

Lecture 20: Trade Policy: Determinants of the Structure of Protection

14.581: International Economics I

Pol Antràs

Harvard & MIT

Spring 2007

Cite as: Pol Antras, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Introduction

- In this lecture, we begin our study of trade policy.
- In this Lecture 20, we will discuss the determinants (as well as the effects) of trade policies.
- For now, we will consider unilateral incentive to use trade policy, but we will introduce strategic aspects in the next lecture.
- The latter will open the door for an economic analysis of international trade organizations, such as the WTO.
- In the last lecture, we will briefly discuss the literature on regionalism vs. multilateralism, which seeks to understand the impact of regional free trade agreements on the prospects of multilateral trade liberalization.
- A couple of gross omissions (given the time constraint) are:
 - a detailed discussion of the literature on trade protection and domestic distortions (Meade, Bhagwati, Johnson,...);
 - a summary of the different results in the literature on strategic trade policy in models with imperfect competition.

Cite as: Pol Antràs, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Why is International Trade Not Free?

- Some of the welfare results we obtained in previous lectures suggest that there might be little incentives for countries to restrict international trade.
- This is clearly at odds with reality. Why is trade not free?
- ① **Optimal Tariff Argument:** Even when free trade is Pareto optimal, a large enough country will have a unilateral incentive to use trade taxes to tilt the terms of trade in its favor.
- ② **Second-Best Argument:** In the presence of domestic distortions (learning-by-doing, price or wage rigidity, commitment problems...), and when direct correction of these distortions is not possible, trade taxes might improve welfare (large literature with many examples).
- ③ **Political Economy:** Trade taxes may be a way to redistribute income across different groups in society, when more efficient means are not available or prove to be too costly.
 - ① models with voting and/or lobbying fall in this category;
 - ② this also comprises situations in which income taxation is more costly (informationally intensive?), and governments end up resorting to trade taxes to raise revenue.

Cite as: Pol Antràs, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

A General Framework

- Consider a general framework in which a social planner maximizes the utility of the representative consumer subject to a feasibility constraint and an import “affordability” constraint:

$$\begin{aligned} \max_{X, M} \quad & U(X + m) \\ \text{s.t.} \quad & F(X) \leq 0 \\ & m^T \pi(m) \leq 0. \end{aligned}$$

- X denotes the production vector, V is the endowment vector, m is the net import vector (so $C = X + m$), and $\pi(m)$ is the vector of world prices.
- The key feature of the problem is that if a country is large enough, world prices will depend on the net import vector of that particular country.
- The first-order conditions of this program can be written as

$$U_i = \lambda \cdot F_i, \quad \text{for all } i; \tag{1}$$

$$U_i = \mu \cdot \left(\pi_i + \sum_{j=1}^I m_j \frac{\partial \pi_j}{\partial m_i} \right) \quad \text{for all } i, \tag{2}$$

where λ and μ are the Lagrange multipliers.

A General Framework (cted.)

- Which type of policies can achieve these allocations in a decentralized way?
- From consumer and producer behavior in a competitive economy we have:

$$U_i = \omega p_{ci};$$

$$F_i = \xi p_i,$$

where p_c and p denote consumer and producer prices, respectively.

- Using (1) and the fact that only relative prices matter, this implies that optimal policies will not create a wedge between consumer prices and producer prices ($p_c = p$).
 - Consumption taxes or production subsidies will not be used.
- By choice of units, we can next write (2) as:

$$p_{ci} = \pi_i + \sum_{j=1}^n m_j \frac{\partial \pi_j}{\partial m_i}, \quad (3)$$

which shows that optimal policies will generally create a wedge between domestic prices and international prices.

No Cross-Price Effects

- In the absence of cross-price effects, condition (3) becomes

$$p_{ci} = \pi_i + m_i \frac{\partial \pi_i}{\partial m_i},$$

and thus free trade is optimal only if $\partial \pi_i / \partial m_i = 0$, that is only if the country cannot alter world prices.

- If the country is large enough, then we will have $\partial \pi_i / \partial m_i > 0$. In such a case, $p_{ci} > \pi_i$ when $m_i > 0$ and $p_{ci} < \pi_i$ when $m_i < 0$.
- In other words, the country will want to tax imports ($p_{ci} > \pi_i$) and also tax exports ($p_i < \pi_i$)
- **Intuition:** in a competitive economy, the effect of a marginal unit of exports or imports neglects its effects on prices, and therefore on export revenue or import cost.
 - a government will internalize this externality and will introduce trade taxes.
- Optimal add-valorem tariff is

$$\frac{p_{ci}}{\pi_i} - 1 = \frac{m_i}{\pi_i} \frac{\partial \pi_i}{\partial m_i},$$

which corresponds to the inverse of the foreign export supply elasticity.

