The Economic Effect of Greenhouse Policies in New Zealand

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Outline

• Introduction
• Economic context for contemplating Kyoto
• Preferred Policy Package
• Model
• Experiments
• Results and conclusions
Introduction

• Preferred Policy Package – April 2002
  – Pre-cursor to introduction of policy legislation and consultation process
• Ratify at or before Rio+10
  – Consultation in 2001; legislation to ratify pending
• Two camps throughout public debate:
  a) Easy, no or low cost due largely to forest sinks, simply the right thing to do
  b) NZ is energy and emission intensive; leakage and impacts on competitiveness
New Zealand’s Influence?
NZ’s Economic Performance

• Real per capita GDP
  – OECD average grown by 145% since 1960
  – NZ grown by 65% since 1960

• Real per capita GDP in NZ about 6% higher than OECD in 1960; today it is about 30% lower

• Poor performance now acknowledged as a problem
GDP Growth

Index, 1970=100

- New Zealand
- OECD
- Australia
- United States
- United Kingdom

Structure and Export Composition

• Cause of poor growth performance?
• 1970-1999
  – Real value of NZ’s exports increased by an average of 3.6% p.a. (1990 US dollars)
  – World imports increased by 6%
• NZ stuck in the slow-growing sectors?
  – Agricultural and related sectors (dairy, meat, hort, etc.) more than 35% merchandise exports
• Imports 28% of GDP; exports 29%. Equivalent figures for US are 12% and 11%
Sectoral GDP and Export Shares

- Agriculture
- Other Primary
- Food, etc, Mfg
- Non-food Mfg
- Elec., Gas & Water
- Services
- Trade
- Accom. & Restaurants
- Transport & Storage

GDP
Exports
Energy and GHG Emissions

- Relatively inexpensive energy a source of comparative advantage
- Electricity
  - 80%+ hydro but few options for new capacity
  - Gas and coal but reliant on new gas discoveries
  - Renewables
- Transport fuel use (and emissions)
  - Increasing rapidly
  - Small population but sparsely populated
  - Dairy and forestry growth – transport intensive
Energy and GHG Emissions, contd.

- Agriculture accounts for 55% GHG emissions
  - Dairy v. sheep
- Fuel combustion and industrial processes account for 41% GHG emissions
- Energy intensive industry
  - Dairy processing (SI – high growth; coal only)
  - Wood processing
  - Petrochemicals
  - Steel, cement, aluminium
Value of Energy Input per $ of GDP

1998 dollars

Japan, EU, OECD Pacific, OECD Europe, UK, OECD, Australia, US, NZ, Canada

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Preferred Policy Package

• Overall goal is to set NZ towards a downward path for gross emissions by 2012
• Key points:
  – Build on foundation policies
  – “Projects” (incentivised investments)
  – NGAs for CaR industries
  – Carbon tax capped at NZ$25/tonne CO$_2$-equiv. (about US$12 at current exrate)
  – Revenue to be recycled
  – Govt retains all sink credits and liabilities
  – Agriculture exempt (methane and nitrous oxide)
# GHG Emissions, 2008-12

<table>
<thead>
<tr>
<th></th>
<th>Mt CO₂</th>
<th>Ave. p.a.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected emissions, BAU</td>
<td>440</td>
<td>88</td>
</tr>
<tr>
<td>Assigned amount (1990)</td>
<td>365</td>
<td>73</td>
</tr>
<tr>
<td>Excess to be covered</td>
<td>-75</td>
<td>-15</td>
</tr>
<tr>
<td>Existing policies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEECS</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Waste strategy</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Amount left to be covered</td>
<td>-50</td>
<td>-10</td>
</tr>
<tr>
<td>Sinks generated</td>
<td>105</td>
<td>21</td>
</tr>
<tr>
<td>Est. net positive position</td>
<td>55</td>
<td>11</td>
</tr>
</tbody>
</table>
Model

- SOE static CGE
- Nested CES production with emission rights purchased as an input along with energy
  - GTAP-EG; Rutherford and Paltsev, 2001
  - GTAP-E; Burniaux and Truong, 2002
- 29 industries; 34 commodities; 1 h/h; 1 govt agent; r.o.w.
- SAM based on Stats NZ 1996 inter-industry study (August 2001)
- Generate a 2010 solution and recalibrate
Experiments

• NZ$25/tonne CO$_2$ with agriculture exempt and NGAs for CaR sectors (exemptions)
• CF1-CF3 with viable world permit market; CF4-CF6 without.
  – CF1: Agriculture exempt (dairy, sheep, mixed)
  – CF2: Agriculture, cement, steel, and aluminium exempt
  – CF3: Agriculture, cement, steel, aluminium, dairy processing, and wood processing exempt
  – CF4-CF6: Same as CF1-CF3 except no sale of surplus emission units.
### Macroeconomic Results

<table>
<thead>
<tr>
<th></th>
<th>CF1</th>
<th>CF2</th>
<th>CF3</th>
<th>CF4</th>
<th>CF5</th>
<th>CF6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equivalent variation</td>
<td>-0.08</td>
<td>-0.11</td>
<td>-0.12</td>
<td>-0.88</td>
<td>-0.90</td>
<td>-0.93</td>
</tr>
<tr>
<td>Real GDP</td>
<td>-0.27</td>
<td>-0.29</td>
<td>-0.29</td>
<td>-0.31</td>
<td>-0.33</td>
<td>-0.33</td>
</tr>
<tr>
<td>Real exchange rate</td>
<td>-0.10</td>
<td>-0.22</td>
<td>-0.27</td>
<td>0.18</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>Real output</td>
<td>-0.59</td>
<td>-0.64</td>
<td>-0.61</td>
<td>-0.47</td>
<td>-0.52</td>
<td>-0.49</td>
</tr>
<tr>
<td>Real exports</td>
<td>-2.16</td>
<td>-2.19</td>
<td>-2.23</td>
<td>-0.50</td>
<td>-0.54</td>
<td>-0.57</td>
</tr>
<tr>
<td>Real imports (net of tariffs)</td>
<td>-0.19</td>
<td>-0.24</td>
<td>-0.26</td>
<td>-0.54</td>
<td>-0.58</td>
<td>-0.60</td>
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<tr>
<td>Real intermediate consumption</td>
<td>-0.72</td>
<td>-0.79</td>
<td>-0.73</td>
<td>-0.52</td>
<td>-0.58</td>
<td>-0.53</td>
</tr>
<tr>
<td>Real household consumption</td>
<td>-0.36</td>
<td>-0.39</td>
<td>-0.41</td>
<td>-1.16</td>
<td>-1.18</td>
<td>-1.21</td>
</tr>
<tr>
<td>Real fixed capital formation</td>
<td>1.64</td>
<td>1.62</td>
<td>1.66</td>
<td>0.90</td>
<td>0.88</td>
<td>0.92</td>
</tr>
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</table>

Source: NZIER
Conclusions

- GDP declines about 0.3%
  - 15% of NZ’s long term growth rate
- EV declines
  - ~0.1% in CF1-CF3 and ~0.9% in CF4-CF5
- Gross emissions decline about 0.5%
  - Insufficient to meet policy objective
- Significant sectoral adjustment (Tables 4&5)
  - Gross output changes of about –20% to +4%
- There remains lots of work to do!
New Zealand’s GDP Growth Rate

Actual, annual average

Forecast