

14.581 International Trade  
— Lecture 24: Trade Policy Theory (II)—

# Today's Plan

- ① TOT Externality and Trade Agreements
- ② Political-Economy Motives
- ③ Other Issues

# 1. TOT Externality and Trade Agreements

- Like in previous lecture:
  - 1 All markets are perfectly competitive
  - 2 There are no distortions
  - 3 Governments only care about welfare
- More specifically:
  - 2 countries,  $c = 1, 2$
  - 2 goods,  $i = 1, 2$
  - $p^c \equiv p_1^c / p_2^c$  is relative price in country  $c$
  - $p^w \equiv p_1^w / p_2^w$  is “world” (i.e. untaxed) relative price
  - $d_i^c(p^c, p^w)$  is demand of good  $i$  in country  $c$
  - $y_i^c(p^c)$  is supply of good  $i$  in country  $c$

# Are Unilaterally Optimal Tariffs Pareto-Efficient?

- Following Bagwell and Staiger (1999), we introduce

$$W^c(p^c, p^w) \equiv V^c[p^c, R^c(p^c) + T^c(p^c, p^w)]$$

- Differentiating the previous expression we obtain

$$dW^c = \left[ W_{p^c}^c \left( \frac{dp^c}{dt^c} \right) + W_{p^w}^c \left( \frac{\partial p^w}{\partial t^c} \right) \right] dt^c + W_{p^w}^c \left( \frac{\partial p^w}{\partial t^{-c}} \right) dt^{-c}$$

- The slope of the iso-welfare curves can thus be expressed as

$$\left( \frac{dt^1}{dt^2} \right)_{dW^1=0} = \frac{W_{p^w}^1 \left( \frac{\partial p^w}{\partial t^2} \right)}{W_{p^1}^1 \left( \frac{dp^1}{dt^1} \right) + W_{p^w}^1 \left( \frac{\partial p^w}{\partial t^1} \right)} \quad (1)$$

$$\left( \frac{dt^1}{dt^2} \right)_{dW^2=0} = \frac{W_{p^2}^2 \left( \frac{dp^2}{dt^2} \right) + W_{p^w}^2 \left( \frac{\partial p^w}{\partial t^2} \right)}{W_{p^w}^2 \left( \frac{\partial p^w}{\partial t^1} \right)} \quad (2)$$

# Are Unilaterally Optimal Tariffs Pareto-Efficient?

- **Proposition 2** *If countries are “large,” unilateral tariffs are not Pareto-efficient.*

- **Proof:**

- ① By definition, unilateral (Nash) tariffs satisfy

$$W_{p^c}^c \left( \frac{dp^c}{dt^c} \right) + W_{p^w}^c \left( \frac{\partial p^w}{\partial t^c} \right) = 0,$$

- ② If  $\left( \frac{\partial p^w}{\partial t^1} \right)$  and  $\left( \frac{\partial p^w}{\partial t^2} \right) \neq 0$ , 1+ (1) and (2)  $\Rightarrow$

$$\left( \frac{dt^1}{dt^2} \right)_{dW^1=0} = +\infty \neq 0 = \left( \frac{dt^1}{dt^2} \right)_{dW^2=0}$$

- ③ Proposition 2 directly derives from 2 and the fact that Pareto-efficiency requires  $\left( \frac{dt^1}{dt^2} \right)_{dW^1=0} = \left( \frac{dt^1}{dt^2} \right)_{dW^2=0}$



# What is the Source of the Inefficiency?

- The *only* source of the inefficiency is the terms-of-trade externality
- Formally, suppose that governments were to set their tariffs ignoring their ability to affect world prices:

$$W_{p^1}^1 = W_{p^2}^2 = 0$$

- Then Equations (1) and (2) immediately imply

$$\left(\frac{dt^1}{dt^2}\right)_{dW^1=0} = \left(\frac{\partial p^w}{\partial t^2}\right) / \left(\frac{\partial p^w}{\partial t^1}\right) = \left(\frac{dt^1}{dt^2}\right)_{dW^1=0}$$

- **Intuition:**

- In this case, both countries act like small open economies
- As a result,  $t^1 = t^2 = 0$ , which is efficient from a world standpoint

