International Trade: Lecture 5

Theory of Trade Policy

Sifan Xue
NSD, Peking University

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Trade Policy Instruments

- Ad valorem tariff: tax on good that crosses border
  - directly raises price of import good to consumer
  - indirectly raises price of perfectly substitutable import-competing good
  - $q = p = p^*(1 + t)$
- Specific tariff: $q = p = p^* + t$
- Export subsidy
  - directly raises producer price of export good
  - If coupled with import tax (to prevent "money mill"), indirectly raises price to consumers
  - $q = p = p^*(1 + s)$

Policy Equivalences

- Import tariff = production subsidy plus consumption tax
  - Production subsidy: $q = p^*(1+\sigma)$
  - Consumption tax: $p = p^*(1+\tau)$
- With competition, specific tariff = ad valorem tariff:

$$p_m^* + t_s = p_m^*(1+t_{av}) \iff t_s = t_{av}p_m^*$$

  Not true with imperfect competition (consider foreign monopolist, for example)

- Export subsidy = production subsidy plus consumption tax
- **Lerner Symmetry**: Import tariff = Export tax
  - Relative domestic prices with import tariff: $\frac{p_m^*(1+t_m)}{p_x^*}$
  - Relative domestic prices with export tax: $\frac{p_m^*}{p_x^*/(1+t_x)} = \frac{p_m^*(1+t_x)}{p_x^*}$

Cost of Tariff: Small Country

- $E[p^* + t, U] = R[p^* + t, V] + tm$

  Total differential: $E_p dt + E_U dU = R_p dt + m dt + t dm$

  $m = E_p - R_p \Rightarrow E_U dU = t dm$

  $t = 0 \Rightarrow dU = 0$, i.e., free trade is optimal for small country.

- Directions of desirable reforms:

  $m = E_p - R_p$

  Total differential: $dm = E_{pp} dt + E_{pU} dU - R_{pp} dt$

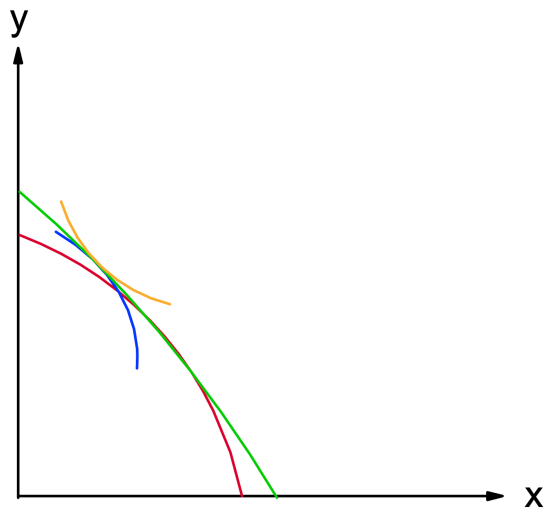
  $\left(E_U - t' E_{pU}\right) dU = t' \left(E_{pp} - R_{pp}\right) dt = t' \left(E_{pp} - R_{pp}\right) t \left(\frac{dt}{t}\right)$

Cost of Tariff: Small Country (cont'd)

$$\underbrace{\left(E_U - t'E_{pU}\right)}_{=p^*E_{pU}>0} dU = t'\left(E_{pp} - R_{pp}\right) t \left(\frac{dt}{t}\right)$$

- $E_U - t'E_{pU}$ is "Hatta term". Using $E_U = pE_{pU}$, it is equal to p^*E_{pU}, a world price weighted sum of income terms. It must be positive for stability.
- Starting from free trade with $t = 0$, welfare loss of tariff or export subsidy is second order.
- Starting from $t \neq 0$, dU/dt_i not necessarily negative; reduction in a single tariff need not raise welfare. (For example, imagine raising a tariff on a good that is close substitute for a good with a high initial tariff.)
- Starting from $t \neq 0$, if $dt_i/t_i = -\alpha$ for all i, then dU is positive.
  Welfare gain from cutting all tariffs equi-proportionately.

