

CHAPTER 12

Trade Policy and Imperfect Competition

In this chapter the focus on trade policy shifts in two ways. We depart from the assumption that markets for goods, services, and factors of production are purely competitive and allow for elements of monopoly and oligopoly. The effects of these market structures are studied mainly in individual markets (partial equilibrium) rather than in the economy as a whole (general equilibrium). Second, because many practical issues of trade policy, both old and new, turn on imperfect competition, we align the theory closely with its empirical applications.

12.1 Monopoly and the Gains from Trade

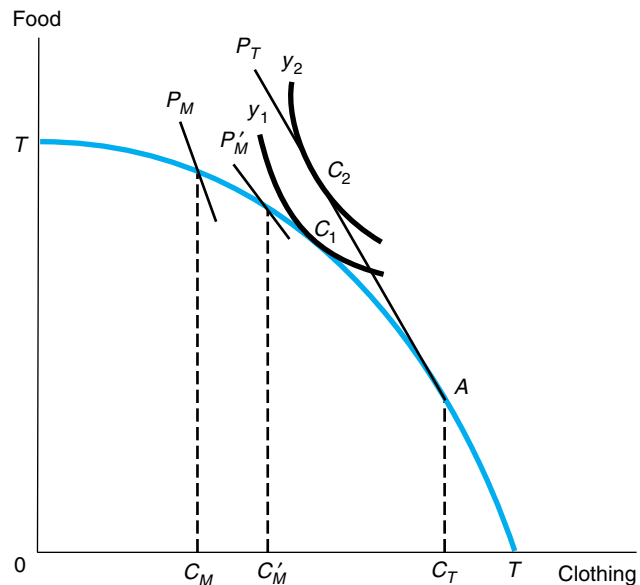
The most basic connection between imperfect competition and international trade lies in the ability of international competition to limit distortions caused by monopolies in a nation's product markets. We show this theoretically; then we consider evidence from real-world markets.

Monopoly and Import Competition

“The tariff is the mother of the trusts” was a charge heard often in the United States at the end of the nineteenth century. It meant that domestic producers who had worked out collusive agreements among themselves could not raise prices and exploit consumers without help from tariffs, which kept import competition away. Indeed, the gains from trade are amplified when foreign competition undercuts a monopoly's ability to raise its price above long-run marginal cost (the benchmark for an efficient, competitive price). This is illustrated in Figure 12.1, which shows not the monopoly's demand and cost curves but the effect of its behavior on resource allocation for the economy as a whole. If the economy were closed and both the clothing and food industries competitive, production and consumption would be at point C_1 , and the slope of a tangent at that point would indicate the equilibrium price. It is assumed, however, that the food industry is monopolized. The monopoly maximizes its profits by producing less than the competitive output and charging a price higher than its marginal cost. Thus, in the two-good model of the economy, it restricts its output to some level such as F_M or F'_M , causing too many factors of production to be shifted into the clothing industry. The monopoly price distorts the economy's relative prices to some value

FIGURE 12.2**Trade Breaks Up a Monopoly:
Exportables**

Without trade, monopolized clothing production at C_M or C'_M is below the closed-economy competitive level. When trade is opened at world prices P_T , the monopolist must trade as a pure competitor on the world market and produces C_T . Domestic price of clothing can either rise (from P'_M) or fall (from P_M).



import competition. Figure 12.2 shows the effect of monopoly in the clothing industry. (The food industry is now assumed to be competitive.) In the absence of trade, output might be restricted to C_M or C'_M , corresponding to relative prices P_M or P'_M , and higher than would prevail in the competitive closed economy at C_1 . Exposing the monopoly to world price ratio AC_2 (shown by the slope of line P_T) induces it to expand its output. Because it is assumed there is no restriction on imports of clothing at these same world prices, the monopoly can no longer exploit the downward-sloping domestic demand curve. Instead it must sell on the foreign and domestic markets at the world price. Paradoxically, the actual domestic price of clothing could either rise or fall when the economy is opened to trade. If the nation's comparative advantage is very great, the high closed-economy monopoly price might be pulled up to a still higher world price (P'_M is flatter than P_T), but the force of international competition could also make the price fall (P_M is steeper than P_T). Once more, the economy's total gain in welfare consists of the conventional gains from trade plus an extra gain that arises from elimination of the monopolistic distortion of production.