Intuition

- What does an import tariff do?
 - It raises the domestic price on impact, thus lowering domestic demand for the good;
 - if the country is large enough, this lower demand will lower world prices for imported goods;
 - for given export prices, the terms of trade have improved and a small enough import tariff will raise welfare;
 - similar to the behavior of a monopsonist.
- What does an export tax do?
 - it reduces the export price on impact, thus lowering domestic supply for the good;
 - if the country is large enough, this lower supply will raise world prices for exported goods;
 - for given import prices, the terms of trade have improved and a small enough export tax will raise welfare;
 - similar to the behavior of a monopolist.
- Should the government use import tariffs, export taxes, both? Lerner (1936) derived an equivalence result that shows that you generally need only use one.

Cite as: Pol Antràs, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Surplus Analysis

- A few of the papers we will discuss in the next few lectures use a more specific setup that facilitates the study of the welfare effects of different policies.
- Each country is populated by a continuum of measure 1 of individuals with identical quasi-linear preferences:

$$U(c) = c_0 + \sum_{i=1}^I u_i(c_i),$$

where c_0 denotes consumption of the outside numeraire good, which is costlessly traded and not subject to tariffs.

- Provided that income is large enough, consumer behavior will satisfy the following optimality condition (assume $u_i(\cdot)$ is increasing and strictly concave):

$$u'_i = p_i.$$

- From this we obtain a demand function which is only a function of prices (income effects are gone):

$$c_i = d_i(p_i) \quad \text{for } i = 1, 2, \dots, I$$

Surplus Analysis (cted.)

- Consumer surplus is in turn given by

$$S_i(p_i) = u_i(c_i(p_i)) - p_i c_i(p_i),$$

which has the property

$$S'_i = -c_i.$$

- On the supply side, the numeraire good is produced one-to-one with labor, which pins down the wage rate to 1 in all countries.
- Non-numeraire goods are produced combining labor and sector-specific capital according to a constant returns to scale technology.
- This generate a rent function $\Pi_i(p_i)$ for the capital specific to sector i . Furthermore, in a perfectly competitive environment, it must be the case that

$$\Pi'_i(p_i) = x_i(p_i),$$

where $x_i(p_i)$ is supply of good i .

- A useful property of quasi-linear preferences is that indirect utility takes the simple form:

$$v(p, I) = I(p_i) + \sum_i S_i(p_i),$$

where I is income.

Surplus Analysis (cted.)

- In the presence of ad-valorem taxes we have $p_i = \pi_i t_i$ and

$$v(t_i) = 1 + \sum_{i=1}^I \Pi_i(p_i) + \sum_{i=1}^I S_i(p_i) + \sum_{i=1}^I (t_i - 1) \pi_i (c_i(p_i) - x_i(p_i)).$$

- Maximizing $v(t_i)$ with respect to t_i yields

$$p_i'(t_i) (\Pi_i'(p_i) + S_i'(p_i)) + (p_i'(t_i) - \pi_i'(t_i)) (c_i(p_i) - x_i(p_i)) \\ + (t_i - 1) \pi_i p_i'(t_i) (c_i'(p_i) - x_i'(p_i)) = 0.$$

- Using the properties we mentioned above, together with $m_i(p_i) \equiv c_i(p_i) - x_i(p_i)$, we can write this as

$$-\pi_i'(t_i) m_i(p_i) + (t_i - 1) \pi_i p_i'(t_i) m_i'(p_i) = 0. \quad (4)$$

- Now use the trade balance condition $m_i(p_i) = -m^W(\pi_i)$ to conclude that:

$$p_i'(t_i) m_i'(p_i) = -\pi_i' m_{W_i}'(\pi_i), \quad (5)$$

Optimal Trade Taxes

- Using (5), we can re-express (4) as

$$t_i - 1 = \frac{m_{Wi}(\pi_i)}{\pi_i m'_{Wi}(\pi_i)} \equiv \frac{1}{\varepsilon_{fX}}. \quad (6)$$

- Under regularity conditions, we have $m'_{Wi}(\pi_i) < 0$, so that the net export supply function of Foreign is upward sloping.
- When $m^W(\pi_i) < 0$ (or $m_i(p_i) > 0$), we have an optimal import tariff ($t_i > 1$) equal to the inverse of the Foreign supply elasticity.
 - a **small open economy** faces a flat export supply schedule and therefore $t_i = 1$, implying that **free trade is optimal**.
- When $m^W(\pi_i) > 0$ (or $m_i(p_i) < 0$), then we have that an export tariff ($t_i < 0$) is optimal (but only for a sufficiently large country).
- Note the analogy of this analysis with the case with no cross-price effects above.

