

## 5. Market Structure and International Trade

### Learning Objectives

- Consider the role of economies of scale and market structure in generating *intra-industry* trade.
- Become familiar with the concept of dumping as it pertains to international trade policy.

### Readings

Paul Krugman and Maruice Obstfeld, International Economics, Theory and Policy, 8<sup>th</sup> ed. (2009). chapter 6, “Economies of Scale, Imperfect Competition, and International Trade”.

### Outline

1. Models of comparative advantage, such as a basic Ricardian model or the Hecksher-Ohlin model, explain *inter-industry* trade between countries with distinct differences. It has been estimated, however, that at least one-quarter of world trade is *intra-industry* trade (in which countries export and import in the same sectors). Modern trade theory emphasizes economies of scale and industry structure.
2. A model of imperfect competition / monopolistic competition:  
[Note: the notation used here is somewhat different from that which was used in class, but the model and outcomes are generally the same.]
  - a. Basic assumptions:
    - 1) Linear industry demand:  $Q = \alpha - \beta\bar{P}$
    - 2) Individual firm demand:  $q_i = Q \left[ \frac{1}{n} - b_i(P_i - \bar{P}) \right]$
    - 3) Linear total cost function for firms:  $c_i(q_i) = \phi_i + c_i q_i$ .
  - b. From these assumptions, notice the following:
    - 1) Average firm cost is positively related to  $n$ .

From the representative cost function,  $ATC_i = \frac{c_i(q_i)}{q_i} = \frac{\phi_i}{q_i} + c_i$

$$\text{and } \frac{1}{q_i} = \frac{n}{Q} - \frac{1}{Qb_i(P_i - \bar{P})}$$

$$\text{therefore, } ATC_i = \frac{n\phi_i}{Q} - \frac{\phi_i}{Qb_i(P_i - \bar{P})} + c_i$$

$$\text{and } \frac{\partial ATC_i}{\partial n} = \frac{\phi_i}{Q} > 0$$

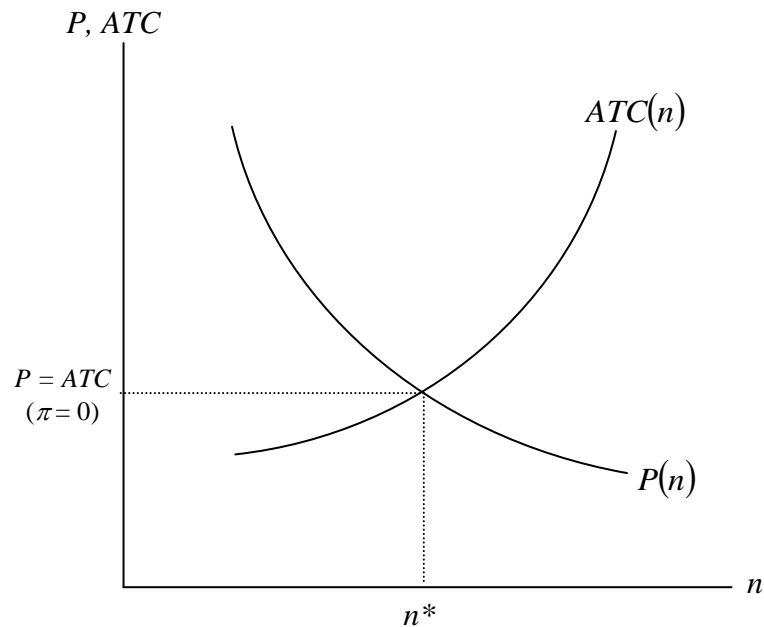
- 2) Price is negatively related to  $n$ .

$$\text{From the firm-level demand function, } P_i = \bar{P} + \frac{1}{b_i n} - \frac{q_i}{b_i Q}$$

$$\text{and } \frac{\partial P_i}{\partial n} = -\frac{1}{b_i n^2} < 0$$

- 3) There is an equilibrium number of firms in a market. Figure 1 illustrates this outcome. As two markets are integrated into one via the opening of trade, the equilibrium number of firms may rise, but may not necessarily be the simple sum of the equilibrium number of firms of the original two markets.

