost

\[ \text{Remaining Emissions} \]

\[ \text{Tax revenue} \]

\[ \text{Reductions from Business as Usual} \]
Cap-and-trade works much the same way as a tax, except you know the emissions, not the price.
Carbon tax with uncertain abatement costs

Marginal abatement cost?

Emissions uncertainty range

$\text{$/ton C equiv}$

$P_{\text{tax}}$

(GHG reduction as a result of the tax are uncertain)

Remaining Emissions

Tax revenue

Reductions from Business as Usual
Carbon tax adjusted to hit specific emissions goal => uncertain revenue

Remaining Emissions

Tax rate uncertainty range

Tax revenue?

Reductions from Business as Usual

(P \text{\_tax})

\$/\text{ton C equiv}

(GHG reduction as a result of the tax)
Considerations

• Some sectors will decarbonize much more slowly than others.

• Tax rate must rise in real terms to maintain abatement while economy grows.

• Investment occurs at expected prices, not statutory prices.
  • Tax rate that is “too high” will result in less abatement.
  • Tax rate that rises credibly and predictably will produce higher expected prices and greater abatement.

• Political and economic durability are key to strong market signals.
Trajectory options include:

- Start at an ambitious price and grow slowly in real terms
  - If credible, incentivizes abatement more quickly; prevents investment in higher-carbon capital.
  - Pattern of SCC trajectories
How the US Government Monetizes the Benefits of GHG Mitigation

• Interagency Social Cost of Carbon Report
  » Applies to regulations of all kinds, from all federal agencies
  » Criticized for many good reasons. It’s a hard problem.
  » Debate on whether to use domestic or global benefits

Revised Social Cost of CO₂, 2010 – 2050 (in 2007 dollars per metric ton of CO₂)

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>5.0%</th>
<th>3.0%</th>
<th>2.5%</th>
<th>3.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Avg</td>
<td>Avg</td>
<td>Avg</td>
<td>95th</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
<td>33</td>
<td>52</td>
<td>90</td>
</tr>
<tr>
<td>2015</td>
<td>12</td>
<td>38</td>
<td>58</td>
<td>109</td>
</tr>
<tr>
<td>2020</td>
<td>12</td>
<td>43</td>
<td>65</td>
<td>129</td>
</tr>
<tr>
<td>2025</td>
<td>14</td>
<td>48</td>
<td>70</td>
<td>144</td>
</tr>
<tr>
<td>2030</td>
<td>16</td>
<td>52</td>
<td>76</td>
<td>159</td>
</tr>
<tr>
<td>2035</td>
<td>19</td>
<td>57</td>
<td>81</td>
<td>176</td>
</tr>
<tr>
<td>2040</td>
<td>21</td>
<td>62</td>
<td>87</td>
<td>192</td>
</tr>
<tr>
<td>2045</td>
<td>24</td>
<td>66</td>
<td>92</td>
<td>206</td>
</tr>
<tr>
<td>2050</td>
<td>27</td>
<td>71</td>
<td>98</td>
<td>221</td>
</tr>
</tbody>
</table>

Trajectory options, continued:

• Start modestly and grow more quickly
  » Allows more gradual adjustments and strands less capital.
  » Relies on expectations and future policy to abate more ambitiously

• Different trajectories have different revenue profiles.

• Modeling can help...
Trajectory options, continued:

• Adopt a price path consistent with global cost-minimizing achievement of 2\(^o\) C (or below) = deep decarbonization

• Long term price paths very uncertain – depend on technology and economic growth a long time from now
  » Also depend on assumptions about when and which countries adopt carbon price, which gases and sources are covered, and availability of key technologies.

• Nearer term:
Gross vs. net revenue, “Neutrality”

- Carbon tax can lower revenue from other taxes
- Carbon tax can raise government costs
- In U.S. : Net revenue ≈ 75% gross revenue
- Revenue neutrality ≠ Budget neutrality
  » Some goals for revenue may best be achieved by spending rather than tax cuts.
  » E.g., rebates to poor households; assistance for coal workers and communities
Note on price-based agreements

• More transparent and comparable level of efforts (on the margin)

• Straightforward compliance

• Agreement speaks directly to leakage and competitiveness concerns

• Don’t guarantee cumulative emissions outcomes – needs to be updated
Conclusion

- Any positive carbon price is infinitely more than 0.
- Get started as soon as possible.
- Credible price path strengthens expectations and market signal, all else equal.
- Plan on increasing the tax rate over time.
- Balance predictability, adaptability, and other design principles.
- Cooperate internationally.
Options for further reading:

