

# **“Climate Policy and Border Tax Adjustments: What’s New?”**

**Ian Sheldon  
(Ohio State University)**

**Drawing on:**

**(1) S. McCorriston and I.M. Sheldon, “Market Access and WTO Border Tax Adjustments for Environmental Excise Taxes under Imperfect Competition”, *Journal of Public Economic Theory*, 7 (September) 2005a.**

**(2) S. McCorriston and I.M. Sheldon, “Export Competition and the Remission of Domestic Environmental Taxes”, *International Tax and Public Finance*, 12 (September) 2005b.**

**(3) I.M. Sheldon, “Trade and Environmental Policy: A Race to the Bottom?” *Journal of Agricultural Economics*, 57 (September) 2006.**

**(4) I.M. Sheldon, “Climate Policy and Border Tax Adjustments: What’s New?” Innovation Seminar Series and Johnson-Shoyoma Public Lecture, University of Saskatchewan, Canada, March 2009.**

**Seminar, Tecnológico de Monterrey, Campus Guadalajara  
Guadalajara, Mexico, August 27, 2009**



# **Climate Policy and Trade Policy**

- **Clear connection being made between climate policy and trade policy, e.g., US Congress – Lieberman-Warner (2007), and Waxman-Markey Bills (2009); EU Commission Directive (2008)**
- **Domestic climate policies should be accompanied by appropriate border measures applied to carbon-intensive imports**
- **Objective is to address issues of “carbon leakage” and “competitiveness”**
- **Is this just “old wine in new green bottles”? (Lockwood and Whalley, 2008)**

# **Plan of Presentation**

- **Overall focus: economics of border adjustments for domestic climate policies:**
  - **Connection between trade and environment**
  - **Economics of WTO and environmental regulation**
  - **WTO law and border tax adjustments**
  - **Optimal border tax adjustments**
  - **Implementation issues for climate policies**
- **Key conclusion: economic and regulatory principles not new, but climate policies will create additional complexity for border adjustments**

# Trade and Environment

- Starting in early-1990s, connection between trade and environmental policy subject to heated debate:
  - 1991 GATT ruling in US-Mexico *tuna-dolphin* dispute
  - Negotiations over NAFTA
  - Larry Summers' 1991 statement while at World Bank
- Two questions arise from debate:
  - What is connection between trade and environment?
  - What is controversy?

# Trade and Environment

- **Factors linking trade and environment (Ulph, 1997):**
  - If trade affects economic activity, and latter generates *local* public bads – then by extension trade affects environment
  - Economic activity also generates *global* public bads, e.g., trans-boundary pollution (acid rain), depletion of ozone-layer due to use of chlorofluorocarbons (CFCs)
  - Trade policies (sanctions) often part of international environmental agreements, e.g., Convention on International Trade in Endangered Species (CITES)

# Trade and Environment

- **So what is controversy?**
  - **Impact of trade on environment:**
    - (i) Environmentalists argue benefits due to trade liberalization outweighed by environmental damage**
    - (ii) Economists argue trade and economic growth may be good for environment – typically appeal to environmental Kuznets curve (EKC) - originally due to Grossman and Krueger (1993; 1995)**

# Trade and Environment

- **WTO and environmental policy:**
  - (i) Environmentalists concerned governments will not set optimal environmental policies - constrained in use of trade policies (1998 WTO *shrimp-turtle* case)**
  - (ii) Governments *either* resist implementing tough standards - “regulatory chill” *or* reduce stringency of existing standards - “race to the bottom” (Bagwell and Staiger, 2001a)**
  - (iii) Calls for governments to be allowed to use trade policies to countervail “ecological dumping”**

# Trade and Environment

## Is Trade Good or Bad for the Environment?

Effects of Trade on Environment	Income Growth	Given Income Level
Harmful Effects	Larger scale of economic activity	Regulatory chill
Beneficial Effects	Cleaner techniques, and composition of activity	Ratcheting up of standards, innovation, consumer power
Statistical Evidence		
For SO <sub>2</sub>	EKC – peaks at \$5,700 income/capita/year	Favorable effects of trade dominate
For CO <sub>2</sub>	Some evidence of EKC	Trade exacerbates emissions