- **Question:**

- *How much does this rely on the fact that governments maximize welfare?*

## 2. Political-Economy Approach

# Economic Environment

## Endowment economy

- We consider a simplified version of Grossman and Helpman (1994)
  - Endowment rather than specific-factor model
- To abstract from TOT considerations, GH consider a small open economy
  - If governments were welfare-maximizing, trade taxes would be zero
- There are  $n + 1$  goods,  $i = 0, 1, \dots, n$ , produced under perfect competition
  - good 0 is the numeraire with domestic and world price equal to 1
  - $p_i^W$  and  $p_i$  denote the world and domestic price of good  $i$ , respectively
- Individuals are endowed with 1 unit of good 0 + 1 unit of another good  $i \neq 0$ 
  - we refer to an individual endowed with good  $i$  as an  $i$ -individual
  - $\alpha_i$  denote the share of  $i$ -individuals in the population
  - total number of individuals is normalized to 1

# Economic Environment (Cont.)

## Quasi-linear preferences

- All individuals have the same quasi-linear preferences

$$U = x_0 + \sum_{i=1}^n u_i(x_i)$$

- Indirect utility function of  $i$ -individual is therefore given by

$$V_i(\mathbf{p}) = 1 + p_i + t(\mathbf{p}) + s(\mathbf{p})$$

where:

$$t(\mathbf{p}) \equiv \text{government's transfer [to be specified]}$$

$$s(\mathbf{p}) \equiv \sum_{i=1}^n u_i(d_i(p_i)) - \sum_{i=1}^n p_i d_i(p_i)$$

- **Comment:**

- Given quasi-linear preferences, this is *de facto* a partial equilibrium model

# Political Environment

## Policy instruments

- For all goods  $i = 1, \dots, n$ , the government can impose an ad-valorem import tariff/export subsidy  $t_i$

$$p_i = (1 + t_i) p_i^W$$

- We treat  $\mathbf{p} \equiv (p_i)_{i=1, \dots, n}$  as the policy variables of our government
- The associated government revenues are given by

$$t(\mathbf{p}) = \sum_{i=1}^n (p_i - p_i^W) m_i(p_i) = \sum_{i=1}^n (p_i - p_i^W) [d_i(p_i) - \alpha_i]$$

- Revenues are uniformly distributed to the population so that  $t(\mathbf{p})$  is also equal to the government's transfer, as assumed before

- An *exogenous* set  $L$  of sectors/individuals is politically organized
  - we refer to a group of agents that is politically organized as a *lobby*
- Each lobby  $i$  chooses a schedule of contribution  $C_i(\cdot) : (\mathbb{R}^+)^n \rightarrow \mathbb{R}^+$  in order to maximize the total welfare of its members net of the contribution

$$\max_{C_i(\cdot)} \alpha_i V_i(\mathbf{p}^0) - C_i(\mathbf{p}^0)$$

subject to:  $\mathbf{p}^0 = \arg \max_{\mathbf{p}} G(\mathbf{p})$

where  $G(\cdot)$  is the objective function of the government [to be specified]

- Conditional on the contribution schedules announced by the lobbies, government chooses the vector of domestic prices in order to maximize a weighted sum of contributions and social welfare

$$\max_{\mathbf{p}} G(\mathbf{p}) \equiv \sum_{i \in L} C_i(\mathbf{p}) + aW(\mathbf{p})$$

where

$$W(\mathbf{p}) = \sum_{i=1}^n \alpha_i V_i(\mathbf{p}) \text{ and } a \geq 0$$

- **Comments:**

- GH (1994) model has the structure of *common agency problem*
- Multiple principals  $\equiv$  lobbies; one agent  $\equiv$  government
- We can use Bernheim and Whinston's (1986) results on *menu auctions*

# Equilibrium Contributions

- We denote by  $\left\{ (C_i^0)_{i \in L}, \mathbf{p}^0 \right\}$  the SPNE of the previous game
  - we restrict ourselves to interior equilibria with differentiable equilibrium contribution schedules
  - whenever we say “in any SPNE”, we really mean “in any interior SPNE where  $C^0$  is differentiable”
- **Lemma 1** *In any SPNE, contribution schedules are locally truthful*

$$\nabla C_i^0 (\mathbf{p}^0) = \alpha_i \nabla V_i (\mathbf{p}^0)$$

- **Proof:**

- 1  $\mathbf{p}^0$  optimal for the government  $\Rightarrow \sum_{i \in L} \nabla C_i^0 (\mathbf{p}^0) + a \nabla W (\mathbf{p}^0) = 0$
- 2  $C_i^0 (\cdot)$  optimal for lobby  $i \Rightarrow \alpha_i \nabla V_i (\mathbf{p}^0) - \nabla C_i (\mathbf{p}^0) + \sum_{i' \in L} \nabla C_{i'}^0 (\mathbf{p}^0) + a \nabla W (\mathbf{p}^0) = 0$
- 3 1+2  $\Rightarrow \nabla C_i^0 (\mathbf{p}^0) = \alpha_i \nabla V_i (\mathbf{p}^0)$