Monopoly and Exports in Practice: U.S. Steel in 1900

Time and again, trade has reduced the power of national monopolies. Still, its practical effect is both more limited and more complex than the preceding theory would suggest. Consider as an example the early years of the United States Steel Corporation, formed in 1898 by a consolidation of many previously independent companies. It controlled approximately two thirds of U.S. production of major steel products, and it also enjoyed tight control over the iron ore deposits in Minnesota and Michigan, thereby gaining protection from the threat of entry by new domestic competitors. Just at the time of

U.S. Steel's formation, the prices of pig iron (an intermediate product in steelmaking) and the major finished products nearly doubled. That increase itself was not the handiwork of the newly dominant firm because it took place in British markets as well. However, outside the United States, prices quickly retreated, whereas at home they were kept at this newly elevated level. Indeed, during the next decade the domestic pig iron price stayed about 40 percent above the U.K. price plus the U.S. tariff. Transportation costs were apparently high enough that this differential led to substantial imports only in boom years, when the U.S. price became 70 to 80 percent higher than the U.K. price plus the U.S. tariff, setting off a burst of imports.

The United States had in fact become a significant exporter of iron and steel by this time, and U.S. Steel's elevated domestic price was a dire threat to its export sales. The problem had a simple solution: U.S. Steel charged its monopoly price on domestic sales while selling abroad for whatever price it could get. Prices of steel rails for export were sometimes only 75 percent of their domestic level. Transport costs and tariffs were high enough that it did not pay domestic rail buyers to bid these bargain goods away from favored foreign buyers. (This practice of selling cheaply abroad, known as dumping, is considered in Section 12.3.) Thus, although international trade did limit U.S. Steel's monopoly power as theory suggests it would, the presence of high tariffs and transport costs and the feasibility of dumping left the company with access to generous monopoly profits in its early years.¹

Economists studying trade and market competition in present-day industries often use statistical methods to compare the situations of different industries—those with substantial or little import competition and those with few sellers (perhaps approaching monopoly) or many sellers (close to pure competition). What they find repeatedly—not just in the United States, but for many countries and periods of time—is that freedom from import competition is a necessary condition for such excess profits, as is a small enough number of competitors that they behave in a monopolistic fashion. A monopoly-elevated price pulls in more imports, which erode the monopoly's profits.²

Every industrial country maintains some type of antitrust or competition policy that seeks to avert monopoly-type distortions in domestic markets. It has been argued, quite properly, that applications of these policies should take international competition into account. The United States, for example, maintains “merger guidelines” to determine when rival firms that merge can be presumed to obtain market shares high enough to threaten monopoly. These guidelines now take account of import competition. Whereas large countries whose domestic markets are only moderately affected by international competition tend to take competition policy seriously, most small ones with highly open markets count on trade to do the job.

¹This information is taken from Donald O. Parsons and Edward John Ray, “The United States Steel Consolidation: The Creation of Market Control,” *Journal of Law and Economics*, 18 (April 1975): 181–219.

²Examples of these studies are Thomas A. Pugel, “Foreign Trade and U.S. Market Performance,” *Journal of Industrial Economics*, 29 (December 1980): 119–129; and Michelle M. Katicis and Bruce C. Petersen, “The Effect of Rising Import Competition on Market Power,” *Journal of Industrial Economics*, 42 (September 1994): 277–286.

12.2 Cartels and the Interests of Producing and Consuming Countries

That international trade pays dividends by enforcing market competition and enlarging the gains from trade is a simple message—simple because each country's gains are independent of its neighbors' actions. Noncompetitive markets present a more complex issue, however, when monopoly overflows into international trade. The problem that arises is exactly that identified with the optimal tariff (Section 10.3). When a national monopolist earns profits on exports sold to foreigners, those profits both enrich the monopolist and enter into the exporting country's national income. When the monopolist snatches profits from domestic customers, these represent a redistribution of national income. (The deadweight loss that occurs when buyers cut back on purchases of monopolized goods is a real cost in either case.) Just as countries' interests clash when they attempt to monopolize their trade through tariffs, they may also clash over monopoly prices in international trade.