**Figure 1**



Furthermore, it may be shown, that the equilibrium number of firms,  $n^*$ , is given by

$$n^* = \sqrt{Q/b\phi} \text{ and that in equilibrium, } \bar{P} = \frac{1}{bn} + c .$$

- c. Example: Suppose there are two separate markets for automobiles, and we know the following:

$$Q_A = 900,000; Q_B = 1,600,000$$

$$q_i = Q \left[ \frac{1}{n} - \frac{1}{30,000} (P_i - \bar{P}) \right]$$

and

$$c_i(q_i) = 750,000,000 + 5,000q_i$$

Given these conditions, integration of the two markets into one market results in a reduction in the total number of firms and lower average price:

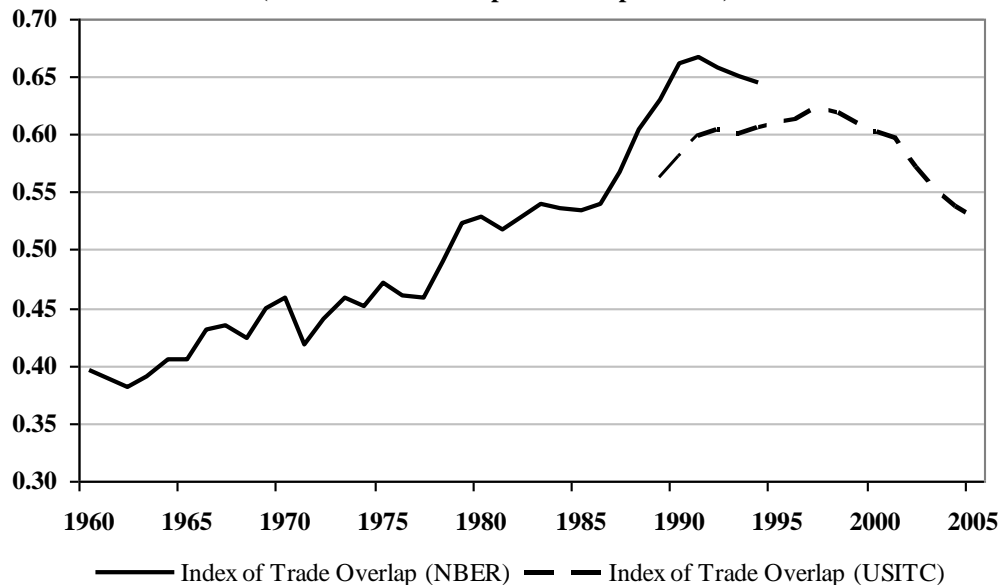
	Market A	Market B	Integrated Market
Market demand, $Q$	900,000	1,600,000	2,500,000
Equilibrium number of firms, $n$	6	8	10
Sales per firm, $q_i$	150,000	200,000	250,000
Average Price, $\bar{P}$	10,000	8,750	8,000

3. Importance of economies of scale / imperfect competition to our understanding of international trade:
  - a. Allows our models of international trade to incorporate a bit more of reality:
    - 1) Among major U.S. trading partners, only Mexico, China, and OPEC countries stand out as being significantly “different”.
    - 2) Among major U.S. exporters, many are dominant firms in their industries, and the assumption of perfectly competitive markets seems increasingly unrealistic
  - b. Allows us to explain both *inter-industry trade* and *intra-industry trade*.
  - c. Patterns of trade become more unpredictable when intra-industry trade is introduced.
  - d. Allows us to examine the increasingly important issue of dumping.
4. The balance between inter-industry and intra-industry trade flows is commonly measured by Gruebel-Lloyd indexes, which disaggregate international trade by commodity groups or industry classification and measure the degree of overlap of exports and imports within commodity or industry groups. Where  $X_i$  and  $M_i$  represent a country's exports and imports in commodity group or industry  $i$ , a Gruebel-Lloyd index for a particular period,  $t$ , may be constructed as a weighted average of commodity or industry group overlap, with weights given by trade in group or industry  $i$  as a percentage of total trade:

$$I_t = \sum_i \left[ \frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \right] * \left[ \frac{(X_i + M_i)}{\sum_i (X_i + M_i)} \right]$$