Political Economy

- Let us first introduce political economy considerations in a very reduced form way.
- Assume that the country under study is a small open economy, but that the government places a higher weight on producers' welfare than on consumers' (not entirely clear why yet).

- Letting $\lambda_i > 1$, the optimal tariff now solves:

$$v(t_i) = 1 + \sum_{i=1}^I \lambda_i \Pi_i(p_i) + \sum_{i=1}^I S_i(p_i) + \sum_{i=1}^I (t_i - 1) \pi_i(c_i(p_i) - x_i(p_i)),$$

- Following the same steps as above (but imposing $\pi'_i(t_i) = 0$), we now obtain:

$$t_i - 1 = (\lambda_i - 1) \frac{x_i(p_i)}{m_i(p_i)} \frac{m_i(p_i)}{\pi_i(-m'_i(p_i))}$$

or simply

$$\frac{t_i - 1}{t_i} = (\lambda_i - 1) \frac{1}{\mu(p_i)} \frac{1}{\varepsilon_m(p_i)},$$

where $\mu(p_i)$ is the import penetration ratio ($m_i(p_i) / x_i(p_i)$) and $\varepsilon_m(p_i)$ is the import elasticity.

Political Economy: Implications

- Several things about the previous expression are noteworthy:
- ① Even though this is a small open-economy, it will set a positive import tariff whenever $m_i(p_i) > 0$ and $x_i(p_i) > 0$.
 - the reason is that the tariff benefits producers (whose revenue increases) at the cost of consumers, but the latter carry a lower weight in welfare;
- ② The tariff will be decreasing in the import penetration ratio: the larger that ratio, the larger the distortions relative to the gain for producers.
- ③ The tariff will be decreasing in the import elasticity: again, the larger the elasticity, the larger the distortions of the tariff.
- ④ When the good is an exportable, the model predicts an export subsidy, rather than an export tax:
 - this follows from noting that when $m_i(p_i) < 0$, it continues to be the case that $t_i > 1$, provided of course that $x_i(p_i) > 0$ and $\lambda_i > 1$.
 - the intuition is that again the subsidy benefits producers at the expense of consumers.

Protection for Sale: Grossman and Helpman (1994)

- Grossman and Helpman (1994) develop a lobbying model that provides a micro-foundation for a social welfare function that weights different groups differently (see Rodrik, 1995, for a survey of previous approaches).
- They adopt the economic model developed above, but also model the interactions between:
 - a policymaker who sets rates of protection, and
 - special interest groups (SIGs) who seek to get protection tilted towards themselves by making campaign contributions.
- The timing of events is as follows:
 - 1 The SIGs move first, simultaneously, and offer $\{C_i(\mathbf{p})\}$ campaign contributions as a function of protection, which is given by domestic prices \mathbf{p} , with
$$\mathbf{p} = \boldsymbol{\pi} + \mathbf{t}.$$
 - 2 The policy maker then chooses \mathbf{p} to maximize
$$aW(\mathbf{p}) + \sum_{i \in L} C_i(\mathbf{p}),$$
where $W(\cdot)$ is aggregate welfare and a is the weight on welfare relative to contributions.
- Why do politicians care about contributions? See GH (Restud, 1996).

Cite as: Pol Antràs, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Protection for Sale (cted.)

- The set L is the set of SIGs. SIG i 's welfare is given by:

$$U_i = W_i(\mathbf{p}) - C_i(\mathbf{p}),$$

where $W_i(\cdot)$ is SIG i 's gross welfare.

- The game is quite complicated and has multiple subgame perfect equilibria.
- But Bernheim and Whinston (1986) have shown that the following “truthful Nash equilibria” may be focal among the set of equilibria:

$$C_i^T(\mathbf{p}, B_i) = \max\{W_i(\mathbf{p}) - B_i, 0\}.$$

- Consider the weaker requirement of “locally truthful contributions,” that is

$$\nabla C_i^T(\mathbf{p}) = \nabla W_i(\mathbf{p}).$$

- The FOC of the politician is

$$a \nabla W(\mathbf{p}) + \sum_{j \in L} \nabla C_j(\mathbf{p}) = 0,$$

and thus \mathbf{p} will be such that

$$a \nabla W(\mathbf{p}) + \sum_{j \in L} \nabla W_j(\mathbf{p}) = 0.$$

Protection for Sale (cted.)