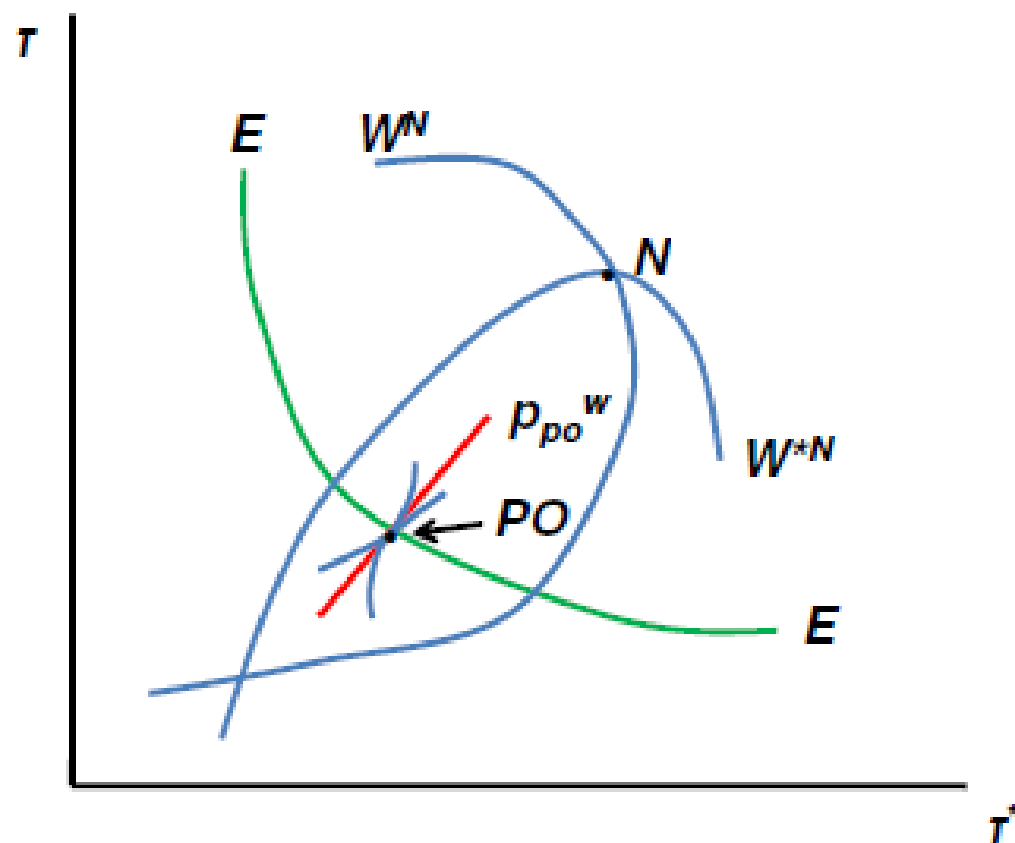
Sources: Frankel (2004; 2009) and Frankel and Rose (2005)

# **Economics of WTO and Environmental Regulation**

- **Countries implement optimal tariffs in terms-of-trade-driven Prisoner's Dilemma (Johnson, 1953-54; Dixit, 1987; Grossman and Helpman, 1995)**
- **Solution via tariff bindings (Bagwell and Staiger, 1999) (Figure 1)**
- **With environmental standards – is there a race to the bottom in such a set-up?**
- **Only with complete sovereignty over standards**

# Economics of WTO and Environmental Regulation

Figure 1: Purpose of a Reciprocal Trade Agreement



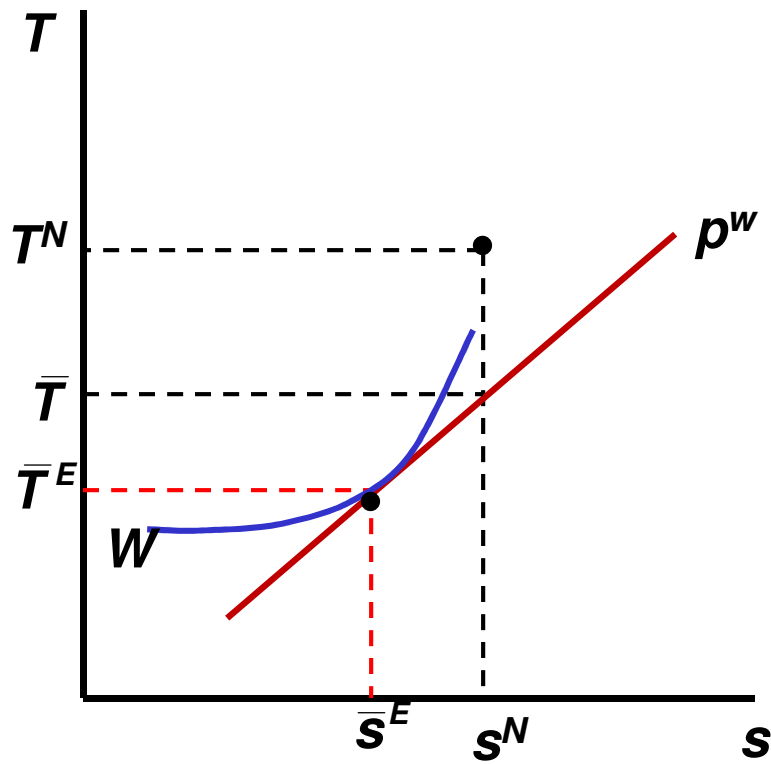
# Economics of WTO and Environmental Regulation

- Under WTO, countries do not have total sovereignty over environmental standards
- If country's negotiated market access is reduced by standards, a *non-violation* complaint can be filed (GATT Article XXIII)
- This should prevent a race to the bottom
- What if country wants to raise standards, allowing more market access, but its tariffs are bound?

