9. *Import quotas* restrict the quantity of a particular import, thereby increasing the domestic price, increasing domestic production, and creating a benefit for those who are allowed to import the quantity allotted. These benefits are called *quota rents*.

10. Assuming perfectly competitive markets for goods, quotas are similar to tariffs since the restriction in the amount imported leads to a higher domestic price. However, the welfare implications of quotas are different from those of tariffs depending on who earns the quota rents. These rents might be earned by firms in the importing country (if they have the licenses to import the good), or by firms in the exporting country (if the foreign government administers the quota), or by the government in the importing country (if it auctions off the quota licenses). The last case is most similar to a tariff, since the importing government earns the revenue.

KEY TERMS

trade policy, p. 272
import tariff, p. 272
import quota, p. 272
dumping, p. 273
export subsidies, p. 274
safeguard provision, p. 274
escape clause, p. 274
regional trade agreements, p. 274
free-trade areas, p. 274
customs unions, p. 274
consumer surplus, p. 276
producer surplus, p. 276
small country, p. 278
import demand curve, p. 279
deadweight loss, p. 284
production loss, p. 284
consumption loss, p. 285
dispute settlement procedure, p. 289
tariff war, 290
large country, p. 290
terms of trade, p. 293
terms-of-trade gain, p. 294
optimal tariff, p. 295
Multifibre Arrangement (MFA), p. 298
equivalent import tariff, p. 300
quota rents, p. 301
quota licenses, p. 301
rent seeking, p. 301
"voluntary" export restraint (VER), p. 303
"voluntary" restraint agreement (VRA), p. 303

PROBLEMS

1. The following questions refer to **Side Bar: Key Provisions of the GATT.**
   a. If the United States applies a tariff to a particular product (e.g., steel) imported from one country, what is the implication for its steel tariffs applied to all other countries according to the "most favored nation" principle?
   b. Is Article XXIV an exception to most favored nation treatment? Explain why or why not.
   c. Under the GATT articles, instead of a tariff, can a country impose a quota (quantitative restriction) on the number of goods imported? What has been one exception to this rule in practice?

2. Consider a small country applying a tariff, t, to imports of a good like that represented in Figure 8-5.
   a. Suppose that the country decides to *reduce* its tariff to t'. Redraw the graphs for the Home and import markets and illustrate this change. What happens to the quantity and price of goods produced at Home? What happens to the quantity of imports?
   b. Are there gains or losses to domestic consumer surplus due to the reduction in tariff? Are there gains or losses to domestic producer surplus due to the reduction in tariff? How is government revenue affected by the policy change? Illustrate these on your graphs.
   c. What is the overall gain or loss in welfare due to the policy change?

3. Consider a large country applying a tariff, t, to imports of a good like that represented in Figure 8-7.

a. How does the export supply curve in panel (b) compare with that in the small-country case? Explain why these are different.

b. Explain how the tariff affects the price paid by consumers in the *importing* country and the price received by producers in the *exporting* country. Use graphs to illustrate how the prices are affected if (i) the export supply curve is very elastic (flat) or (ii) the export supply curve is inelastic (steep).

4. Consider a large country applying a tariff, t, to imports of a good like that represented in Figure 8-7. How does the size of the terms-of-trade gain compare with the size of the deadweight loss when (i) the tariff is very small and (ii) the tariff is very large? Use graphs to illustrate your answer.

5. a. If the foreign export supply is perfectly elastic, what is the optimal tariff Home should apply to increase welfare? Explain.

b. If the foreign export supply is less than perfectly elastic, what is the formula for the optimal tariff Home should apply to increase welfare?

c. What happens to Home welfare if it applies a tariff higher than the optimal tariff?

6. Rank the following in ascending order of Home welfare and justify your answers. If two items are equivalent, indicate this accordingly.

a. Tariff of t in a small country corresponding to the quantity of imports M

b. Tariff of t in a large country corresponding to the same quantity of imports M

c. Tariff of t' in a large country corresponding to the quantity of imports $M' > M$

7. Rank the following in ascending order of Home welfare and justify your answers. If two items are equivalent, indicate this accordingly.

a. Tariff of t in a small country corresponding to the quantity of imports M

b. Quota with the same imports M in a small country, with quota licenses distributed to Home firms and no rent seeking

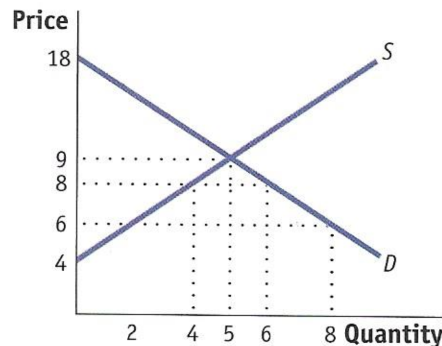
c. Quota of M in a small country with quota licenses auctioned to Home firms

d. Quota of M in a small country with the quota given to the exporting firms

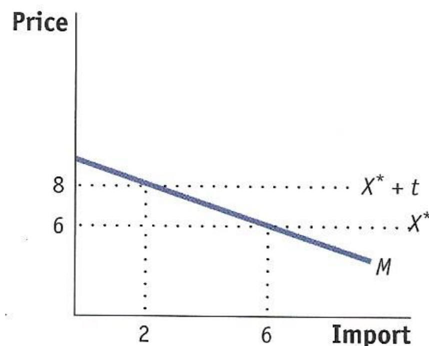
e. Quota of M in a small country with quota licenses distributed to rent-seeking Home firms