Optimal Trading Equilibrium: Large Country: The Baldwin Envelope



Optimal Trading Equilibrium: Large Country: Optimal Tariff

- How do we achieve the optimum: tangency of indifference curve with Baldwin Envelope?

$$\max U(c_x, c_y)$$
$$\text{s.t.} \quad y = F(x)$$
$$m_y = \phi(m_x)m_x$$

- Substitute

$$\max U\left(x + m_x, F(x) - \phi(m_x)m_x\right)$$

- FOCs

$$U_1 + F'U_2 = 0 \Rightarrow \frac{U_1}{U_2} = -F' \quad (\text{MRS} = \text{MRT})$$
$$U_1 + U_2(\phi + m_x\phi') = 0 \Rightarrow \frac{U_1}{U_2} = \phi + m_x\phi' \quad (\text{MRS} = \text{MRT})$$

Optimal Trading Equilibrium: Large Country: Optimal Tariff (cont'd)

- How to decentralize?

$$p = \frac{U_1}{U_2} = -F' = q,$$

$$q = p = \phi(1 + \frac{m_x \phi'}{\phi}) = p^*(1 + t_{opt}).$$

- Optimum tariff exploits terms of trade effect:

$$E\left[p^* + t, U\right] = R\left[p^* + t, V\right] + tm,$$

$$E_p dt + E_p dp^* + E_U dU = R_p dt + R_p dp^* + mdt + tdm,$$

$$E_U dU = tdm - mdp^*.$$

- Optimum tariff is "beggar thy neighbor" policy:

$$E^*_{U^*} dU^* = mdp^*,$$

$$E_U dU + E^*_{U^*} dU^* = tdm,$$

i.e., for world as a whole, TOT effect is a pure transfer.

Optimal Tariff: Broda, Limão and Weinstein (2008 AER)

Look at imports of "goods" (4 digit: e.g., "live fish") into 15 non-WTO countries.

- Assume all "varieties" of a good are CES substitutes.
- Varieties are 6-digit products from a given source: e.g., "Australian trout".
- Estimate two equation export supply/import demand system, with double differences:
  - difference over time;
  - difference relative to reference product;
  - use import shares and unit prices.
- Identifying assumption: shocks to export supply (after differencing) uncorrelated with shocks to import demand.

Optimal Tariff: Broda, Limão and Weinstein (2008 AER) (cont'd)

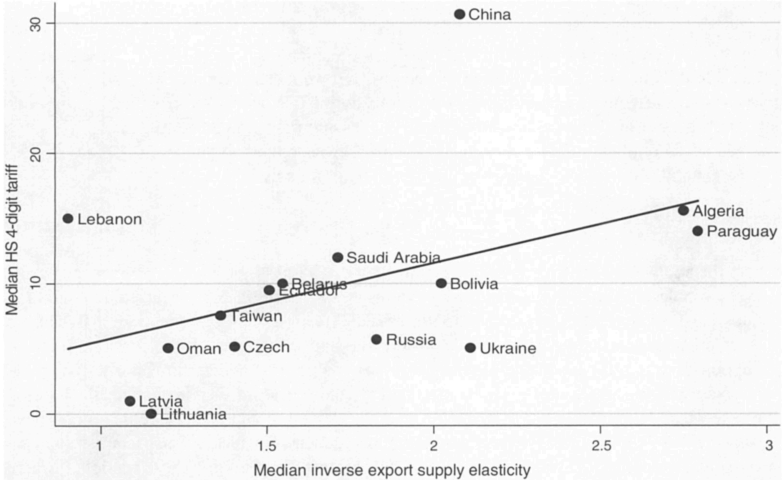


FIGURE 3. MEDIAN TARIFFS AND MARKET POWER ACROSS COUNTRIES

Optimal Tariff: Broda, Limão and Weinstein (2008 AER) (cont'd)