- **Lemma 2** *In any SPNE, domestic prices satisfy*

$$\sum_{i=1}^n \alpha_i (I_i + a) \nabla V_i (\mathbf{p}^0) = 0,$$

where  $I_i = 1$  if  $i$  is politically organized and  $I_i = 0$  otherwise

- **Proof:**

- ①  $\mathbf{p}^0$  optimal for the government  $\Rightarrow \sum_{i \in L} \nabla C_i^0 (\mathbf{p}^0) + a \nabla W (\mathbf{p}^0) = 0$
- ② 1 + Lemma 1  $\Rightarrow \sum_{i \in L} \alpha_i \nabla V_i (\mathbf{p}^0) + a \nabla W (\mathbf{p}^0) = 0$
- ③ Lemma 2 directly derives from this observation and the definition of  $W (\mathbf{p}^0)$

- **Comment:**

- In GH (1994), everything is *as if* governments were maximizing a social welfare function that weighs different members of society differently

# Equilibrium Trade Policies (Cont.)

- **Proposition 2** In any SPNE, trade policies satisfy

$$\frac{t_i^0}{1 + t_i^0} = \frac{l_i - \alpha_L}{a + \alpha_L} \left( \frac{z_i^0}{e_i^0} \right) \text{ for } i = 1, \dots, n, \quad (3)$$

where  $\alpha_L \equiv \sum_{i' \in L} \alpha_{i'}$ ,  $z_i^0 \equiv \alpha_i / m_i$ , and  $e_i^0 \equiv d \ln m(p_i^0) / d \ln p_i^0$

- **Proof:**

- 1 Roy's identity + definition of  $V_i(\mathbf{p}^0) \Rightarrow$

$$\frac{\partial V_{i'}(\mathbf{p}^0)}{\partial p_i} = (\delta_{i'i} - \alpha_i) + (p_i^0 - p_i^w) m'(p_i^0)$$

where  $\delta_{ij} = 1$  if  $i = j$  and  $\delta_{ij} = 0$  otherwise

- 2 1 + Lemma 2  $\Rightarrow$  for all  $i' = 1, \dots, n$ ,

$$\sum_{i'=1}^n \alpha_{i'} (l_{i'} + a) \left[ \delta_{i'i} - \alpha_i + (p_i^0 - p_i^w) m'(p_i^0) \right] = 0$$

- 3 2 + definition of  $\alpha_L \equiv \sum_{i' \in L} \alpha_{i'} \Rightarrow$

$$(l_i - \alpha_L) \alpha_i + (p_i^0 - p_i^w) m'(p_i^0) (\alpha_L + a) = 0$$

# Equilibrium Trade Policies (Cont.)

- **Proof (Cont.):**

4.  $3 + t_i^0 = (p_i^0 - p_i^w) / p_i^w \Rightarrow$

$$t_i^0 = \frac{l_i - \alpha_L}{a + \alpha_L} \left( -\frac{\alpha_i}{p_i^w m'(p_i^0)} \right) = \frac{l_i - \alpha_L}{a + \alpha_L} \left( -\frac{z_i m(p_i^0)}{p_i^w m'(p_i^0)} \right)$$

5. Equation (3) directly derives from 4 and the definition of  $z_i^0$  and  $e_i^0$

# How Should Tariffs Vary Across Industries (and Countries)?

GH's (1994) basic insights

- According to Proposition 2:
  - 1 Protection only arises if some sectors lobby, but others don't: if  $\alpha_L = 0$  or 1, then  $t_i^0 = 0$  for all  $i = 1, \dots, n$
  - 2 Only organized sectors receive protection (they manage to increase price of the good they produce and decrease the price of the good they consume)
  - 3 Protection decreases with the import demand elasticity  $e_0$  (which increases the deadweight loss)
  - 4 Protection increases with the ratio of domestic output to imports (which increases the benefit to the lobby and reduces the cost to society)