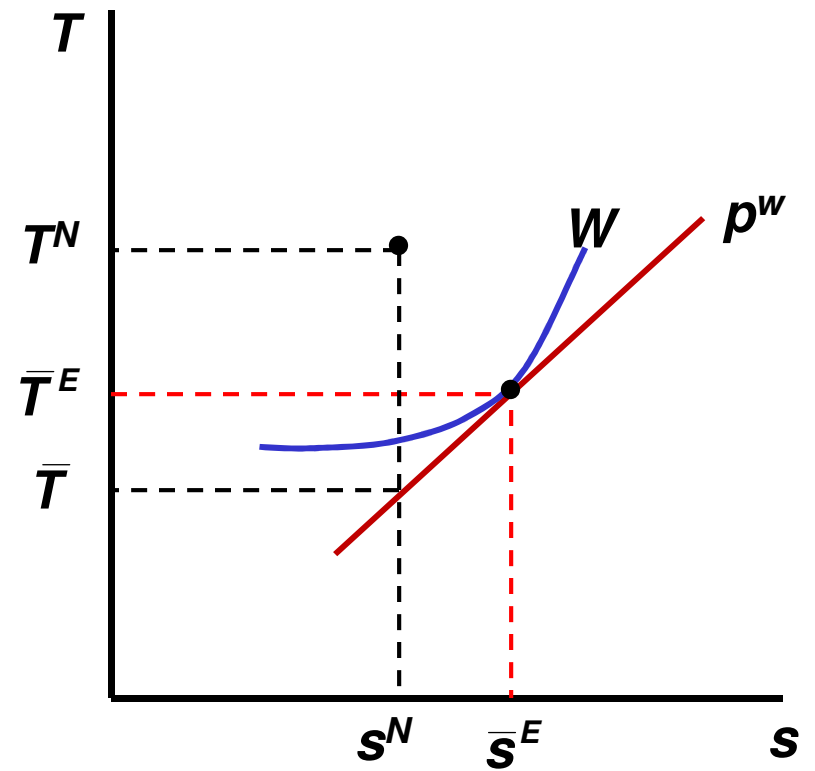
# **Economics of WTO and Environmental Regulation**

- **Assume 2-stage game with given initial standards:**
  - (i) **bound tariffs are negotiated**
  - (ii) **unilateral change in policy mix, subject to bound tariffs and market access commitments**
- **If country's preferred standard is lower, can only reduce this by lowering bound tariff because of chance of non-violation complaint**
- **If country's preferred standard is higher, can only raise it by increasing bound tariff – but violates WTO rules**
- **Bagwell and Staiger (2001b) suggest allowing renegotiation of bound tariffs to avoid regulatory chill**

Figure 2: Tariffs and Environmental Policy



Race to the bottom?



Regulatory chill?

# **WTO Law and Border Tax Adjustments**

- **Old principle – goes back to Ricardo (Sraffa,1953)**
- **Issue arose in 1960s, when EEC adopted destination-basis, harmonized VAT system with taxes on imports and tax rebates on exports**
- **Debate as to whether in violation of GATT Articles III and XVI - no negotiation occurred during Tokyo Round**
- **Lockwood and Whalley (2008) claim analysis of Shibata (1967) and others showed when all consumption goods are taxed at same rate, no real effects on trade, production and consumption**

# WTO Law and Border Tax Adjustments

- 1970 GATT Working Party defined BTAs:

“...any fiscal measure which put into effect, in whole or part, the destination principle (i.e., which enable...imported products sold to consumers to be charged with some or all of the tax charged in the importing country in respect of *similar* domestic products).” (WTO, 1997, para: 28)

- Objective of BTAs is:

“...to ensure *trade neutrality* of domestic taxation...and thus to preserve the competitive equality between domestic and imported products.” (WTO, 1997, para: 24)

- Taxes subject to BTAs include VAT and excise duties

# WTO Law and Border Tax Adjustments

- In principle, nothing to prevent country from applying BTA for taxes on inputs (energy) used in production of final good (aluminum)
- Raises issue of BTAs on *like* products vs. BTAs applied on basis of *processes and production methods* (PPMs)
- Embodied taxes on carbon/energy likely to be contentious – despite WTO Appellate Body's findings in *shrimp-turtle* case (Charnowitz, 2002)
- Potential challenges will come under GATT Article III, but legal issues are less than clear-cut

# **WTO Law and Border Tax Adjustments**

- **GATT Articles III:1 and III:2 (National Treatment) obliges WTO members not to discriminate against imports in application of internal laws and regulations**
- **Key language in Article III:2 states imported products:**

**“...shall not be subject directly or indirectly, to internal taxes or other internal charges of any kind in excess of those applied, directly or indirectly, to like domestic products”.**
- **20% BTA applied on imported diesel fuel to adjust for a 20% domestic excise tax on diesel fuel would be consistent with Article III**
- **Less clear if BTAs applied to inputs are permitted**

