

Carbon Taxes

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Outline

1. Understanding the economic response to carbon taxes
2. Why economists like carbon taxes
3. Stringency

1. Understanding economic response to carbon taxation

Response to a Carbon Tax

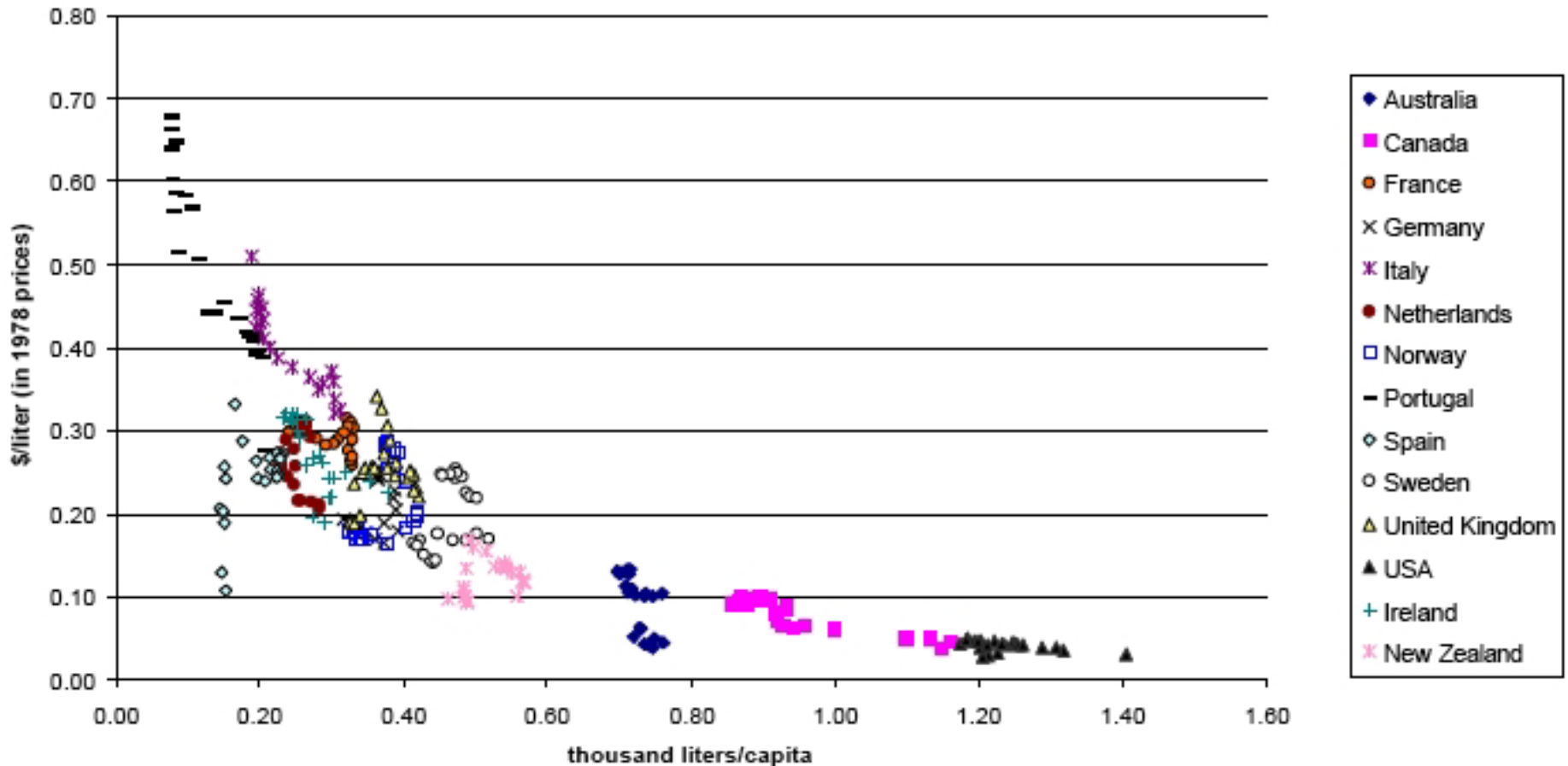
- “I’m not going to stop driving...”
- Response increases over time:
 - Small immediate behaviour change (when technology/capital is inflexible)
 - Larger change when capital is flexible
 - Larger change when firms have time to develop new technologies
- Overall long-term response to a price change is larger than most people imagine

Personal Transportation Elasticities

- Personal transportation generally considered least price responsive sector
- Price elasticity is percent change in demand associated with a 1 percent increase in price
- Short run gasoline price elasticity:
 - 350+ international studies surveyed: $\sigma = -0.25$
- Long-run gasoline price elasticity:
 - 200+ international studies surveyed: $\sigma = -0.77$
 - Recent Canadian data: $\sigma = -0.9$

Source: Graham, D. and Glaister, S. 2005
“Decomposing the determinants of road traffic
Demand”. *Applied Economics*.
Yatchew, A. and No. J. 2001. “Household gasoline
Demand in Canada” *Econometrica*.