TABLE 7— TARIFFS AND MARKET POWER ACROSS GOODS (WITHIN COUNTRIES): OLS AND TOBIT ESTIMATES

Dependent variable	Average tariff at four-digit HS (%)								
Fixed effects	Country			Country and industry					
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	Tobit	OLS[a]	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inverse exp. elast.	0.0003			0.0004					
	(0.0001)			(0.0004)					
Mid and high inv exp elast		1.24			1.46			1.86	
		(0.25)			(0.24)			(0.31)	
Log(1/export elasticity)			0.12			0.17	0.17		
			(0.04)			(0.04)	(0.05)		
(Inv. exp. elast) × (1 − med hi)								1.45	
								(0.31)	
(Inv. exp. elast) × med hi								0.0003	
								(0.0001)	
Mid inv. exp. elast.									1.56
									(0.28)
High inv. exp. elast.									1.37
									(0.28)

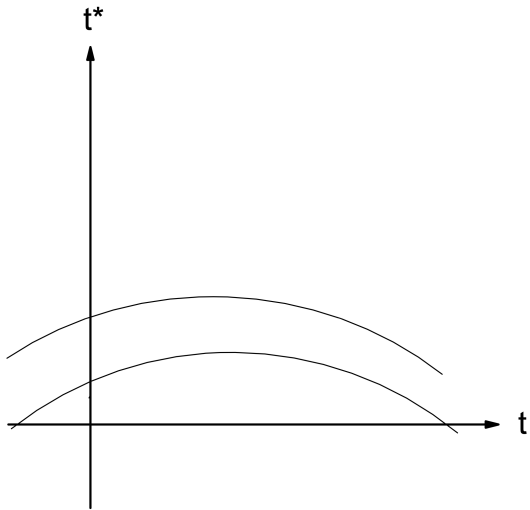
Terms-of-Trade Manipulation with Product Heterogeneity

- In neoclassical trade theory, trade protectionism can be justified by terms-of-trade manipulation, which refers to the idea that an increase in tariffs can benefit a country by allowing it to extract rents from foreign producers by forcing them to reduce prices in order to continue serving the home economy.
- A direct implication of a neoclassical small open economy in which the country cannot affect world prices is that the optimal tariff is zero.
- However, with product heterogeneity (e.g., Eaton and Kortum, 2002), a small economy would want to manipulate its terms of trade even when it cannot affect factor prices abroad. Any economy, no matter how small, has some goods that it is extremely efficient at producing.
- See Caliendoa and Parro (2022) Handbook chapter.

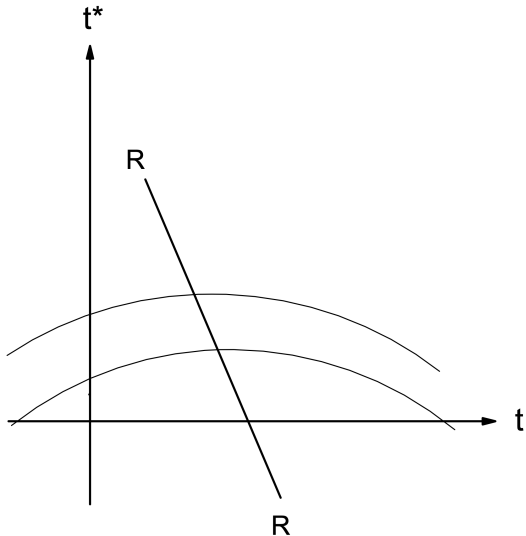
Tariff War

- Non-cooperative policy setting game
- Two goods
- Simultaneous play, each country chooses tariff on its import good

