Modeling the Economic Impacts of State Climate Policies

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Public Meeting to Update the Board on Assembly Bill 32 Economic Analyses
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California is the Front-Runner, But Not Alone

- Center for Climate Strategies (CCS) has facilitated the development of climate action plans through a fact-finding and consensus building process for over 16 US states
  - Stakeholders include utility representatives, regulators, environmental reps, legislators, consumer protection advocates, manufacturing and agricultural lobbyists
- Policy recommendations represent negotiated, consensual policies of what is desirable and achievable
CCS Macroeconomic Modeling

- Macro-economic analyses in four diverse states: Florida, Michigan, Pennsylvania and Wisconsin
  - Research team includes Adam Rose and Dan Wei from USC, Steve Miller from Michigan State (WI and MI reports)
- Economy-wide climate action plans modeled (except WI)
  - Transportation and Land Use
  - Agriculture, Forestry and Waste
  - Energy Supply
  - Residential, Commercial, Industrial (typically demand side management)
- Local stakeholder knowledge on program design and implementation
  - Data is mix of policies, price mechanisms, and codes and standards
Example: Climate Action Plan for Michigan

- Estimate approximately 27% of business as usual emissions can be mitigated at negative cost

Mapping Microeconomic Data onto REMI Model

- Desktop energy and climate results inputted into Regional Economic Models, Inc (REMI) model
  - Structural economic forecasting and policy analysis model:
    - integrates input-output (I-O), CGE, econometric & economic geography methods
    - dynamic, with forecasts & simulations generated on annual basis
    - behavioral responses to wage, price, and other economic factors
  - Five major blocks:
    1) Output and Demand
    2) Labor and Capital Demand
    3) Population and Labor Supply
    4) Wages, Prices and Costs
    5) Market Shares
  - 169 sectors
State Results

<table>
<thead>
<tr>
<th>State</th>
<th>Date of Report</th>
<th>Target Year</th>
<th>% MTCO2e Reduction</th>
<th>GDP Impact % of BAU</th>
<th>Employment Impact % of BAU</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>Jan-10</td>
<td>2020</td>
<td>44% below 2025 BAU</td>
<td>2.3</td>
<td>2.7</td>
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<tr>
<td>FL</td>
<td>May-09</td>
<td>2025</td>
<td>33% below 1990</td>
<td>0.87</td>
<td>1.13</td>
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<tr>
<td>PA</td>
<td>Dec-09</td>
<td>2020</td>
<td>39% below 2000</td>
<td>0.48</td>
<td>0.71</td>
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<tr>
<td>WI</td>
<td>Feb-10</td>
<td>2025</td>
<td>22% below 2005</td>
<td>0.62</td>
<td>0.56</td>
</tr>
<tr>
<td>CA</td>
<td>Mar-10</td>
<td>2020</td>
<td>15% below 2020 BAU</td>
<td>-0.2</td>
<td>0.1</td>
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</tbody>
</table>

- Compared to other state estimates, ARB results seem conservative
- CCS modeling indicates that climate policies are likely to lead to improved economic outcomes, rather than slightly negative results
California Modeling Methodology

- Energy modeling results linked to CGE model
  - Similar to CCS’ approach
- **Strengths**
  - Better representative of real world
    - Rich sectoral detail to simulate California labor and investment components
      - Target spending changes in specific industries
  - Moves beyond market failure debate
    - Jurisdictions deploying demand side management on a massive scale
      - In many cases greatly reducing or eliminating new demand growth
    - DSM should be considered “core” policy rather than complementary policy
California Approach con’t

• Concerns about methodology
  • Model / assumptions might be overstating compliance costs in sensitivity cases
  • Forces Energy 2020 to find GHG reductions endogenously to compensate for sensitivity cases (2-5) limitations on GHG mitigation supplies
    • Energy 2020 model is complex and assumes prices have to rise considerably to induce behavioral change
    • Assumes no new GHG reductions from renewables in power sector aside from 33% RPS
      • “Sticky” coal-gas fuel switching might require artificially high CO2 price
    • So, model forces CO2 reductions from end user efficiency and fuel switching at high cost
    • But, model’s built environment shows limited to no device efficiency improvements through 2020 (Appendix G)
Specific questions / comments about California approach

- CCS models increase in private sector credit intermediation from new clean energy capital investments
  - ARB table 27 (p. 57) indicates limited involvement of finance and insurance sectors
- Readers would benefit from data on disaggregated sectoral impacts
  - Including industries and government
Summary

- ARB model selection and methodology best captures the complexities of reality
- ARB estimates of the costs reducing GHGs in California are potentially overstated
  - Modeling in other states indicates net economic gains for similar or greater relative GHG reductions
  - Energy 2020 model design and assumptions might be interacting to increase CO2 prices and compliance costs
Thank you

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