Cross-country Gasoline Demand



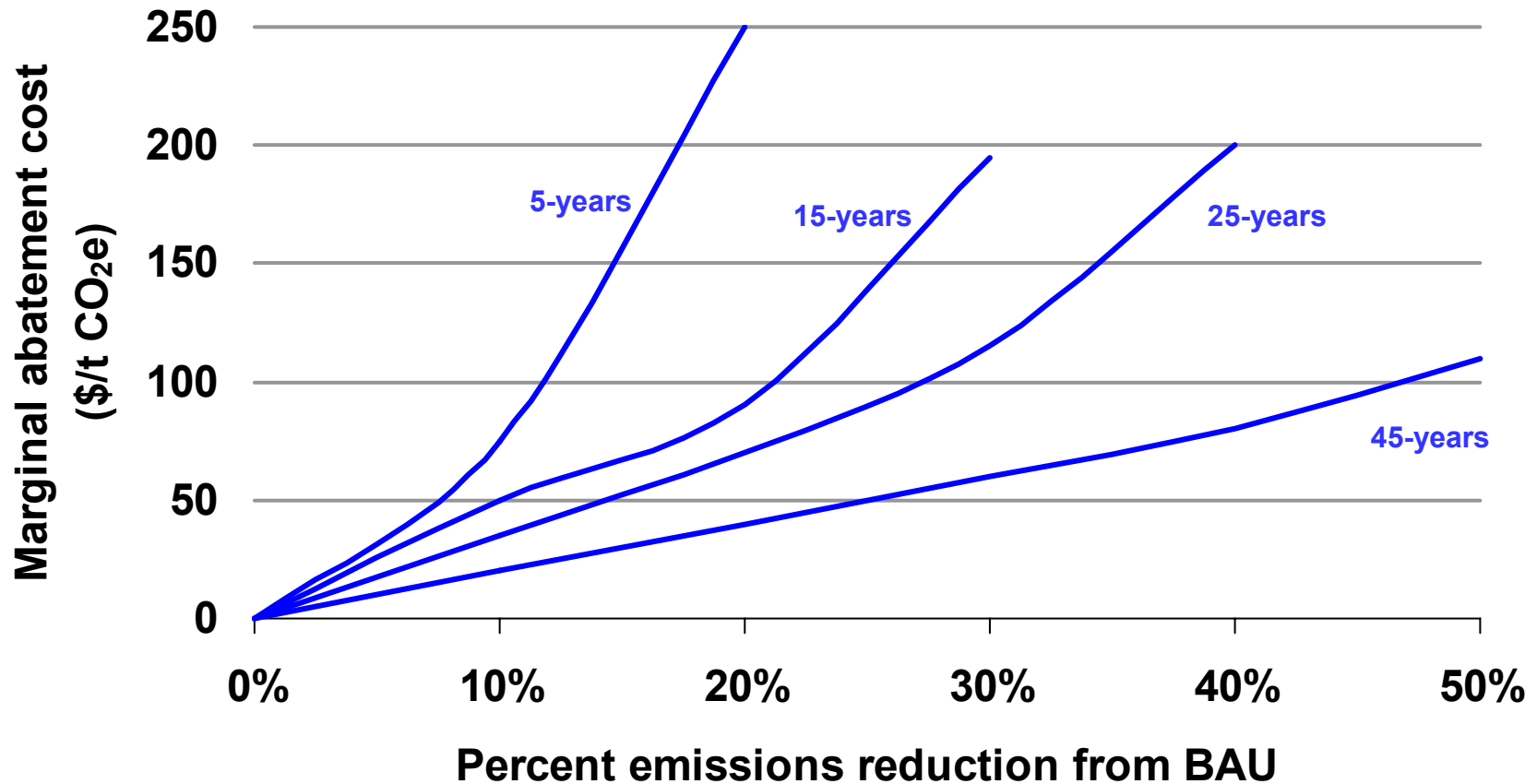
Source: Hammar, H., Lofgren, A., Sterner, T.2004
 "Political Economy Obstacles to Fuel Taxation"
The Energy Journal.

Note: This study implies a long-run price elasticity of -1

Interpretation of Elasticities

- BCs \$30/t CO₂ tax will increase the price of gasoline by about 5 percent
 - Short run response: 1-2 percent reduction in gasoline demand
 - Long run response: 4-5 percent reduction in gasoline demand
- Other sectors are likely to be more price responsive than transportation

Modeled Response to Carbon Taxes



Note: Study conducted using CIMS model applied nationally.