## WTO Law and Border Tax Adjustments

- **GATT *Superfund Case* (1987) – challenge to US taxes on imported substances that were end-products of chemicals taxed in the US**
- **Given tax on imported substances was equivalent to tax borne by domestic substances, Panel deemed measure consistent with Article III:2 - ruling focused on fiscal burden not product “likeness” (Goh, 2004)**
- **Key issues: (i) what products are being compared for “likeness”? (ii) can imported and domestic products be compared given differences in amount of energy embodied in final product?**

# WTO Law and Border Tax Adjustments

- If energy BTAs found inconsistent with GATT Article III:2, possible to justify under GATT Article XX (General Exceptions)
- Justification for measure has to satisfy 2-tier test:
  - necessary “to protect human, animal or plant life or health...” or relating to “conservation of exhaustible natural resources...”
  - measure is “not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade...” (Article XX Chapeau)
- Significant debate about legal outcome (Goh, 2004; Biermann and Brohm, 2005; Pauwelyn, 2007; Bordoff, 2008) – will only be settled via an actual ruling

## Optimal Border Tax Adjustments

- Poterba and Rotemberg (1995) examine case of perfect competition at intermediate and final goods stages
- Import tax on final good equal to environmental tax times extent to which intermediate good enters final good cost function is neutral in terms of maintaining market access
- Result may be sensitive to assumption of perfect competition and definition of *neutrality*

## **Optimal Border Tax Adjustments**

- **McCorriston and Sheldon (2005) used model of successive oligopoly with one-to-one fixed proportions technology**
- **Three-stage game:**
  - (i) Government commits to environmental tax and border tax**
  - (ii)/(iii) Nash equilibria upstream and downstream**
- **Final goods strategic substitutes (Bulow *et al.*, 1985)**

# Optimal Border Tax Adjustments

- Intermediate sector - domestic duopoly
- Final sector - duopoly of domestic/foreign firms
- Revenue functions:

$$R_1(x_1, x_2) \quad (1)$$

$$R_2(x_1, x_2) \quad (2)$$

- Profit functions:

$$\pi_1 = R_1(x_1, x_2) - c_1 x_1 \quad (3)$$

$$\pi_2 = R_2(x_1, x_2) - c_2 x_2 \quad (4)$$

# Optimal Border Tax Adjustments

- First-order conditions are:

$$R_{1,1} = c_1 \quad (5)$$

$$R_{2,2} = c_2 \quad (6)$$

- Nash equilibrium is:

$$\begin{bmatrix} R_{1,11} & R_{1,12} \\ R_{2,21} & R_{2,22} \end{bmatrix} \begin{bmatrix} dx_1 \\ dx_2 \end{bmatrix} = \begin{bmatrix} dc_1 \\ dc_2 \end{bmatrix} \quad (7)$$

- Slopes of reaction functions:

$$\frac{dx_1}{dx_2} = r_1 = -\frac{R_{1,12}}{R_{1,11}} \quad (8)$$

$$\frac{dx_2}{dx_1} = r_2 = -\frac{R_{2,21}}{R_{2,22}} \quad (9)$$

For *strategic substitutes*, if  $R_{i,ij} < 0$ , then  $r_i < 0$

# Optimal Border Tax Adjustments

- Solution found by re-arranging and inverting (7), and simplifying notation:

$$\begin{bmatrix} dx_1 \\ dx_2 \end{bmatrix} = \Delta^{-1} \begin{bmatrix} a_2 & b_1 \\ b_2 & a_1 \end{bmatrix} \begin{bmatrix} dc_1 \\ dc_2 \end{bmatrix} \quad (10)$$

where:  $a_1 = R_{1,11}$   $a_2 = R_{2,22}$

$b_1 = R_{1,12}$   $b_2 = R_{2,21}$  ,

and for stability,  $a_i < 0$ , and  $\Delta = (a_1 a_2 - b_1 b_2) > 0$

- From (8) and (9), substitute  $r_i = -(b_i) / a_i$  into (10):

$$\begin{bmatrix} dx_1 \\ dx_2 \end{bmatrix} = \Delta^{-1} \begin{bmatrix} a_2 & a_1 r_1 \\ a_2 r_2 & a_1 \end{bmatrix} \begin{bmatrix} dc_1 \\ dc_2 \end{bmatrix} \quad (11)$$

# Optimal Border Tax Adjustments

- Given technology, and two firms, upstream equilibrium can be derived in similar fashion:

$$\begin{bmatrix} dx_A^U \\ dx_B^U \end{bmatrix} = (\Delta^U)^{-1} \begin{bmatrix} a_B^U & a_A^U r_A^U \\ a_B^U r_B^U & a_A^U \end{bmatrix} \begin{bmatrix} dc_A^U \\ dc_B^U \end{bmatrix} \quad (12)$$

Imposition of an environmental tax  $t^e$  raises both  $c_A^U$  and  $c_B^U$ , raising price of intermediate good,  $dp_1^U = dc_1$