This section considers this issue in a traditional context—that of international cartels and the divergent interests of producing and consuming countries. Section 12.3 reviews some new thinking about national policies designed to capture monopoly gains or to fight off such raids.

The Organization of Petroleum Exporting Countries

We start with the best known and most successful cartel in history, the Organization of Petroleum Exporting Countries (OPEC). For at least a dozen years starting in 1973, OPEC kept the price of crude oil far above what a competitive market would set. The excess profits are indirectly apparent in the cash buildups that corresponded to the OPEC members' export surplus of \$60 billion in 1974 and of almost twice that in 1980 after another price increase. These riches resulted from the members' agreement to charge a common high price for oil. Of course, that price reduced the world's consumption of oil, not only because any price increase tends to cut the quantity demanded, but also because the disturbance reduced employment in the industrial economies, thus reducing their demand for all imports, oil included. For the cartel to hold together, its members had to accept a reduction in the quantities they produced and sold; the leading members made these cuts. However, in the 1981–1983 recession, the cartel began to crumble after appropriating vast wealth for its members and inflicting further heavy indirect costs (unemployment, inflation) on the consuming countries. Three forces finally weakened OPEC's grip on the world's oil consumers. First, many oil users made the investments necessary to shift to the use of other fuels or to reduce their fuel usage overall. Second, other would-be producers went searching for oil, and many succeeded. In 1983 OPEC's share of Western production was one third, down from two thirds a mere five years earlier. Third, some members of the cartel themselves began to cheat on its agreed price; in early 1983 OPEC had to reduce its posted price from \$34 to \$29 a barrel to acknowledge that some of its members were making spot sales at prices much below list. The decline continued, bringing the price down to \$11 a barrel in 1998, little more in real terms than the price prevailing before 1973. Then, aided by heavy

world demand, OPEC recovered some of its punch and pushed the price back above \$30 a barrel. OPEC has followed classical cartel strategies to sustain some cooperation among its members. Producers with small reserves (and the greatest incentive to cheat) got proportionally large output quotas. Saudi Arabia, the largest producer and chief enforcer, sometimes tolerated cheating and absorbed disturbances by cutting its own output, but it sometimes punished cheaters with a “tit for tat” strategy.³

Despite OPEC’s apparent departure from classic cartel status, in 2006 petroleum consumers found oil prices soaring above \$70 a barrel. The causes seem numerous and present a “supply and demand” aspect rather than monopoly behavior. They include strongly growing demand because of increased use in large successfully developing countries such as China and India but also demand in the industrial countries—notably the ever-decreasing fuel efficiency of the U.S. motor vehicle stock. They also include supply factors such as constraints on the capacity of the world’s oil-refining facilities and restricted crude-oil extraction in Iraq and other suppliers.

Commodity Agreements

OPEC’s role follows a long history of attempts by countries or producer groups to manipulate their terms of trade. Primary-product cartels first became prominent after World War I. Most of them soon failed for reasons evident from the theoretical requisites of a successful cartel: It must face a price-inelastic demand (no actual or potential close substitutes). All important producers must join the arrangement. Members must be willing to cut back production, and an enforcement mechanism must be found that can curb their incentive to cheat once price has been elevated above their marginal costs. Last, buyers must be unable (or at least disinclined) to organize to ward off the exaction of monopoly rents. Most cartels soon collapsed for want of one or another of these conditions, even after producer governments became active participants in the 1930s.

Fortunately, commodity agreements have commonly sought a different goal, more meritorious than monopoly profit, that is, the stabilization of product prices prone to high volatility. Their demands tend to be inelastic, if only because a primary product often accounts for a small fraction of the cost of the finished product that incorporates it. Supplies also tend to be inelastic because of the sunken status of producers’ costs. With both demand and supply price-inelastic, a given disturbance produces a large change in price. The developing countries that supply many such products are commonly quite specialized, so fluctuations of a major export’s price translate into large swings in the country’s national income—a source of personal disutility, badly blurred signals about investment decisions, a disaster-prone banking system, and various other problems. A case can be made for a so-called buffer-stock scheme: creating an authority with funds to buy and stockpile the commodity when its price is low and sell off its stocks when the price is high. Indeed, buying cheap and selling dear, the buffer-

