

**“International Trade in Carbon-Based Products:  
What are the Rules and Consequences?”**

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# Climate Change

- **Widely accepted climate change is occurring, is largely irreversible, and CO<sub>2</sub> emissions are connected to human activity (NRC, 2010)**
- **CO<sub>2</sub> concentrations have increased from pre-industrial levels of 280 ppm to 400 ppm (IPCC, 2014)**
- **In absence of mitigation, mean projected global warming will reach 3 to 4<sup>0</sup>C by 2100 (IPCC, 2014)**
- **Risks associated with climate change include changes in precipitation, sea-levels, and ocean circulation (Farid *et al.*, 2016)**

# Climate Change

- **Climate change is “...greatest and widest-ranging market failure ever seen...” Stern Report (2006)**
- **Despite logic of multilateralism (Paris Agreement), climate policy increasingly common at regional (EU), national (Australia), and sub-national (California) levels**
- **Necessarily “second-best” – problem of free-riding by those not in coalition**
- **Irrespective of policy-choice (tax vs. cap-and-trade), proposed unilateral climate legislation often includes border carbon measures**

# Why Border Carbon Measures?

- **Industries accounting for large proportion of GHG emissions will face increased costs**
- **Typically, legislation targets border measures at carbon-intensive imports – predicated on two concerns about unilateral climate policy:**
  - *Carbon leakage*
  - *Competitiveness*
- **SB 775 (California) - importers required to purchase permits for CO<sub>2</sub> emissions, exporters exempt (Fowlie, 2017)**

# Economics of Border Carbon Measures

- **Interdependence of leakage and competitiveness not a new idea – restatement of “pollution-haven” hypothesis (Copeland and Taylor, 2004)**
- **Policy options analyzed extensively:**
  - ***Environmental economists:* solve collective action problem via manipulation of terms of trade (Hoel, 1996; Böhringer *et al.*, 2014 )**
  - ***Trade economists:* restoring competitiveness vs. meeting WTO commitments (Bagwell and Staiger, 2001)**

# WTO Rules on Border Carbon Measures

- From standpoint of WTO, choice of border carbon measure will be critical – even if they have similar effects (Pauwelyn, 2013)
- *Import bans* – would violate GATT Article XI
- *Punitive tariffs* – would violate GATT Article II
- *Anti-dumping duties* – cannot include cost of carbon in importing country
- *Countervailing duties* – failure to price carbon would not constitute an export subsidy
- Main challenge: to convince WTO that a border measure is an extension of domestic climate policy

# Border Tax Adjustments (BTAs) and WTO

- Are BTAs trade-distorting?
- Imposition of domestic tax on “like” imported goods – allowed under GATT Article II: 2(a) if BTA is equivalent to internal tax
- Position of GATT/WTO established following implementation of VAT by EU, and based on economics of move to *destination-based* tax system
- Non-distorting due to price/wage/exchange rate adjustments (Lockwood *et al.*, 1994)
- BTAs should be *neutral* in terms of trade effects (WTO, 1997) – what does neutrality mean?

## **WTO/Climate Policy/BTAs**

- **BTAs come under GATT Article III: 2 – key issue is whether they are allowable on final goods that embody carbon or use carbon-intensive inputs**
- **Considerable legal analysis of how WTO Panel might rule (Goh, 2004; Pauwelyn, 2013)**
- **May be consistent with GATT Article III: 2 – *Superfund* case (GATT, 1987) cited in support**
- **Could justify under GATT Article XX – i.e., has necessary environmental objective, and is not discriminatory/trade-distorting**

## Case-Study: U.S. Aluminum Industry

- Energy-intensive industries such as steel, aluminum, chemicals, paper and cement most likely to be affected by unilateral climate policy (Houser *et al.*, 2008)
- If market structure matters in these sectors, issues of carbon leakage and competitiveness best analyzed in tradition of, *inter alia*, Conrad (1993) and Barrett (1994)
- Trace out potential effects of US and Québec climate policies in U.S. aluminum industry where BTAs are assumed WTO-legal