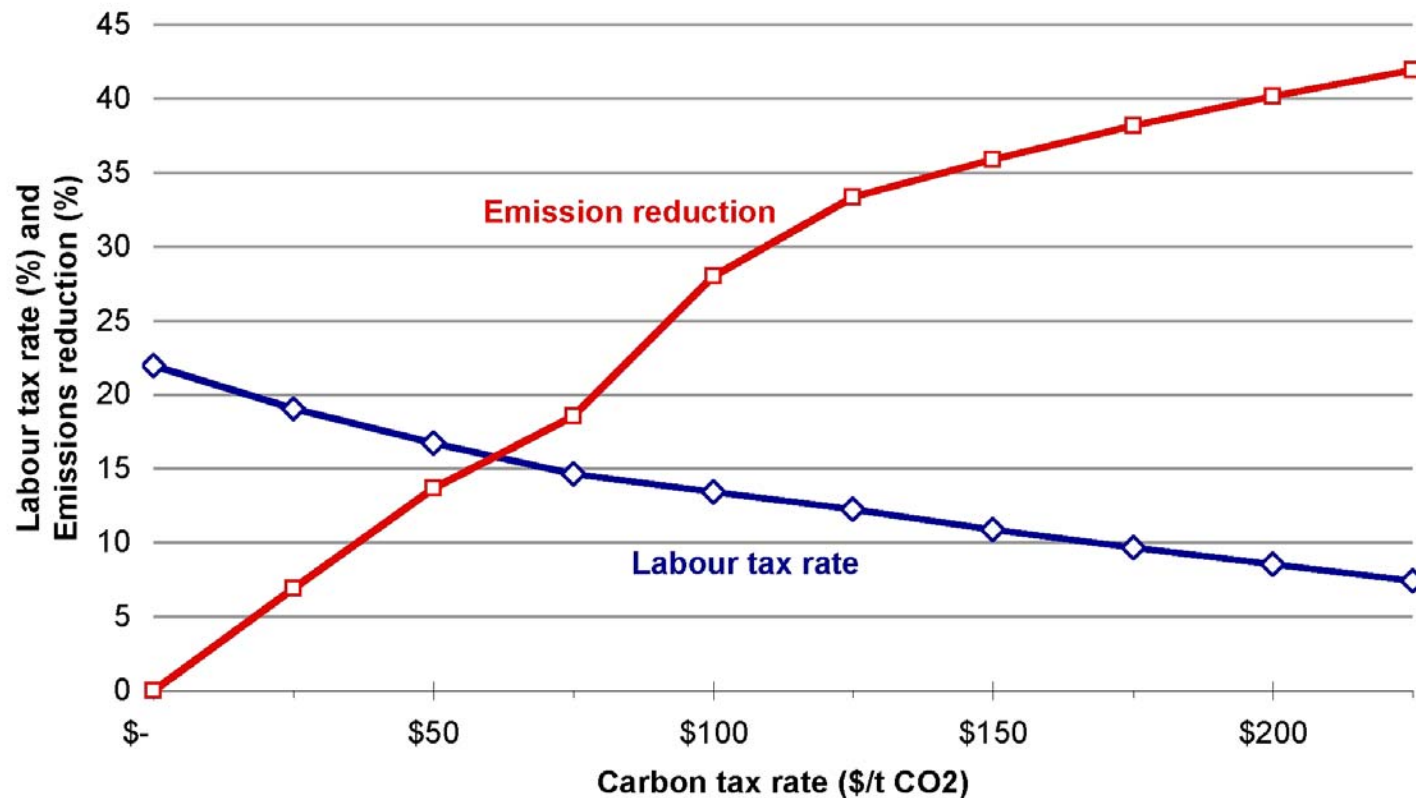
Source: Murphy, R., et al., 2006, NRCan.

2. Why economists like carbon taxes

Attributes of carbon taxes

- Flexible and efficient
 - Firms and individuals can choose between continuing current behaviour (while paying the tax) vs. reducing emissions
- Low administrative burden
 - Current tax collection structure can be used
- Effective
 - Induce reductions in carbon emissions
- Raises revenue
 - Can be used to reduce other taxes which hinder economic growth
- **Using carbon taxes to reduce emissions will cost less than using other policies**

Analysis of Canadian carbon tax



*Note: Study conducted using GEEM model applied nationally;
Assumes all carbon tax revenue is recycled to reduce personal income tax.
Results are for year 2020.*

Source: Rivers, N. and Sawyer, D. 2008.
"Carbon-centred tax reform in Canada".
Report prepared for David Suzuki
Foundation.