³James M. Griffin and Weiwen Xiong, “The Incentive to Cheat: An Empirical Analysis of OPEC,” *Journal of Law and Economics*, 40 (October 1997): 289–316; M. A. Adelman, “Scarcity and World Oil Prices,” *Review of Economics and Statistics*, 68 (August 1986): 387–397.

stock agency should make a profit. However, with the competitive market-clearing price neither readily known nor agreed upon, observers may well disagree on whether price-raising efforts on a given day carry the market price toward or above that equilibrium price.

The operation of international commodity agreements since World War II shows this ambiguity of objectives and also illustrates the ways in which the agreements can fail. Reflecting their unclear objectives, the agreements have employed a mixture of policy instruments—buffer stocks (usable mainly for price stabilization) and export quotas (needed to secure monopoly prices). Even those agreements that succeeded for some periods of time collapsed through the failure of one or the other mechanism. An agreement of tin producers worked for a time because the producers were few and production was stable (unlike most agricultural crops). However, the buffer stock effectively ran out of funds and collapsed. The international coffee agreement, like others, failed because producers could not agree on reallocating quotas among themselves toward suppliers who were raising their efficiency (lowering marginal cost) or producing varieties in growing demand. After maintaining high and stable prices from 1980 to 1989, the agreement collapsed, and wholesale prices fell 40 percent when Brazil left it; Brazil, a large but not high-quality producer, was unwilling to accept a reduced output quota and market share.⁴

Despite this checkered experience, in the 1970s the developing countries demanded through the United Nations Conference on Trade and Development (UNCTAD) an international program of commodity agreements as the keystone of a “new international economic order.” It would involve agreements covering eighteen commodities, along with a Common Fund to finance the agreements and to assist exporters in developing countries in diversifying their economies. A much reduced version of the Common Fund was agreed to in principle in 1983, but ratification faltered. The International Monetary Fund has devised several facilities to assist countries operating buffer-stock arrangements, but they have done little business.

Economic analysis offers several points to clarify the debate over the Common Fund proposal. It was originally intended to promote not just commodity-price stabilization but also income transfers from consumers to producers through increased average prices. Unfortunately, transferring income to producers by having them restrict supply and raise their selling price is an inefficient procedure: It costs more real resources than if the buyer simply hands over an equivalent transfer of real income.

12.3 Monopoly and Policies of Exporting and Importing Countries

The world would be better off without monopolies unless they have an unavoidable “natural” basis, but most countries are happy to maximize their own incomes by using any monopoly power they may possess (or acquire through international cartels). This

⁴See Christopher L. Gilbert, “International Commodity Agreements: Design and Performance,” *World Development*, 15 (May 1987): 591–616; Robert H. Bates, *Open-Economy Politics: The Political Economy of the World Coffee Trade* (Princeton: Princeton University Press, 1997).

section considers how nations can use their market power effectively—by exploiting foreign consumers or by snatching monopoly rents away from foreign exporters. The discussion also examines the monopolistic practice of selling more cheaply abroad than at home (dumping) and the reactions of importing countries to this practice.

Exploiting Monopoly Power over Exports

The interest of an exporting country in exploiting its monopoly power in trade is obvious enough. The optimal tariff lets it achieve that goal, as was demonstrated in Chapter 10 for a general-equilibrium model with purely competitive industries. The same problem is now considered in a broader context, where each industry or market is thought of as one of many making up the economy. If the U.S. passenger aircraft industry consisted of many small firms that failed to recognize their joint monopoly power, the government would maximize national welfare by imposing an export tax. The right tax rate in this case is one that “marks up” the export price over the industry’s marginal cost by the same amount that a profit-maximizing monopolistic seller of aircraft would select.