Cost increase to domestic downstream firm affects imports, i.e., from (11),  $dx_2 / dc_1$

Border tax adjustment also affects level of imports, i.e., from (11),  $dx_2 / dc_2$

## Optimal Border Tax Adjustments

- Maintained market access not defined explicitly in WTO rules - two possible rules:
- *Import-volume* neutrality
  - change in foreign firm's costs  $c_2$  through BTA that keeps import volume,  $x_2$ , constant given environmental tax  $t^e$
  - size of BTA depends on *incidence* of upstream environmental tax  $t^e$  on downstream firm's costs,  $c_1$
  - profits fall (rise) for domestic (foreign) firm

- **neutral BTA =  $\frac{(dx_2 / dc_1) t^e}{-(dx_2 / dc_2)}$  (14)**

**With competitive markets, absolute value of  $dx_2 / dc_2 = dx_2 / dc_1$ , and net effect is such that  $dx_2 = 0$ , i.e., neutral BTA =  $t^e$**

**With imperfect competition, setting BTA =  $t^e$  will lead to non-neutral outcome,  $dx_2 \neq 0$**

**Using (11), effect of BTA is:**

$$dx_2 = \Delta^{-1} a_1 dc_2 \quad (15)$$

**Since  $\Delta^{-1} > 0$  and  $a_1 < 0$ , BTA reduces level of imports,**

**Impact of  $t^e$  upstream on downstream imports is:**

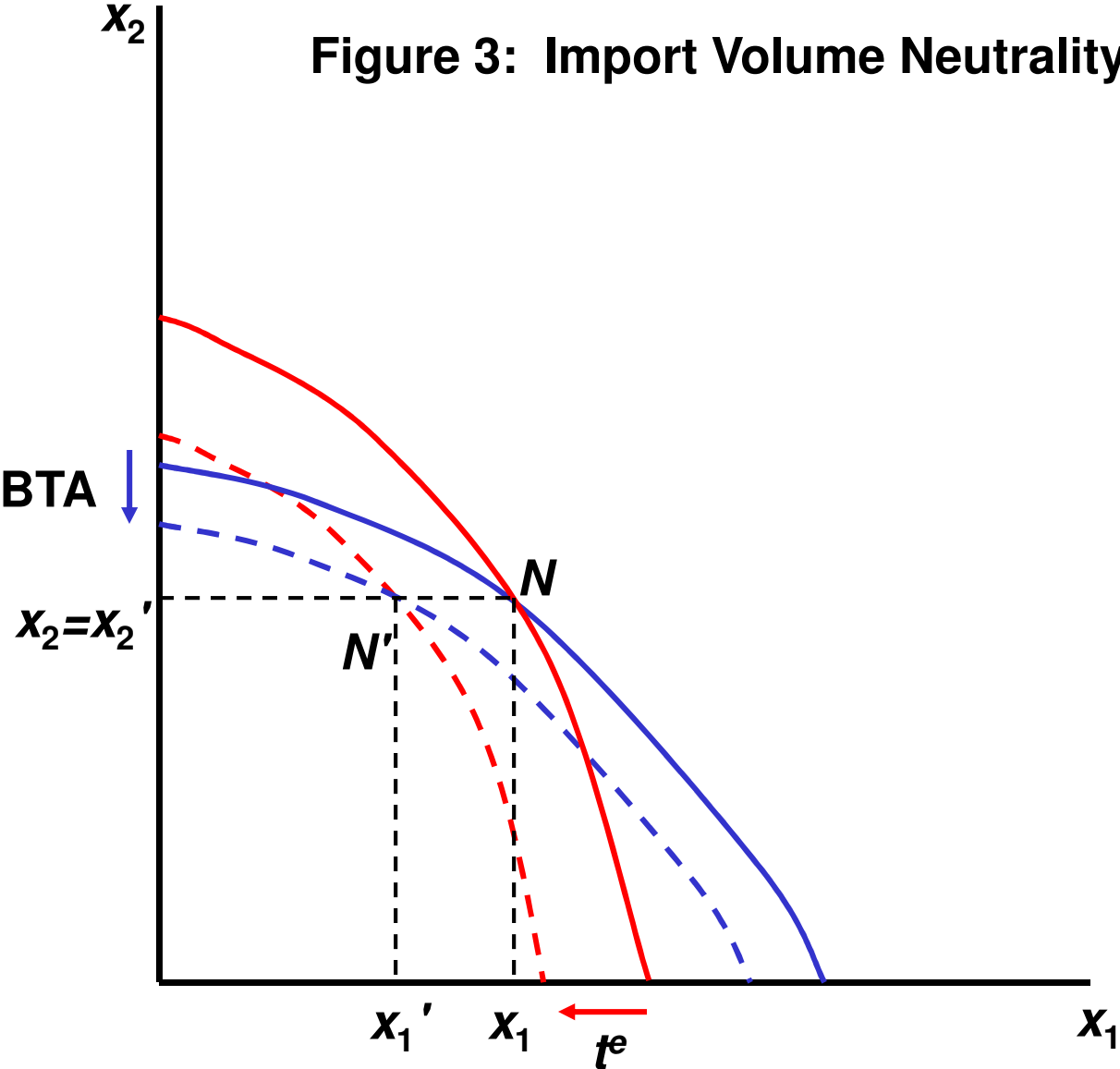
$$dx_2 = \Delta^{-1} a_2 r_2 dc_1 \quad (16)$$