8. Suppose Home is a small country. Use the graphs below to answer the questions.

(a) Home Market



(b) Import Market



a. Calculate Home consumer surplus and producer surplus in the absence of trade.

b. Now suppose that Home engages in trade and faces the world price, $P^* = \$6$. Determine the consumer and producer surplus under free trade. Does Home benefit from trade? Explain.

c. Concerned about the welfare of the local producers, the Home government imposes a tariff in the amount of \$3 (i.e., $t = \$3$). Determine the net effect of the tariff on the Home economy.

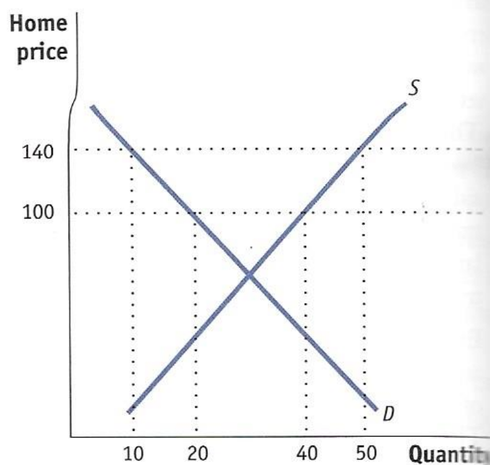
6. A Nash equilibrium in a game is a situation in which each player is making the best response to the action of the other player. In a game with multiple Nash equilibria, the outcome can depend on an external factor, such as the ability of one player to make the first move.
7. Export subsidies can affect the Nash equilibrium of a game by altering the profits of the firms. If a subsidy increases the profits to a firm by more than the subsidy cost, then it is worthwhile for the government to undertake the subsidy. As we have seen, though, subsidies are not always worthwhile unless they can induce the competing firm to exit the market altogether, which may not occur.

KEY TERMS

export subsidy, p. 357
Common Agricultural Policy (CAP), p. 358
indirect subsidies, p. 358
domestic farm supports, p. 358
deadweight loss, p. 363
production loss, p. 363
consumption loss, p. 363
terms of trade, p. 364
production subsidy, p. 368
targeting principle, p. 372
externality, p. 373
strategic advantage, p. 373
imperfect competition, p. 373
duopoly, p. 373
game theory, p. 374
payoff matrix, p. 374
Nash equilibrium, p. 375
first mover advantage, p. 376

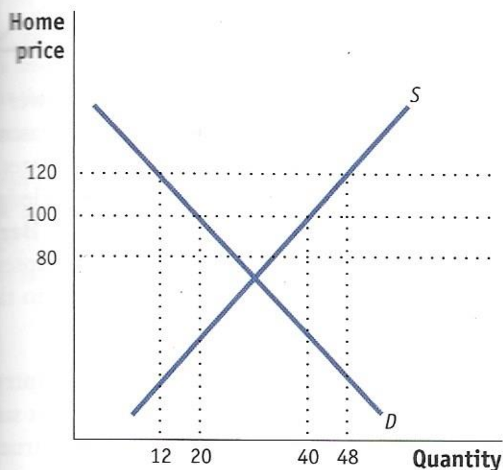
PROBLEMS

1. Describe the impact of each of the following goals from the Hong Kong WTO meeting on (i) domestic prices and welfare of the country taking the action and (ii) world prices and welfare for the partner countries.
   a. Elimination of agriculture export subsidies
   b. Reduction of agricultural tariffs
   c. Duty-free, quota-free access for 97% of goods originating in the world's least developed countries
2. Consider a large country with export subsidies in place for agriculture. Suppose the country changes its policy and decides to cut its subsidies in half.
   a. Are there gains or losses to the large country, or is it ambiguous? What is the impact on domestic prices for agriculture and on the world price?
   b. Suppose a small food-importing country abroad responds to the lowered subsidies by lowering its tariffs on agriculture by the same amount. Are there gains or losses to the small country, or is it ambiguous? Explain.
   c. Suppose a large food-importing country abroad reciprocates by lowering its tariffs on agricultural goods by the same amount. Are there gains or losses to this large country, or is it ambiguous? Explain.
3. Suppose Home is a small exporter of wheat. At the world price of $100 per ton, Home growers export 20 tons. Now suppose the Home government decides to support its domestic producer with an export subsidy of $40 per ton. Use the following figure to answer these questions.



