

Problem Set 4 - Due December 2, 2011

1. Consider a world of two countries (US, China (CH)) with these demand and supply curves:
US: Demand = $300 - 4P_c^{us}$; Supply = $6P_c^{us}$ where P_c^{us} is the price of clothing in the US;
CH: Demand = $300 - 10P_c^{CH}$; Supply = $20P_c^{CH}$ where P_c^{CH} is the price of clothing in China.
 - a) Find the autarky price in each country.
 - b) Assuming free trade (no tariffs), find the equilibrium world price and quantities traded.
 - c) Calculate how a US **import** tariff of t affects the volume of trade and prices in China and the US (your answer should be expressed in terms of t). *Who pays for the US import tax? Explain.*
 - i. Calculate how the US import tariff changes US producer surplus, consumer surplus and government tariff revenue (again, the answer should be expressed in terms of t). Use these results to show how the US import tariff changes US welfare.
 - ii. Provide a numerical answer to (i) for $t = 6$. Does US welfare rise or fall?
 - iii. Suppose the US import tariff of $t = 6$ were replaced by an import quota of 105 units (no more than 105 units could be imported to the US). What difference, if any, would this change make?
 - iv. Using your answer to part i above, find the US import tariff that **maximizes** US welfare (the sum of consumer surplus, producer surplus and government tariff revenue). Why isn't free trade optimal for the US?
 - d) Show how the US import tariff of t affects China's producer surplus, consumer surplus and welfare (the sum of producer and consumer surplus).
 - e) Use your answer to parts (c) and (d) to show how the US import tariff affects world welfare.
 - i. Assuming the US import tariff reduces world welfare, why doesn't the US want to unilaterally lower its tariff? Explain.
 - f) Can China also gain by using an export tariff? Explain.
 - i. Return to part (cii). Suppose initially the U.S. has an import tariff of $t=6$ and China has no export tariff. Suppose the U.S. eliminates its import tariff AND China simultaneously imposes an export tariff of $t=6$. How would this affect production, consumption and price in each country? How would it effect the welfare of each country?
 - ii. Use the arguments above to argue that both countries can gain from their own tariff (but are hurt by the other country's tariff). **Is it possible to have an equilibrium where both the US and China have tariffs, both are worse off than under free trade and yet neither country wants to unilaterally eliminate its tariff? Explain** (no calculations required). {If this happens, it is called a *prisoner's dilemma*}.

2. (Free Trade Area) Consider a simple partial equilibrium model of the computer industry. Mexico has the following supply and demand curves:

$$S = 2p^d; \quad D = 6,000 - 2p^d$$

Mexico can import (identical) computers from the US, at $p^{us} = 600$, or from Brazil, at $p^B = 800$. Mexican imports do not affect these “world” prices. Mexico is contemplating forming a Free Trade Area (FTA) with either the US or Brazil. The FTA would eliminate tariffs on imports from the country with which it forms the FTA but leave Mexico’s tariffs on imports from other countries unchanged.

- a) Initially Mexico has a tariff of $t=400$ on imports from either country. From whom would Mexico import, and what would domestic price, production, consumption and imports be under this tariff?
 - b) Suppose Mexico forms a Free Trade Area with the US, but Brazilian goods are still subject to the tariff. How does this FTA affect *from whom* Mexico imports, domestic prices, production, consumption and imports? **Calculate the change in Mexican welfare due to the FTA.**
 - c) Suppose instead Mexico forms a FTA with Brazil, so that the tariff is eliminated on Brazilian computers but U.S. computers remain subject to the tariff. How does this FTA affect *from whom* Mexico imports, domestic prices, production, consumption and imports? **Calculate the change in Mexican welfare due to the FTA and explain your answer in terms of trade creation and trade diversion.**
 - d) Repeat part (c) under the assumption the original tariff had been **600**. Does your answer as to whether joining the FTA is beneficial change? Explain your result.
 - e) Are there any general conclusions you would draw about the benefits of forming an FTA with another country?
3. Consider a small country (Thailand) with the following demand and supply curves for steel:

$$\text{Supply} = Q^s = 6P_s^s; \quad \text{Demand} = 5000 - 4P_s^c$$

Note that P_s^s is the price producers (sellers) receive for steel output, P_s^c is the price consumers pay for steel, and if there are no **domestic** taxes or subsidies, then: $P_s^c = P_s^s$. Assume Thailand can trade (import or export) steel at a **given world** price of: $P_s^w = 600$ per ton of steel.

Suppose that the domestic **production** of steel in Thailand creates pollution, which damages the local environment. Suppose the estimated (economic) cost of this pollution is **200** per ton of steel produced. This means that the **marginal social cost** of producing steel **exceeds** the marginal private cost of producing steel by **200**. {Since the supply curve comes from equating marginal private cost to price, the marginal private cost (MPC) of producing steel is: $Q^s = 6P_s^s \rightarrow MPC = (Q^s/4)$ }.

Finally, assume the government has no domestic policy to redress the externality (pollution).

- a) Suppose the world price of steel is 600. Is it possible that allowing steel exports could lower domestic welfare? How does the presence of the externality affect the gains from trade?
- i. Calculate the gains (or losses) from trade in this setting.
 - ii. If the government were to use some policy to attack the market failure (the pollution), what policy should it use? Be as specific as possible.
 - iii. If only trade policy is possible, should the government tax or subsidize steel exports?
- b) Suppose now that the world price of steel is **400** so that, with no government policy, the country will import steel. Is it possible that free trade could lower domestic welfare in this case? Why does this case differ from part (a)?
- i. Calculate the gains (or losses) from trade in this setting.
 - ii. If the government were to use some policy to attack the market failure (the pollution), what policy should it use? Be as specific as possible.
 - iii. If only trade policy is possible, should the government tax or subsidize steel imports?