Economics 101 — Fall 2009

International Trade

Problem Set 3

November 12, 2009

Due:	**Tue, December 1, *before* 12:30pm**
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1 Trade with Heterogeneous Firms

Consider three car makers that can potentially operate under monopolistic competition in equilibrium. There are two completely identical countries. To start operations, a car maker i needs to pay a fixed cost of $F = 1,250$ and can produce at a constant marginal cost of c_i. To enter the foreign market, a car exporter needs to pay an additional fixed cost of $F_X = 312.5$. To ship an export, a car maker incurs an additional transportation cost of $\tau = 1$ (100 percent) on top of marginal production cost so that marginal costs for an export good are $(1 + \tau) \cdot c_i$.

In each country, the three car makers have constant marginal cost of production $c_1 = 50, c_2 = 150, c_3 = 300$ (and $c_1^* = 50, c_2^* = 150, c_3^* = 300$).

Every car maker i faces residual demand of

$$Q_i^d = S \cdot [1/n - b \cdot (P_i - \bar{P})]$$

under monopolistic competition, where $S = 5,000$, $b = 1/100$ and $\bar{P}$ is average equilibrium price.

Recall from class that, for this residual demand, optimal quantity and profits are

$$Q_i = \frac{Sb}{2}\left(\bar{P} + \frac{1}{b \cdot n} - c_i\right) \quad \text{and} \quad \Pi_i = \frac{Sb}{4}\left(\bar{P} + \frac{1}{b \cdot n} - c_i\right)^2 .$$

The domestic marginal-cost ceiling at which the last (highest-cost) entrepreneur n just enters and the marginal-cost ceiling for exports at which the last (highest-cost) domestic firm n_X just exports are

$$c_n = \bar{P} + \frac{1}{b \cdot n} - 2\sqrt{\frac{F}{Sb}} \quad \text{and} \quad c_{n_X}^X = \bar{P}^* + \frac{1}{b \cdot n^*} - 2\sqrt{\frac{F_X}{S^* b}}.$$

- Use profits Π_i and fixed entry costs F to derive the domestic marginal-cost ceiling c_n.

- Use the equilibrium price-variety relationship for the average firm $\bar{P} = 1/(b \cdot n) + \bar{c}$ to restate the marginal-cost ceilings in terms of the average markup $1/(b \cdot n)$ and market-average marginal cost $\bar{c}$.

- Consider autarky (fixed export costs are prohibitively high at $F_X = 350,000$.) Use the marginal-cost ceiling to show that two firms will enter the domestic market, but not three.

- Consider free trade (fixed export cost of $F_X = 312.5$) and suppose that wages remain unchanged. Use the marginal-cost ceiling for exports to show that exactly one domestic firm will export and that the two foreign incumbent firms remain in operation. Also show that two exporters and two foreign incumbents cannot be an equilibrium outcome, and that one home exporter and three foreign firms cannot be an equilibrium outcome.

- Continue to consider free trade and unchanged wages. How does free trade affect the average markup $1/(b \cdot n)$ and market-average marginal cost $\bar{c}$? How does market average price $\bar{P}$ change?

2 Import Tariffs and Export Promotion in a Small Open Economy's General Equilibrium

A small open economy produces cars and grows food with some unspecified number of factors of production. The opportunity costs of car production in terms of food change with the production pattern but are lower than those of its trading partners.

- Draw a production possibility frontier that is consistent with the above assumptions.

- Depict an initial world trade equilibrium and the consumption possibilities of the small open economy, consistent with the above assumptions.

- Suppose the small open economy imposes a tariff on its imports. How do the country's Terms of Trade change? How does the domestic price ratio change? How will the small open economy's production pattern change? How will the small open economy's consumption and trade pattern change? How is welfare affected?

- Suppose the small open economy promotes its exports with a cost subsidy to producers. How do the country's Terms of Trade change? How does the domestic price ratio change? How will the small open economy's production pattern change? How will the small open economy's consumption and trade pattern change? How is welfare affected? Is there a difference to the import tariff?

3 Import Tariffs and Export Promotion in World General Equilibrium with a Large Country

A large economy produces cars and grows food with some unspecified number of factors of production. The opportunity costs of car production in terms of food change with the production pattern but are lower than those of its trading partners.

- Draw a production possibility frontier that is consistent with the above assumptions.

- Depict an initial world trade equilibrium and the consumption possibilities of the large country, consistent with the above assumptions.

- Suppose the large country imposes a tariff on its imports. How do the country's Terms of Trade change? How does the domestic price ratio change? How will the large country's production pattern change? How will the large country's consumption and trade pattern change? How is welfare affected?

- Suppose the large country promotes its exports with a cost subsidy to producers. How do the country's Terms of Trade change? How does the domestic price ratio change? How will the country's production pattern change? How will its consumption and trade pattern change? How is welfare affected? Is there a difference to the import tariff?

4 Import Tariff in Partial Equilibrium

Home's demand and supply for cars are given by: $D = 130 - 30 \cdot P$ and $S = 10 + 30 \cdot P$, while Foreign's demand and supply for cars are: $D^* = 60 - 30 \cdot P$ and $S^* = 40 + 30 \cdot P$ (P is thousands of US\$).

- Determine the autarky equilibrium, and calculate domestic price for each country. Illustrate your answer with suitable graphs.

- Derive Home's import demand schedule and Foreign's export supply schedule. Calculate and depict the world price when both countries trade, and show the traded quantities.

- Home imposes a tariff of $\tau = .4$ per car. Calculate and depict the price that Home consumers pay. Show domestic consumption, production and the trade volume.

- Show graphically how the tariff affects Home welfare. Distinguish Home consumer surplus, producer surplus and government revenues.

- Did the tariff improve efficiency? Show the net efficiency gain or loss graphically.

5 Export Promotion in Partial Equilibrium

Consider the two countries from question 4 again. Home has a tariff of $\tau = .4$ per car in place.

The Foreign government decides to grant an export subsidy of $\tau = .4$ per exported car.

- How does this subsidy affect Home welfare?

- Show the changes to surpluses and tax revenues for Foreign.

6 Political Economy of Trade

As opposed to the findings of Magee (1980) for the tariff reforms in US Congress in 1973, Baldwin and Magee (2000) identify the following contributions and voting patterns in 1993 and 1994.

	Congressional votes	
	For NAFTA 1993	For GATT 1994
Actual votes	*229*	*283*
Predicted by model	229	290
Absence of labor contributions	+62	+56
Absence of business contributions	−34	−33
Absence of any contributions	+27	+33

Baldwin and Magee (2000)

- Is this evidence for or against the Stolper-Samuelson theorem?
- Is Heckscher-Ohlin trade theory supported? If not, what would voting patterns have to look like?
- Is the Specific Factors model (Ricardo-Viner trade theory) supported? If not, what would voting patterns have to look like?
- Discuss in what regards the results of Baldwin and Magee (2000) stand in contrast to those of Magee (1980).