14.581 International Trade

Class notes on 5/8/2013[1]

1 Political-Economy Approach

1.1 Economic Environment

1.1.1 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, $i = 0, 1, ..., n$, 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
  - α_i denote the share of i-individuals in the population
  - total number of individuals is normalized to 1

1.1.2 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:

$$\begin{aligned} t(\mathbf{p}) &\equiv \text{ government's transfer [to be specified]} \\ s(\mathbf{p}) &\equiv \sum_{i=1}^{n} u_i(d_i(p_i)) - \sum_{i=1}^{n} p_i d_i(p_i) \end{aligned}$$

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

[1] The notes are based on lecture slides with inclusion of important insights emphasized during the class.

1.2 Political Environment

1.2.1 Policy instruments

- 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

1.2.2 Lobbies

- 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 $C_i(\cdot) : (\mathbb{R}^+)^n \to \mathbb{R}^+$ in order to maximize the total welfare of its members net of the contribution

$$\begin{aligned} & \max_{C_i(\cdot)} \alpha_i V_i\left(\mathbf{p}^0\right) - C_i\left(\mathbf{p}^0\right) \\ \text{subject to:} \quad & \mathbf{p}^0 = \arg\max_{\mathbf{p}} G(\mathbf{p}) \end{aligned}$$

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

1.2.3 Government

- 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≡ lobbies; one agent≡ government
  - We can use Bernheim and Whinston's (1986) results on *menu auctions*

1.3 Equilibrium Contributions

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

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

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

1.4 Equilibrium Trade Policies

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

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

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

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

$$\frac{t_i^0}{1+t_i^0} = \frac{I_i - \alpha_L}{a + \alpha_L}\left(\frac{z_i^0}{e_i^0}\right) \text{ for } i = 1, ..., n, \tag{1}$$

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

- **Proof:**

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

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

  where $\delta_{ii'} = 1$ if $i = i'$ and $\delta_{ii'} = 0$ otherwise

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

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

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

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

- **Proof (Cont.):**

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

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

  5. Equation (1) directly derives from 4 and the definition of z_i^0 and e_i^0

1.5 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 $i = 1, ..., n$
  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)

1.5.1 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

1.6 Terms-of-Trade Externality Revisited

Bagwell and Staiger (1999)

- Political-economy motives affect preferences, $W^c\left(p^c, p^w\right)$, 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 $W^c\left(p^c, p^w\right)$, then the *only* source of the inefficiency has to be the terms-of-trade externality:
  - Nothing in part 1 relied on $W^c\left(p^c, p^w\right) \equiv V^c\left[p^c, R^c\left(p^c\right) + T^c\left(p^c, p^w\right)\right]$!
- Intuitively, starting from a situation where $W^c_{p^c}\left(p^c, p^w\right) = 0$ 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

1.7 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 $\Delta t^1 \equiv t^{1\prime} - t^1$ and $\Delta t^2 \equiv t^{2\prime} - t^2$ is reciprocal if

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

- Using trade balance, this can be rearranged as

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

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

2 Other Issues

2.1 Strategic Trade Policy

- 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?

2.2 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)

2.3 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?

14.581 International Economics I

Spring 2013