# Aluminum Production

- **Primary aluminum produced in vertical process initially requiring bauxite and alumina**
- **Aluminum extracted from alumina by electrolytic reduction method using carbon anodes**
- **Production process energy-intensive, energy accounting for 25% of production costs (USITC, 2010)**
- **Two key sources of GHG emissions (Carbon Trust, 2011):**
  - **Production process (2-3 tCO<sub>2</sub>/t of aluminum)**
  - **Upstream electricity generation (3-20 tCO<sub>2</sub>/t aluminum)**

# Aluminum Industry: Market Structure

**Table 1: Market Structure of North American Aluminum Industry**

<b>U.S. Producers</b>	<b>Market Share (%)</b>	<b>Canadian Producers</b>	<b>Market Share (%)</b>
<b>Alcoa</b>	<b>50.8</b>	<b>Rio Tinto Alcan</b>	<b>51</b>
<b>Century Aluminum</b>	<b>21.2</b>	<b>Alcoa</b>	<b>31</b>
<b>Rio Tinto Alcan</b>	<b>5.3</b>	<b>Alouette</b>	<b>18</b>
<b>Columbia Falls Aluminum</b>	<b>5.0</b>		
<b>Other</b>	<b>17.7</b>		
<b>1/H</b>	<b>2.94</b>		<b>2.57</b>

Source: Sheldon and McCorriston (2016)

# North American Aluminum Industry

- Reasonable to treat U.S. and Canada as segmented markets where Canadian producers compete in US
- 50% of U.S. consumption via imports predominantly from Canada, and U.S. is most important export market for Canada
- Key difference between U.S. and Canadian aluminum production is that latter exclusively sources hydro-electric power
- Estimated GHG emissions: 2.5 tCO<sub>2</sub>/t of aluminum in Canada (CIEEDAC, 2013) compared to 7.4 tCO<sub>2</sub>/t of aluminum in U.S. (Carbon Trust, 2011)

# Simulation Results

**Table 2: Welfare Effects of U.S. and Québec Carbon Policies (\$ billion)**

Variable	Pre-policy	U.S. carbon tax	Volume BTA	Share BTA
Producer profits	2.29	1.96	2.03	2.18
User surplus	11.72	11.15	10.92	10.40
Tax revenue	0.00	0.46	0.74	1.30
Social cost	0.52	0.49	0.49	0.50
Social welfare	13.49	13.08	13.20	13.40
Deadweight loss	-	-0.11	-0.06	-0.02
Effective carbon price (\$/tCO <sub>2</sub> )	-	282, 84	282, 84	282, 84
BTA (\$/t)	-	-	141	469
Market share (%)	57	55	56	58
Emissions (CO <sub>2</sub> t - millions)	24.67	23.31	23.41	23.64
Leakage	-	0.12	0.00	-0.78

Source: Sheldon and McCorriston (2016)

## Case Study - Conclusion

- **Once market structure is allowed for in aluminum production, competitiveness can be defined in terms of profit-shifting**
- **Extent of both leakage and reduction in competitiveness dependent on interaction between U.S. and Canadian producers**
- **WTO-legal application of BTAs needs to account for way in which firms respond to changes in costs**
- **Deadweight losses due to second-best structure of problem**

# **BTAs: Federal vs. State Regulation**

- **Debate over state-level BTAs being subject to federal legal challenge**
- **(Not) facially discriminatory under dormant Commerce Clause, and will (not) satisfy complementary tax doctrine (Ferrey, 2008 vs. Shanske, 2014; Gamage and Shanske, 2017)**
- **BTAs could also run up against dormant Foreign Commerce clause (Gamage and Shanske, 2017)**
- **However, in absence of WTO ruling on BTAs, not obvious there would be any federal ruling**

# **Current Status of U.S. Climate Policy**

- Federal climate policy unlikely to be enacted anytime soon, and U.S. backing away from international commitments to reduce emissions**
- Imposition of BTAs on U.S., given its withdrawal from Paris Agreement, may provoke retaliatory tariff response by U.S.**
- U.S. may be able to negatively influence China's terms of trade (Böhringer and Rutherford, 2017)**
- Plays into President Trump's view of China competing unfairly with the U.S.**