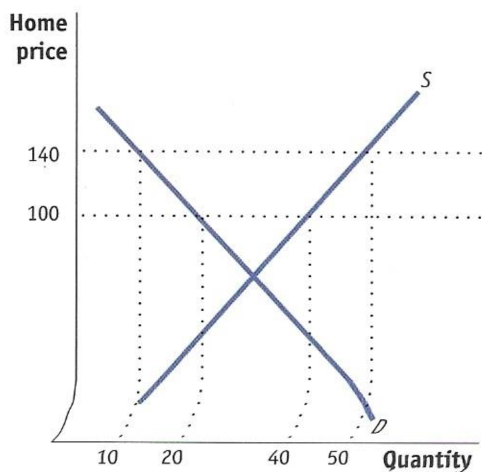
a. What is the quantity exported under free trade and with the export subsidy?
b. Calculate the effect of the export subsidy on consumer surplus, producer surplus, and government revenue.
c. Calculate the overall net effect of the export subsidy on Home welfare.

4. Refer to Problem 3. Rather than a small exporter of wheat, suppose that Home is a large country. Continue to assume that the free-trade world price is $100 per ton and that the Home government provides the domestic producer with an export subsidy in the amount of $40 per ton. Because of the export subsidy, the local price increases to $120 while the foreign market price declines to $80 per ton. Use the following figure to answer these questions.



a. Relative to the small-country case, why does the new domestic price increase by less than the amount of the subsidy?
b. Calculate the effect of the export subsidy on consumer surplus, producer surplus, and government revenue.
c. Calculate the overall net effect of the export subsidy on Home welfare. Is the large country better or worse off as compared to the small country with the export subsidy? Explain.

5. Refer to Problem 3. Suppose Home is a small exporter of wheat. At the world price of $100 per ton, Home growers export 20 tons. But rather than an export subsidy, suppose the Home government provides its domestic producer with a production subsidy of $40 per ton. Use the following figure below to answer these questions.



a. What is the quantity exported with the production subsidy?
b. Calculate the effect of the production subsidy on consumer surplus, producer surplus, and government revenue.
c. Calculate the overall net effect of the production subsidy on Home welfare. Is the cost of the production subsidy more or less than the cost of the export subsidy for the small country? Explain.

6. Boeing and Airbus are the world's only major producers of large, wide-bodied aircrafts. But with the cost of fuel increasing and changing demand in the airline industry, the need for smaller regional jets has increased. Suppose that both firms must decide whether they will produce a smaller plane. We will assume that Boeing has a slight cost advantage over Airbus in both large and small planes, as shown in the following payoff matrix (in millions of U.S. dollars). Assume that each producer chooses to produce only large, only small, or no planes at all.

a. What is the Nash equilibrium of this game?
b. Are there multiple equilibria? If so, explain why. *Hint:* Guess at an equilibrium and then check whether either firm would want to change its action, given the action of the other firm. Remember that Boeing can change only its own action, which means moving up or down a column, and likewise, Airbus can change only its own

		Airbus		
		Large planes	Small planes	Not produce
Boeing	Large planes	10, -5	115, 125	115, 0
	Small planes	150, 100	15, 0	150, 0
	Not produce	0, 100	0, 125	0, 0

action, which means moving back or forth on a row.

7. Refer to Problem 6. Now suppose the European government wants Airbus to be the sole producer in the lucrative small-aircraft market. Then answer the following:
   a. What is the minimum amount of subsidy that Airbus must receive when it produces small aircraft to ensure that outcome as the unique Nash equilibrium?
   b. It is worthwhile for the European government to undertake this subsidy?

8. Here we examine the effects of domestic sales taxes on the market for exports, as an example of the "targeting principle." For example, in the domestic market, there are heavy taxes on the purchase of cigarettes. Meanwhile, the United States has several very large cigarette companies that export their products abroad.
   a. What is the effect of the sales tax on the quantity of cigarette exports from the United States? *Hint:* Your answer should parallel the case of production subsidies but for a consumption tax instead.
   b. How does the change in exports, if any, due to the sales tax compare with the effect of an export subsidy on cigarettes?

9. Refer to Problem 8. Based on your answer there, would foreign countries have a reason to object to the use of a sales tax on cigarettes by the United States? Based on your knowledge of the GATT/WTO provisions (see **Side Bar: Key Provisions of the GATT** in Chapter 8), are foreign countries entitled to object to the use of such a tax?

10. To improve national welfare, a large country would do better to implement an export subsidy rather than an import tariff. Is this true or false? Explain why.

11. Who gains and who loses when governments in Europe and the United States provide subsidies to Airbus and Boeing?

12. Explain why the WTO is more concerned with the use of direct export subsidies than production subsidies in achieving the same level of domestic support.

13. Provide motivations for the use of export subsidies. Does your answer depend on whether firms compete under perfect or imperfect competition?