3. Stringency

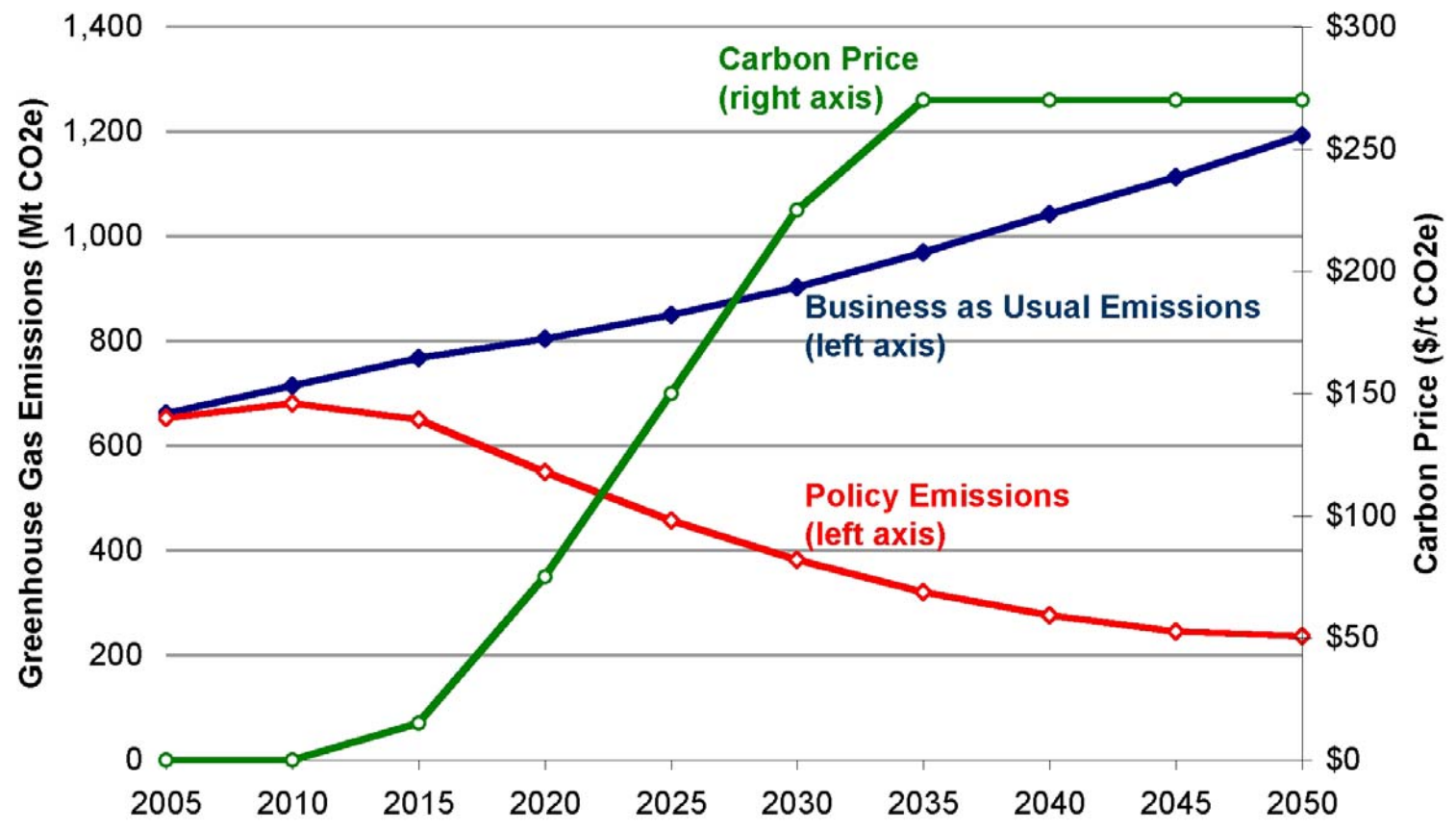
Large reduction in GHG emissions desired

- International community is focused on capping emissions at 450-550 ppmv CO₂
 - Entails 60-90% reduction in GHG emissions from current levels by developed countries by 2050
- Current federal target: 65% reduction from current levels by 2050
- Current British Columbia target: 80% reduction from current levels by 2050

Stringent policies are required

- Various models (MIT-EPPA, CIMS) estimate that a tax would have to reach \$200 to \$300/t CO₂ to reduce emissions by 60-80% from current levels by 2050
- BC's carbon tax is an excellent start, but well below stringency required for deep reductions
- Delay in implementing policy implies that larger policies will be required in the future, or that goals will not be met

Modeling policy stringency



Note: Study conducted using CIMS applied nationally. Agricultural and waste emissions are excluded.

Source: Bataille, C., Rivers, N., Peters, J. 2007. "Pathways for deep GHG emissions reductions". Report for NRTEE.