This index ranges from zero when there is no overlap in commodity groups or industry classifications to one when overlap is complete. Thus, as the index approaches zero, a country is exporting and importing different things and inter-industry trade is the increasingly important form of trade in the country's overall mix of trade. Conversely, as the index approaches one, a country is exporting and importing the same things and intra-industry trade is an increasingly important element of the country's overall mix of trade. Figure 1 presents a picture of an aggregate Grubel-Lloyd index for the United States from 1960 to 2006:

**Figure 1: Index of Trade Overlap**  
 (Based on Annual Export and Import Data)



Sources of Data: National Bureau of Economic Research, World Import and Export Values, 1958-1994, (NBER); U.S. International Trade Commission Dataweb, <http://dataweb.usitc.gov/> (USITC).

5. *Dumping* is defined as selling a product in a foreign country at a price that is lower than the price charged by the same firm in its home market (international price discrimination) or at a low price, perhaps even below costs of production, in an attempt to drive competitors out of a market (“predatory” dumping).

U.S. law defines dumping as sales which occur at *less than fair value* (LTFV).

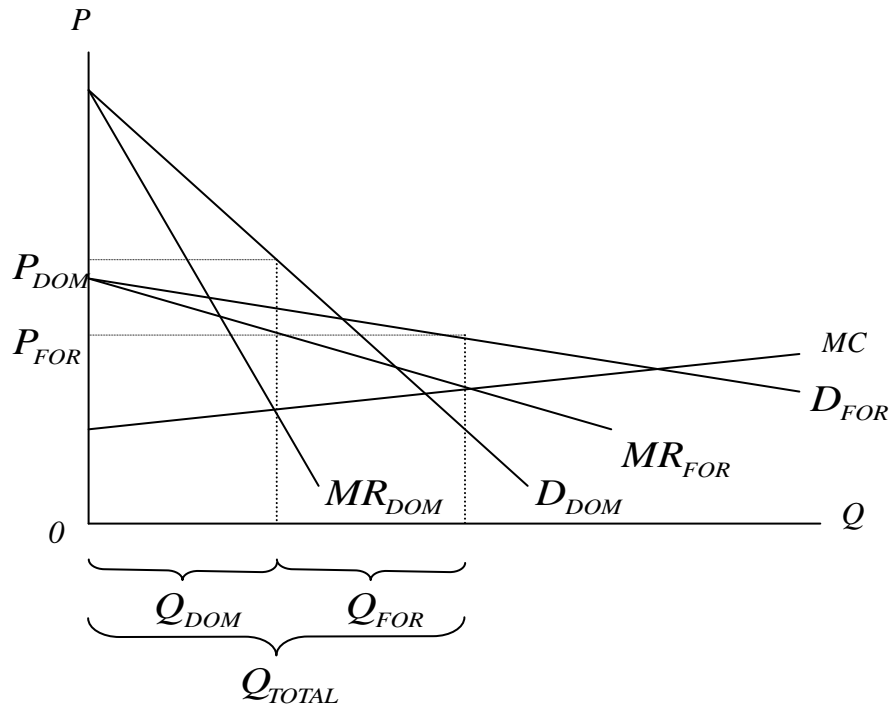
There are both *economic and legal aspects* to dumping.

a. *Economic aspects*

1) *International price discrimination*

Selling a product in a foreign country at a price that is lower than the price charged by the same firm in its home market. This can only arise in imperfectly competitive markets, where sellers face distinct markets with different price elasticities of demand. Figure 2 illustrates international price discrimination.

Figure 2



If  $\epsilon_{DOM} < \epsilon_{FOR}$ , then  $P_{DOM} > P_{FOR}$ . This follows from  $P = \frac{MC}{1 + \frac{1}{\epsilon}}$ .