If the aircraft industry consisted instead of a single monopolistic seller (call it Boeing), the government would presumably find the private firm more than willing to set a price to maximize its profits from export and domestic sales alike. The government still has a welfare problem on its hands, however, because the excess of price over marginal cost to domestic buyers causes an undesirable loss to home consumers. The optimal policy is to compel the firm to sell domestically at a competitive price—that is, one equal to the monopolist’s marginal cost. The only problem is to find a practical policy instrument that will effectively control the domestic price while allowing the producer to monopolize the overseas markets. In practice, governments have some means to regulate the degree of competition in an industry but not much leverage for making it more competitive in its domestic than in its foreign sales. That shortcoming makes the government face a trade-off: The more monopoly it allows in the industry overall, the more monopoly profits are lifted from foreign pockets but also the more surplus is lost by domestic buyers. The government can make a second-best choice—with the right degree of monopoly, a slight increase adds just enough income from exporting profits to offset the consequent extra deadweight loss of domestic consumers’ surplus. Other things being equal, the welfare-maximizing degree of monopoly corresponds to the proportion of its output that the domestic industry exports.

Manipulating the degree of monopoly in an exporting industry to attain this second-best outcome seems impractical and much more complicated than simply setting an optimal tariff (tax) on exports—and it is. Nonetheless, countries can be observed casting about for second-best ways to garner export profits without using export taxes. For the United States, at least, the explanation is easily found in the U.S. Constitution, Article I, Section 9, which prohibits taxes on exports. One substitute device, useful when the exporting industry consists of many competitive suppliers, is to allow them to form a cartel to manage their export sales while forbidding them to collude in selling to the domestic market. The United States permits such cooperative export agreements under the Webb-Pomerene Act, and other countries employ similar policies. Indeed, just as theory predicts, the more important an exporting activity is for a country, the

more generously does the country allow collusion among its exporters (at the risk that this collusion will spill over onto the domestic market and cause deadweight losses to domestic consumers).⁵

National Welfare and International Oligopoly

In the years since World War II, the number of important trading countries in the world economy has grown continuously. The European nations and Japan recovered from the war and then proceeded to narrow the gap in average productivity with the United States. More recently, the emergence of the newly industrialized countries has further enlarged the cast of significant trading nations. With more nations competing, situations in which individual countries, let alone single firms, possess substantial worldwide monopoly power over significant products have grown refreshingly less common. For that reason, OPEC has had no imitators, and in practice the exploitation of single-nation monopoly power is a minor issue. Nonetheless, some important industries are highly concentrated, with few significant sellers worldwide. Automobiles, semiconductors, large computers, large passenger aircraft, turbine generators, and aluminum are a few examples of world oligopolies.

Economists have recently addressed the policy problem of how a country maximizes its welfare when it serves as the home base for only part of a world oligopoly. If it takes a leaf from OPEC's book, it simply works out an agreement with the other producing nations to run a joint monopoly at the expense of consuming nations. For reasons suggested in Section 12.2, this solution is seldom used. Rather, countries define the policy problem as a search for the best method of boosting the home producer's position relative to other members of the international oligopoly. Policy proposals all too often pass up economic reasoning for sporting metaphors: "How can we strengthen our 'national champion' so that the firm can do battle more effectively with its international rivals?" Admittedly, driving the rivals out of business and enjoying a full-blooded monopoly has its economic attractions. Nonetheless, slaughtering one's oligopolistic rivals is usually infeasible, and even if feasible, it may still be unprofitable.⁶

Here some recent theories about national policy-making enter the picture. Suppose that a national firm faces just one competitor, located in a foreign country. That is, the market structure is an international duopoly, with both firms exporting to the rest of the world. Can the government do anything to help the national champion to a larger slice of the duopoly profit or to enlarge the world profit to be sliced? The scope available for national policy depends very much on how the two duopolists compete with one another. If they have formed an OPEC-style cartel to extract maximum joint profit from the world economy, there is probably little that the home government can do unless it can help the home firm bargain for a larger share of that profit.

⁵A. A. Auquier and R. E. Caves, "Monopolistic Export Industries, Trade Taxes, and Optimal Competition Policy," *Economic Journal*, 89 (September 1979): 559–581.

⁶Unprofitable because to drive a rival from the market, the aggressor must charge low prices in the short run or otherwise run losses to inflict large (fatal?) losses on the victim. Even if the attack succeeds and monopoly profits then flow in abundance, they lie in the future; their present value may not offset the profits forgone in the initial period of warfare. And the future profits themselves might induce new competitors to enter.