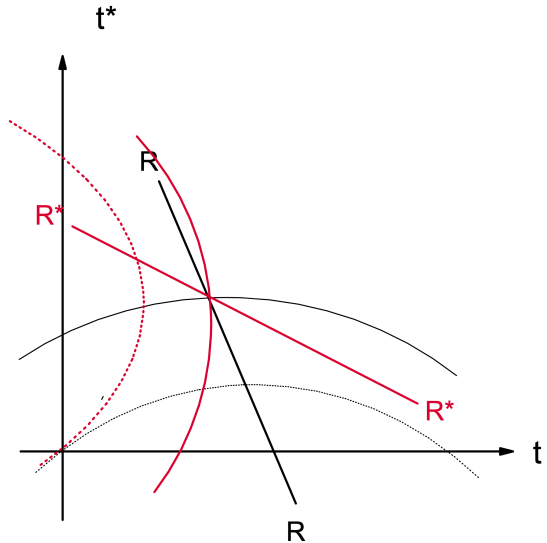
Tariff War: Iso-welfare Contours



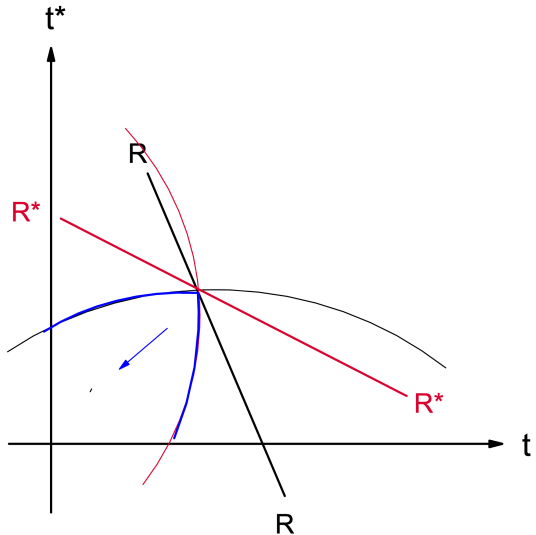
Tariff War: Best-Response Tariffs



Tariff War: Nash-Equilibrium Tariffs



Tariff War: Pareto-Improving Reforms



Theory of Distortions

- Market imperfections: externalities, price rigidities, imperfect competition, asymmetric information; Some government interventions required to achieve efficiency.
  - What interventions are optimal?
  - Will trade interventions raise welfare?
- Two principles:
  - Targeting: first best is achieved by corrective policies that offset market imperfections without introducing new distortions.
  - Second Best: Almost any movement of resources will have first-order effect on aggregate welfare from an initial non-optimum. Typically, can find some direction of movement that is welfare improving.
- Implications for trade policy:
  - Trade policy rarely is first best.
  - Trade policy often better than nothing.

Theory of Distortions: Social Planner's Problem

$$
\begin{aligned}
& \max U(c_1, \ldots, c_n) \\
\text{or } & \max W\left[U^1(c_{11}, \ldots, c_{n1}), \ldots, U^h(c_{1h}, \ldots, c_{nh})\right] \\
\text{s.t. } & c_i \leq y_i + m_i \\
& y_i \leq F^i(V_{1i}, \ldots, V_{ji}) \\
& \sum V_{ji} \leq V_j \\
& \phi(m_1, \ldots, m_n) \leq 0
\end{aligned}
$$