**As  $\Delta^{-1} > 0$ ,  $a_2 < 0$ , and  $r_2 < 0$ , then  $dx_2 / dc_1 > 0$ , i.e., import volume neutrality requires a border adjustment *tax***

**Whether  $dx_2 / dc_1 = dx_2 / dx_2$  depends on likelihood of  $dc_1 = dc_2$  - which is a function of *incidence* of  $t^e$ , i.e.,  $dc_1 = \{dp_1^U / (dc_A^U + dc_B^U)\}$**

**Likely to be ‘under-shifting’ of  $t^e$ , so that  $dc_2 > dc_1$ , then for import volume neutrality:  $BTA < t^e$**

Figure 3: Import Volume Neutrality



# Optimal Border Tax Adjustments

- *Import-share* neutrality

- change in foreign firm's costs  $c_2$  through BTA that keeps import its import share  $x_2/(x_1+x_2)$  constant given environmental tax  $t^e$
- profits of both domestic and foreign firm increase
- while objective is to set border taxes so as not to be unwittingly protectionist, there are profit effects that affect way firms will lobby for policy

Appropriate BTA defined as one where net effect of  $t^e$  on  $x_1$  and  $x_2$  must equal the net effect of BTA on  $x_1$  and  $x_2$  is:

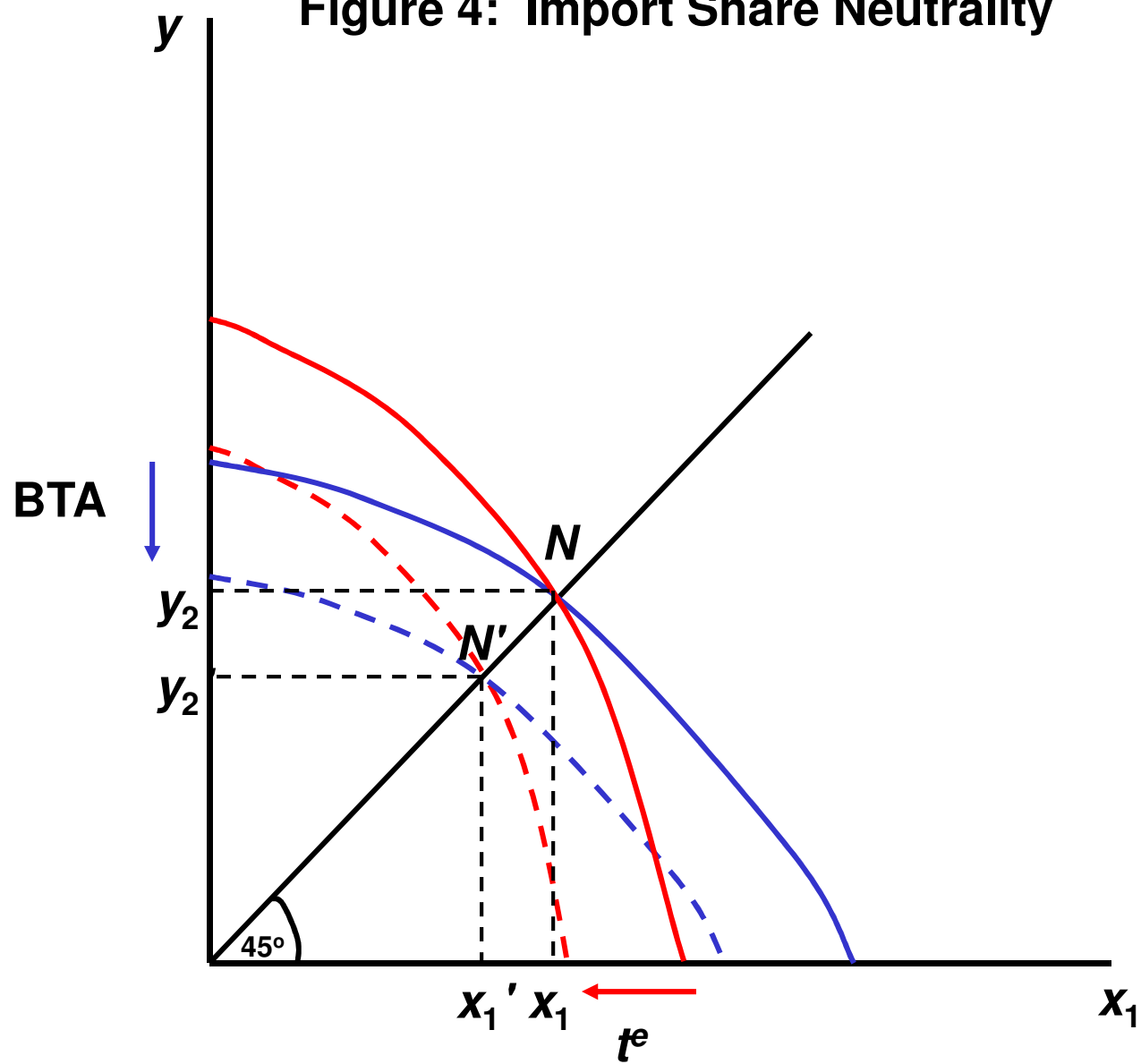
$$\text{neutral BTA} = \frac{t^e [ (dx_2 / dc_1) + (dx_1 / dc_1) ]}{[ (dx_1 / dc_2) + (dx_2 / dc_2) ]} \quad (17)$$