The two duopolists might be less cooperative, however, and in that circumstance recent theoretical models become relevant. The theory of oligopolistic markets in general is indeterminate, meaning that the sellers can interact with one another in any of several ways. We can define some theoretical possibilities but cannot predict in general what output an oligopoly will produce between the reference points of the outputs that purely competitive and purely monopolistic producers would select in the same circumstances. Despite this fundamental ignorance, a popular strategy for modeling oligopoly markets is to assume that the rival sellers do not cooperate in a joint monopoly; indeed, they do not cooperate at all but instead act as if each expects no changes in its rivals' prices or outputs in response to its own moves in the market. Each duopolist knows that increasing its output will drive down the world price because it is a big player on the world market, but it anticipates no reply from its foreign rival. This assumption is implausible for a duopoly, but it makes more sense in oligopolies with enough firms that any one rival holds no systematic expectation about competitors' responses. Also, the assumption is neither particularly optimistic nor pessimistic: At best, when the home firm expands output, it might hope its rival would "move over," reducing output to keep the world price from falling; at worst, it might fear that the rival will come out swinging and expand its own output to maintain its market share, further depressing world price. The assumption that a rival's output will not react to a competitor's output change is called the *Cournot assumption*, and it yields definite conclusions about what output the duopoly will produce and how much monopoly profit its members will earn. As expected, the output is greater than a cartel or joint monopoly would select, and the profit is less, because no collusion occurs.

Profits obtained by the home duopolist go into the national income. What can the government do to enlarge them? The appendix to this chapter shows that by subsidizing the home firm's output, it is possible to increase the profit it obtains (and thus national income) and to reduce the profit of the foreign rival (and its homeland's national income). The intuition behind the result is simple. If the duopolists' behavior follows the Cournot assumption, then an increase in the home firm's output in response to the subsidy causes its rival to contract output. World output still increases, and world price and profit fall, but the firm's enlarged market share gives it a sufficiently bigger share of the shrunken profit pie to make it—and the country—better off.

The Cournot model of duopoly (or oligopoly) is bothersome because sellers in many markets seem to compete by quoting prices rather than setting outputs. The duopoly model can be reconstructed by assuming that each seller sets price on the assumption that its rival's price will remain unchanged—called the *Bertrand assumption*. The market equilibrium is similar to the Cournot equilibrium, if it is also assumed that the duopolists' products are differentiated from one another, and leads to a similar conclusion—that the market price will be set at a level lying above the pure-competition price and below the pure-monopoly price. (Without differentiation, the Bertrand assumption implies that duopolists will settle on the purely competitive price, which is implausible.)

If the world duopoly consists of Bertrand players, can the government once more maneuver the home champion into a superior position? The answer is again affirmative, but—because the Bertrand assumption implies more aggressive behavior than

Cournot's—the appropriate policy this time is to tax rather than subsidize the home company's exports. When the firm, hit with a tax, raises its price and supplies the smaller output that is demanded, its rival will respond by also raising its price and probably lowering its output. Thus the objective in each case is to induce the foreign firm to behave less aggressively.

At this point, the policy maker asks this hard question: “How do I know whether the Cournot or the Bertrand assumption fits a given market, so I can tell whether to subsidize or to tax?” The answer, unfortunately, is that neither assumption can be confirmed by direct observation; in fact, neither approach comes very close to characterizing the behavior of any particular oligopoly. At this point, the policy advice stemming from these models of international duopoly tends to evaporate into nothing more than an engaging curiosity.⁷

Fighting Off Monopoly Power over Imports

So far the discussion has concentrated on how a country might benefit from monopoly power over its exports. The importing country, however, faces the symmetrical problem of how to fight off raids on its economic welfare by monopolists of the goods that it imports. Although recent theoretical research supplies some new insights, it is necessary to recall the message of the optimum tariff for a single importing industry. If a country faces an upward-sloping supply curve for imports, it can benefit from purchasing them as a *monopsonist* (which is what a sole buyer is called). Each additional unit bought (per period of time) drives up the price and thus the cost of every other unit bought. The monopsonist cuts back the quantity bought to the point where the total extra cost due to the last unit is just equal to its marginal value to the user (normally the price that customers pay for a unit of the import).⁸ The country could accomplish this cutback either by allowing some import agent to serve as the monopsony buyer or by setting a tariff rate that would achieve the same restriction of imports. The resulting gain is quite consistent with the imports being supplied competitively by their foreign producers. The essential condition is simply that when less is purchased, the asking price goes down.