A reasonable conjecture seems to be that firms sometimes consider themselves to be in a more competitive environment in foreign markets than in their home markets, particularly when they are first entering the foreign market.

Notice that this interpretation requires imperfectly competitive markets (firms possessing some degree of monopoly power), and imperfectly integrated markets (segmented international markets and limited international arbitrage). The second of these conditions is met when there are transportation costs.

2) *Predatory dumping*

Selling a product in a foreign country at a price that is below production costs. Such a practice is necessarily strategic in character.

3) *Sporadic dumping*

Selling a product in a foreign country at a price that is lower than the price charged by the same firm in its home market or that is below production costs in order to offset cyclical downturns in the domestic market which might otherwise necessitate price or workforce reductions. Such a practice is also strategic in character, but not predatory in intent.

b. Legal Aspects (U.S. trade law)

- 1) “*Fair value*” rules and antidumping legislation. Under certain circumstances, a special tariff may be imposed on foreign goods when a determination is made that the goods are being sold at less than fair value (LTFV). In addition to showing sales at LTFV, U.S. law requires that in order to qualify for such antidumping tariffs, it is necessary to show that the dumping has “materially injured” a domestic industry or threatens to injure a domestic industry.

Determination of fair value usually entails comparison to prices for identical goods in the exporter’s home market, or in third-country markets. Alternatively, average domestic costs of production are used, to which is added 10% for general expenses and at least 8% for profits.

- 2) Antidumping cases and the U.S. International Trade Commission (USITC). Antidumping cases begin with a petition to the U.S. Department of Commerce and the USITC. The ITC is an independent, quasi-judicial agency, headed by five commissioners, who are appointed by the president, and staffed by economists and trade lawyers. The ITC considers the following areas when determined the presence of material injury:

- Sales, market share, profits
- Productivity
- Return on investment
- Capacity utilization and inventories
- Employment and wages

- 3) Countervailing duties

When dumping is determined to be attributable to foreign government export subsidies, the antidumping tariff is called a countervailing duty.

6. External economies of scale and international trade.

- a. Specialized suppliers, knowledge spillovers, and industry “clusters”
- b. Dynamic increasing returns

### Assignment 5

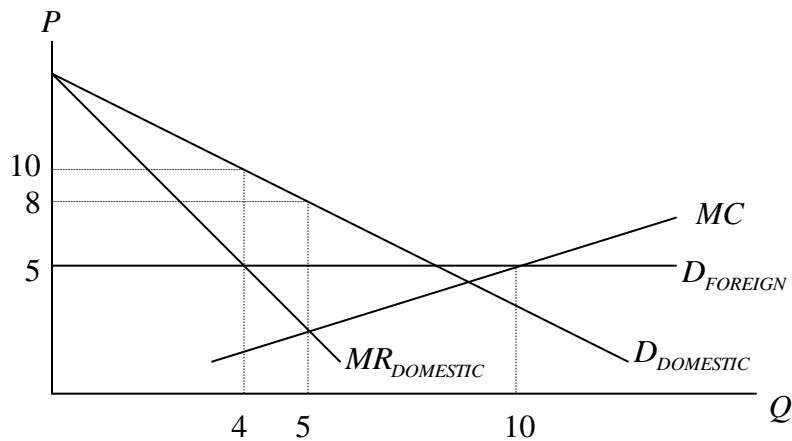
#### Discussion Questions

Krugman and Obstfeld, (8<sup>th</sup> ed.), pages 150 – 151: 6, 7, 8, 11

#### Problems

Krugman and Obstfeld, (8<sup>th</sup> ed.), pages 150 – 151: 4, 5

1. Suppose that the figure below represents the demand and cost functions facing a Brazilian Steel firm that possesses significant market (monopoly) power.



- a. If it were unable to export, what quantity would it sell in its domestic market and at what price?

Suppose instead that this firm can export as much as it likes of its steel at the world price and that it can practice international price discrimination.

- b. How much steel would the firm sell domestically, and at what price?
- c. How much steel would the firm export, and at what price?