Lagrange multipliers: $\lambda_i, \gamma_i, \omega_j, \delta$

Theory of Distortions: First-Order Conditions

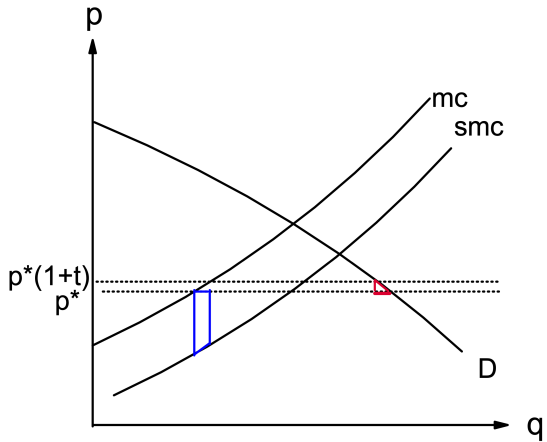
$$
\begin{aligned}
U_i - \lambda_i &= 0 \\
\lambda_i - \gamma_i &= 0 \\
\gamma_i F^i_j - \omega_j &= 0 \\
\lambda_i - \delta\phi_i &= 0
\end{aligned}
\quad \Rightarrow \quad
\begin{aligned}
\frac{U_i}{U_{i'}} &= \frac{\lambda_i}{\lambda_{i'}} = \frac{\gamma_i}{\gamma_{i'}} \\
\frac{\gamma_i F^i_j}{\gamma_{i'} F^{i'}_j} &= 1 \\
\frac{\phi_i}{\phi_{i'}} &= \frac{\gamma_i}{\gamma_{i'}}
\end{aligned}
$$

Theory of Distortions: MRS = MRT = FRT

- FRT: the marginal rate of transformation achievable through foreign trade.
- Targeting: To decentralize, need corrective taxes/subsidies to offset market distortions. But do not want to introduce new wedges.
- Second Best:
  - Take small country, two goods:
  - If MRS $= p^*$, but MRT $\neq p^*$, welfare gain proportional to $(\text{MRT} - p^*)dy_1$;
  - If MRT $= p^*$, but MRS $\neq p^*$, welfare gain proportional to $(\text{MRS} - p^*)dc_1$.

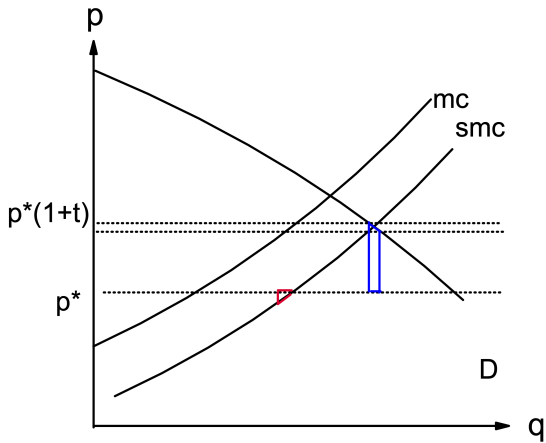
Theory of Distortions: Production Externality: Example

Consider positive externality (e.g., learning-by-doing). Then social marginal cost (smc) below private marginal cost (mc). Small tariff:



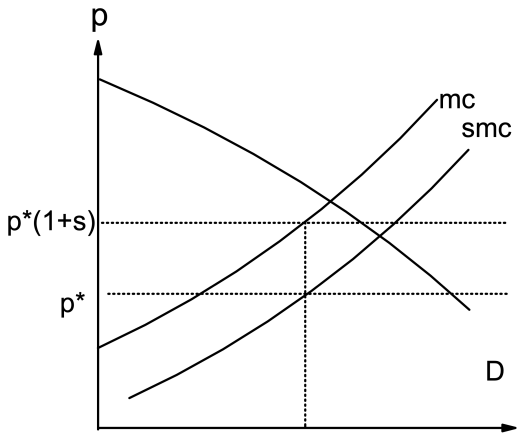
Theory of Distortions: Production Externality: Conservative Second Best Policy

If use tariff, need to be conservative:



Theory of Distortions: First Best

First best is a Pigouvian output subsidy:



If no lump-sum taxes? Production subsidy + optimal revenue-raising tax (broad based, not tariff).

Theory of Distortions: Applications

- Infant Industries?
  - Tariff introduces consumption distortion
  - Production subsidy too blunt
  - Capital market imperfection: loan subsidy (or market outcome may be constrained optimum)
- Unemployment?
  - Why? Union governance? Efficiency wage? Search?
  - Protection distorts consumption
  - Production subsidy distorts allocation of other factors
  - Need targeted labor market policy
- Income Distribution?
  - Raise revenue with least distorting tax
  - Target transfers to disadvantaged groups