14.581 International Trade
— Lecture 25: 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
Basic Environment

- 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

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

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

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

$$\left( \frac{dt^1}{dt^2} \right)_{dW^2=0} = - \frac{W^2_{p^w} \left( \frac{\partial p^w}{\partial t^2} \right)}{W^2_{p^2} \left( \frac{dp^2}{dt^2} \right) + W^2_{p^w} \left( \frac{\partial p^w}{\partial t^1} \right)}$$
Proposition 2 If countries are “large,” unilateral tariffs are not Pareto-efficient.

Proof:

1. By definition, unilateral (Nash) tariffs satisfy

\[ W_p^c \left( \frac{dp^c}{dt^c} \right) + W_p^w \left( \frac{dp^w}{dt^c} \right) = 0, \]

2. If \( \left( \frac{dp^w}{dt^1} \right) \) and \( \left( \frac{dp^w}{dt^2} \right) \neq 0 \), then \( 1+ (1) \) and \( 2 \) imply

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

3. Proposition 2 directly derives from 2 and the fact that Pareto-efficiency requires

\[ \left( \frac{dt^1}{dt^2} \right)_{dW^1=0} = \left( \frac{dt^1}{dt^2} \right)_{dW^2=0} \]
N corresponds to the unilateral (Nash) tariffs
E-E corresponds to the contract curve
If countries are too asymmetric, free trade may not be on contract curve
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:

\[ W_{p1}^1 = W_{p2}^2 = 0 \]

- 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, $i = 0, 1, \ldots, n$, 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
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

\[ V_i(p) = 1 + p_i + t(p) + s(p) \]

where:

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

\[ s(p) \equiv \sum_{i=1}^{n} u_i(d_i(p_i)) - \sum_{i=1}^{n} p_id_i(p_i) \]

Comment:

Given quasi-linear preferences, this is *de facto* a partial equilibrium model
For all goods $i = 1, ..., n$, the government can impose an ad-valorem import tariff/export subsidy $t_i$

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

We treat $\mathbf{p} \equiv (p_i)_{i=1,...,n}$ 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

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

subject to:

$$
p^0 = \arg \max_p G(p)
$$

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

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

where

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

**Comments:**

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

- We denote by $\left\{ (C^0_i)_{i \in L}, p^0 \right\}$ 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*

  \[ \nabla C^0_i \left( p^0 \right) = \alpha_i \nabla V_i \left( p^0 \right) \]

- **Proof:**
  1. $p^0$ optimal for the government \( \Rightarrow \sum_{i \in L} \nabla C^0_i \left( p^0 \right) + a \nabla W \left( p^0 \right) = 0 \)
  2. $C^0_i (\cdot)$ optimal for lobby $i$ \( \Rightarrow \alpha_i \nabla V_i \left( p^0 \right) - \nabla C_i \left( p^0 \right) + \sum_{i' \in L} \nabla C^0_{i'} \left( p^0 \right) + a \nabla W \left( p^0 \right) = 0 \)
  3. $1+2 \Rightarrow \nabla C^0_i \left( p^0 \right) = \alpha_i \nabla V_i \left( p^0 \right)$
**Lemma 2** In any SPNE, domestic prices satisfy

\[ \sum_{i=1}^{n} \alpha_i (l_i + a) \nabla V_i \left(p^0\right) = 0, \]

where \( l_i = 1 \) if \( i \) is politically organized and \( l_i = 0 \) otherwise

**Proof:**

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

**Comment:**

In GH (1994), everything is as if governments were maximizing a social welfare function that weighs different members of society differently
Proposition 2  In any SPNE, trade policies satisfy

\[
\frac{t_i^0}{1 + t_i^0} = \frac{l_i - \alpha_L}{a + \alpha_L} \left( \frac{z_i^0}{e_i^0} \right) \text{ for } i = 1, \ldots, n,
\]

(3)

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

Proof:
1. Roy's identity + definition of \( V_i(p^0) \) ⇒

\[
\frac{\partial V_{i'}(p^0)}{\partial p_i} = (\delta_{i'i} - \alpha_i) + \left( p_i^0 - p_i^w \right) m_i'(p_i^0)
\]

where \( \delta_{i'i'} = 1 \) if \( i = i' \) and \( \delta_{i'i'} = 0 \) otherwise
2. 1 + Lemma 2 ⇒ for all \( i' = 1, \ldots, n, \)

\[
\sum_{i'=1}^n \alpha_{i'} \left( l_{i'} + a \right) \left[ \delta_{i'i} - \alpha_i + \left( p_i^0 - p_i^w \right) m_i'(p_i^0) \right] = 0
\]
3. 2 + definition of \( \alpha_L \equiv \sum_{i' \in L} \alpha_{i'} \) ⇒

\[
(l_i - \alpha_L) \alpha_i + \left( p_i^0 - p_i^w \right) m_i'(p_i^0) (\alpha_L + a) = 0
\]
Proof (Cont.):

4. \(3 + t_i^0 = \left( p_i^0 - p_i^W \right) / p_i^W \) \( \Rightarrow \)

\[
t_i^0 = \frac{l_i - \alpha_L}{a + \alpha_L} \left( - \frac{\alpha_i}{p_i^W m_i' (p_i^0)} \right) = \frac{l_i - \alpha_L}{a + \alpha_L} \left( - \frac{z_i m_i (p_i^0)}{p_i^W m_i' (p_i^0)} \right)
\]

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 $i = 1, \ldots, n$

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.
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 $W^c_{p^c}(p^c, p^w) = 0$ 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

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

- Using trade balance, this can be rearranged as

$$\left( p^w' - p^w \right) m_1^1 \left( p^1', p^w' \right) = 0 \Rightarrow p^w' = p^w$$

- 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)
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?
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)
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 (2013), Horn, Maggi, and Staiger (2010)

Quantitatively, how large are the gains from the WTO?
  - Ossa (2014)