11 essential questions for designing a policy to price carbon

Adele Morris

Friday, July 8, 2016

https://www.brookings.edu/research/11-essential-questions-for-designing-a-policy-to-price-carbon/
HOW TO USE CARBON TAX REVENUES

Donald B. Marron and Adele C. Morris
February 2016

https://www.brookings.edu/research/how-to-use-carbon-tax-revenues/

ABSTRACT

How should governments use the considerable revenue carbon taxes can raise? There are many options for cutting other taxes, increasing spending, or reducing borrowing. We organize the options into four goals: offset the new burdens that a carbon tax places on consumers, producers, communities, and the broader economy; support further efforts to reduce greenhouse gas emissions; ameliorate the harms of climate disruption; and fund unrelated public priorities. We identify important tradeoffs across the goals and make several recommendations for policy design. Revenue neutrality, for example, can assuage public concerns about expanding government, but spending may be better than tax reductions for achieving some goals. We recommend that governments use some revenue to reduce other taxes and to soften the blow to lower-income households, coal workers, and their communities, that they be cautious about using revenues to pursue emissions reductions the tax itself encourages, and that they avoid tight earmarks. Governments should also pay special attention to using revenue in ways that attract and sustain stakeholder and public support for a carbon tax.

Donald Marron is director of economic policy initiatives and an Institute fellow at the Urban Institute; Adele Morris is a fellow at the Urban Institute.
Book

http://www.amazon.com/Implementing-Carbon-Tax-Explorations-Environmental/dp/1138825360/ref=sr_1_1?ie=UTF8&qid=1423668157&sr=8-1&keywords=morris+parry+williams

Book launch was April 22, 2015 at AEI
Policy Brief

A CARBON TAX IN BROADER U.S. FISCAL REFORM: DESIGN AND DISTRIBUTIONAL ISSUES

by

Adele C. Morris
The Brookings Institution

Aparna Mathur
American Enterprise Institute

May 2014

Five carbon tax swap studies: NTJ, March 2015

- **CARBON TAXES AND U.S. FISCAL REFORM**, Warwick J. McKibbin, Adele C. Morris, Peter J. Wilcoxen, and Yiyong Cai

- **CARBON TAXES AND FISCAL REFORM IN THE UNITED STATES**, Dale W. Jorgenson, Richard J. Goettle, Mun S. Ho, and Peter J. Wilcoxen

- **ENVIRONMENTAL POLICY FOR FISCAL REFORM: CAN A CARBON TAX PLAY A ROLE?** Sugandha D. Tuladhar, W. David Montgomery, and Noah Kaufman

- **CARBON TAXES, DEFICITS, AND ENERGY POLICY INTERACTIONS**, Sebastian Rausch and John Reilly

- **THE INITIAL INCIDENCE OF A CARBON TAX ACROSS INCOME GROUPS**, Roberton C. Williams III, Hal Gordon, Dallas Burtraw, Jared C. Carbone, and Richard D. Morgenstern
Proposal for international carbon pricing consultations

In 2013, the UNFCCC set a path toward a new agreement for the post-2020 period. This year, negotiations have aimed to solidify that agreement and will culminate in Paris at the COP21 December meetings. So far, climate talks have tackled national emissions targets, global temperature targets, technology transfer, assistance to poor countries for adaptation and mitigation (a.k.a. “finance”), clean energy cooperation, forest preservation, compensation for countries affected economically by mitigation measures, and many other topics. In comparison to those issues, there has been little discussion of the most cost-effective means to reduce emissions: reducing fossil fuel subsidies and pricing greenhouse gas emissions.

Christine Lagarde, managing director of the IMF, and World Bank Group President Jim Yong Kim recently announced the formation of a “carbon pricing panel” consisting of an alliance of national, state, and local policymakers. This is an important move and should promote carbon pricing as a focus of the post-COP21 negotiations.

The prospect of a new long-term agreement and new venues for climate talks could open an important opportunity for carbon pricing consultations (CPC). Although carbon pricing should eventually be included directly in the UNFCCC process, a smaller-scale carbon pricing dialogue could be undertaken now outside UNFCCC. The goal would be to gather the economic ministries of the largest emitters to discuss the use of carbon pricing to reduce emissions cost-effectively, manage impacts on trade and competitiveness, and foster mutual confidence in the economic ambition of climate commitments.

A carbon price, arising from a cap-and-trade market, a carbon tax, or a “hybrid” policy creates broad, efficient incentives to reduce greenhouse gas emissions. Done well, these policies can gradually shift consumer demand, production methods, new investment, and technology development toward less emissions-intensive goods and services without unduly burdening poor households. A carbon tax or permit program can be designed to remove wedges in prices, support energy efficiency, and provide revenues that support environmental and social objectives.