# Are Unilateral Tariffs Efficient?

- In the case of a small open economy, which is the case considered by GH (1994), the answer is trivially yes
- GH (1995) extend the previous analysis to the case of two large countries
  - in this situation, unilateral tariffs are not Pareto-efficient
  - terms-of-trade changes may affect other countries, and so, provide rationale for trade agreements
- As we mention before, the interesting question, however, is:  
*Do political-economy motives provide a rationale for trade agreements above and beyond correcting the terms-of-trade externality?*
- Bagwell and Staiger's (1999) answer is no

# Terms-of-Trade Externality Revisited

Bagwell and Staiger (1999)

- Political-economy motives affect preferences,  $W^c(p^c, p^w)$ , over domestic and world prices
  - for example, in GH (1994), a small open economy may not choose free trade
- However, at a theoretical level, if we can still write government's objective function as  $W^c(p^c, p^w)$ , then the *only* source of the inefficiency has to be the terms-of-trade externality:
  - Nothing in part 1 relied on  $W^c(p^c, p^w) \equiv V^c[p^c, R^c(p^c) + T^c(p^c, p^w)]!$
- Intuitively, starting from a situation where  $W_{p^c}^c(p^c, p^w) = 0$  all  $c$ , the only first-order effect of a tariff change has to be the change in  $p^w$ 
  - Since this is a pure income effect, it cannot affect world welfare

# Reciprocity in the WTO

Bagwell and Staiger (1999)

- Using the previous insight, one can rationalize the principle of “reciprocity” within the WTO
- **Reciprocity**  $\equiv$  *Mutual changes in trade policy such that changes in the value of each country's imports are equal to changes in the value of its exports*
- Formally, a change in tariffs  $\Delta t^1 \equiv t^{1'} - t^1$  and  $\Delta t^2 \equiv t^{2'} - t^2$  is reciprocal if

$$p^w \left[ m_1^1(p^{1'}, p^{w'}) - m_1^1(p^1, p^w) \right] = \left[ x_2^1(p^{1'}, p^{w'}) - x_2^1(p^1, p^w) \right]$$

- Using trade balance, this can be rearranged as

$$(p^{w'} - p^w) m_1^1(p^{1'}, p^{w'}) = 0 \Rightarrow p^{w'} = p^w$$

- Hence mutual changes in trade policy that satisfy the principle of reciprocity leave the world price unchanged, which eliminates source of inefficiency

### 3. Other Issues

- Strategic trade policy was an active area of research in the 80s
- **Objective:**  
Normative analysis of trade policy under imperfect competition
- **Classics:**
  - 1 Brander and Spencer (1985): export subsidies may be optimal way to shift profits away from foreigners and towards domestic firms (in a Cournot duopoly)
  - 2 Grossman and Eaton (1986): optimal policy crucially depends on details of the model (e.g. Cournot vs. Bertrand)

# Strategic Trade Policy (Cont.)

- Recently, a few papers have revisited the implication of imperfect competition for trade agreements. In particular, does imperfect competition provide a new rationale for trade agreements?
  - Ossa (2011) says yes
  - Bagwell and Staiger (2009) say no
- From an empirical standpoint:
  - Can we figure out which assumptions about market structure fit best a given industry? If so, why would Grossman and Eaton (1986) be a problem?

# Why Do Governments Use Trade Policy Instruments?

- Most papers analyzing trade policy start from ad-hoc restriction on the set of instruments (e.g. tariffs, quotas, export subsidies, no production subsidies)
- Conditional on this ad-hoc restriction, paper then explains why trade policy may look the way it does and what its consequences may be
- But why would governments use inefficient instruments in the first place?
  - In developing countries, this may be the “best feasible” way to raise revenues (Gordon and Li 2009)
  - Inefficient methods may reduce the *size of the pie*, yet increase the *share of the pie* going to those choosing the instruments (Dixit, Grossman and Helpman 1997, Acemoglu and Robinson 2001)

# Understanding the WTO

- What are the implications of the self-enforcing nature of trade agreements?
  - Bagwell and Staiger (1990), Maggi (1996)
- What is the rationale for trade agreements in the presence of NTBs?
  - Bagwell and Staiger (2001) consider the case of product standards (and conclude that only terms-of-trade externality matters)
- How can we rationalize simple rigid rules (e.g. an upper bound on tariffs) within the WTO?
  - Amador and Bagwell (2010), Horn, Maggi, and Staiger (2010)
- Quantitatively, how large are the gains from the WTO?

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