Substituting in from (11), and assuming,  $a_1 \approx a_2$ , neutral BTA<sup>s</sup> can be written as:

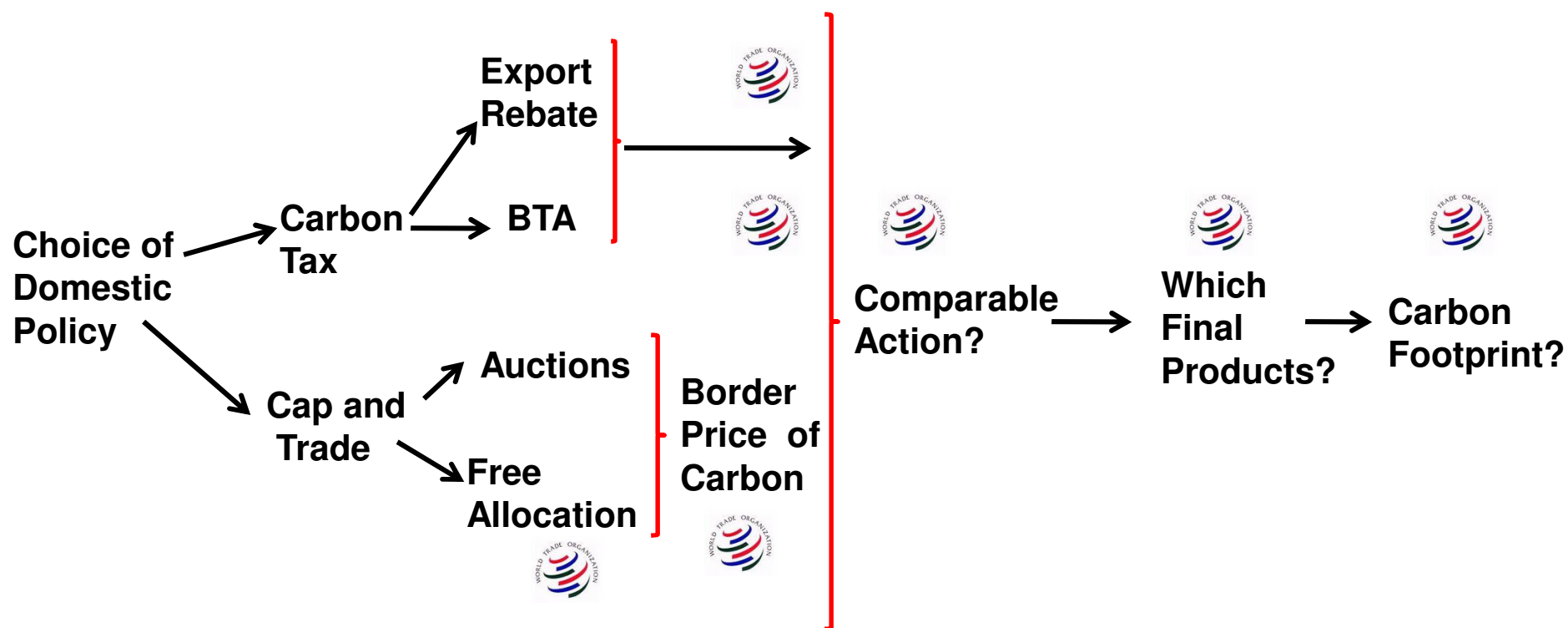
$$\text{neutral BTA} = \frac{(r_2 + 1) t^e}{(r_1 + 1)} = \frac{(r_2 + 1) dc_1}{(r_1 + 1)} \quad (18)$$

With  $r_i < 0$ , and given,  $|r_1| > |r_2|$ , BTA for import-share neutrality > BTA for import-volume neutrality