- It becomes apparent that the problem of the politician is analogous to one in which it maximizes a weighted sum of aggregate welfare and the welfare of the individual lobbies:

$$\mathbf{p}^o = \arg \max_{\mathbf{p}} = aW(\mathbf{p}) + \sum_{j \in L} W_j(\mathbf{p}).$$

- Let us now go back to the economic model, but assume that:
 - the welfare of an organized SIG i is the aggregate welfare of the individuals who own sector i 's sector specific input;
 - an individual owns at most one sector specific input.
- Under these assumptions, we have that

$$W_i(\mathbf{p}) = l_i + \Pi_i(p_i) + \alpha_i \sum_{j=1}^l (p_j - \pi_j) m_j(p_j) + \alpha_i \sum_{j=1}^n S_j(p_j),$$

where α_i is the fraction of the people who own sector i 's specific input.

- The weight in the social welfare function is 1 for an individual who is not represented by an interest group and $1 + a$ for an individual who is.

Protection for Sale: Determinants of Protection

- Solving for the optimal trade tax then delivers:

$$\frac{p_i - \pi_i}{p_i} = \frac{l_i - \alpha_0}{a + \alpha_0} \frac{1}{\mu(p_i)} \frac{1}{\varepsilon_m(p_i)},$$

where l_i is an indicator variable which equals 1 when $i \in L$ and 0 when $i \notin L$, $\alpha_0 = \sum_{i \in L} \alpha_i$ is the fraction of people represented by SIGs, and $\mu(p_i)$ and $\varepsilon_m(p_i)$ have been defined above.

- Notice that protection is positive if and only if a sector is “organized” – when $l_i = 0$, we have that $(p_i - \pi_i) < 0$.
- Also, protected sectors are afforded larger protection when fewer people belong to SIGs and the policy maker places lower weight on welfare.
- Among the protected sectors, sectors with a smaller import penetration ratio and smaller import demand elasticities are more heavily protected.
- But the effect of import penetration on protection switches sign when $l_i = 0$.

Protection for Sale: Empirical Implementation

- Goldberg and Maggi (AER 1999) proposed a test of the Grossman and Helpman (1994) model, by exploiting cross-industry variation in trade protection.
 - there is little variation in tariffs, so Goldberg and Maggi used nontariff barriers (NTB) data (coverage ratios).
- Because the demand elasticities ε_i are not measured accurately, they estimate

$$\varepsilon_i \rho_i = \frac{l_i - \alpha_0}{a + \alpha_0} \left(\frac{1}{\mu_i} \right),$$

where ρ_i , the coverage ratio replaces $(p_i - \pi_i) p_i$.

- They define a sector as organized if their PAC contributions exceed a certain level.
- They then regressed $\varepsilon_i \rho_i$ on $1/\mu_i$ for organized sectors and not organized sectors.
- Goldberg and Maggi got very precise estimates. This suggests that the model has substantial explanatory power for cross-industry variations in the rates of protection, as measured by the coverage ratio.
- Their estimates imply that $\alpha_0 \approx 85\%$ and $a \approx 50 - 70$ (very high).

Cite as: Pol Antras, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].

Why Might Lobbies Prefer to Use Trade Policy for Redistribution Purposes?

- Most political economy approaches to explaining trade protection take it for granted that trade policy is the only vehicle to redistribute income from the population at large to special interest groups.
- Grossman and Helpman (1994) offer a tentative answer for why this may be.
- When solving for the level of contributions that supports their equilibrium, they show that when the interests of lobbies largely conflict with each other (e.g., when ownership of sector-specific capital is not concentrated), then competition among lobbies will tend to lead to inefficiently high contributions given the level of protection granted.
- But if lobbies tried to affect output subsidies rather than trade taxes, the implied contributions would even be larger.
 - The reason is that in order to obtain the subsidy, a lobby has to make a contribution to the government that leaves the government and all other lobbies as well off as they were without the subsidy.
 - Because output subsidies tend to be less distortionary, the joint reservation value of the government and the other lobbies is higher, and the implied contribution will need to be higher.

Cite as: Pol Antras, course materials for 14.581 International Economics I, Spring 2007. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology. Downloaded on [DD Month YYYY].