Figure 4: Import Share Neutrality

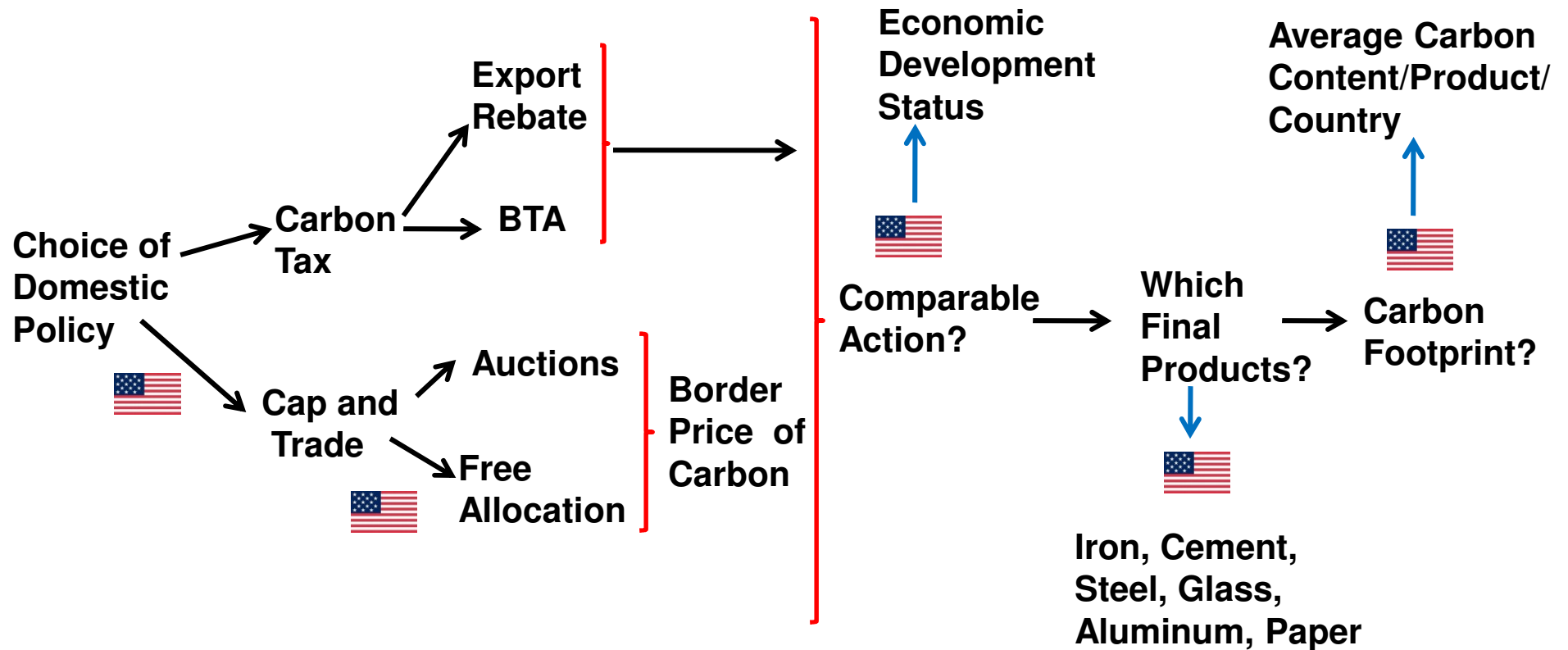


# Some Implementation Issues for Climate Policies



= Potential for WTO challenge

# Some Implementation Issues for Climate Policies



# Potential for WTO Challenge

- **With free allocation of emission allowances, might be non-compliant with WTO Agreement on Subsidies and Countervailing Measures**
- **A subsidy if it: (i) were a “financial contribution”; (ii) conferred economic benefit; (iii) and was specific to certain industries – WTO-inconsistent if other WTO members adversely affected**
- **However – if cap and trade restricts emissions, even if firms receive a transfer, they will still have to pass on opportunity cost of using allowances in higher prices to consumers**

# Potential for WTO Challenge

- As well as satisfying non-discrimination principle under GATT Article III, any BTA must also satisfy GATT Article I – “most favored nation” (MFN) requirement
- If BTA is applied to a “like” product (steel), based on a country (China) not having a “comparably effective” climate policy - WTO might rule it is discrimination
- Even if differential treatment is permitted by WTO, it will be difficult to determine which countries actually have “comparably effective” climate policies

# Potential for WTO Challenge

- **Given complexities of implementation, several reasons why BTA may violate GATT Article XX:**
  - (i) Impact on domestic firms large relative to reduction in emissions - “stealth protectionism”**
  - (ii) Failure to allow exporters to demonstrate the level of their emissions**
  - (iii) Exporting country cannot be required to implement market mechanism such as cap and trade**
  - (iv) Failure to recognize impact of stage of development on cumulative emissions**
  - (v) Failure to make good-faith efforts to engage in negotiations with exporting countries**

# Summary and Conclusions

- Connection between trade and environment is not a new issue – significant debate since early 1990s
- Economic and legal issues are also not new, although only a ruling on BTAs in the presence of domestic climate policies will resolve legal uncertainty
- Climate policies present additional layer(s) of complexity to problem of determining appropriate BTAs – there is “*some new wine mixed* with old wine in new green bottles”!!