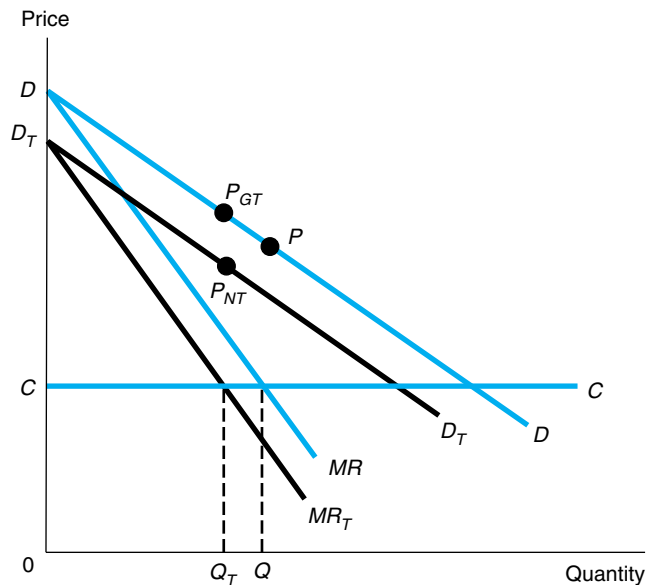
However, what if the foreign supplier is a monopolist? When OPEC quadrupled the price of oil in 1973–1974, some people urged the United States to impose a tax on imported crude oil. They advanced, among other reasons, the likelihood that OPEC would react by backing off partially from its price increase. That prediction has some logic behind it, as can be seen in Figure 12.3, which shows the U.S. demand for imported petroleum as *DD*. It is assumed that OPEC can produce petroleum at a constant marginal cost of *CC*. That assumed constancy is important: In this model the buyer's gains do not depend on an upward-sloping cost or supply curve, as they do in the traditional

⁷Simple and judicious accounts of these and related models can be found in Paul R. Krugman, ed., *Strategic Trade Policy and the New International Economics* (Cambridge, MA: MIT Press, 1986).

⁸This decision is symmetrical with the action of a monopolistic seller, which equates its marginal cost to the net gain in total revenue (i.e., marginal revenue) received when it pushes another unit onto the market and lowers the price.

FIGURE 12.3**Using Import Duty to Reduce Foreign Monopolist's Price**

Import duty reduces demand for monopolized import from DD to $D_T D_T$. Monopoly reduces its price (net of tariff) from P to P_{NT} .



monopsony model summarized in the preceding paragraph. The marginal revenue curve corresponding to the U.S. import demand is MR . A profit-maximizing OPEC would set price P , and quantity Q would be imported. Now suppose that the government imposes an import duty of $\$X$ per barrel. U.S. consumers' willingness to pay for oil *net* of the newly imposed tax is described by demand curve $D_T D_T$, which is shifted downward uniformly by the amount $DD_T (= \$X)$. The profit-maximizing before-tax price charged by OPEC now falls to P_{NT} . U.S. consumers now pay a higher price gross of the tax of P_{GT} and, accordingly, they purchase less than before (Q_T). Although the consumers themselves are worse off than before the tax, the country as a whole is better off because the tax revenue, $(P_{GT} - P_{NT})Q_T$, is part of the national income and could be rebated to consumers or used to buy public goods.

This policy model shares one unhappy property with the model of international duopoly presented previously. Its policy prescription is sensitive to something of which little is known—in this case the exact shape of the demand curve. Figure 12.3 supplied a clear answer because it assumes that the demand curve is a straight line. If it had been assumed only that the curve slopes uniformly downward, however, local “wiggles” in the demand curve (and corresponding, but enlarged, wiggles in marginal revenue) could make a subsidy rather than a tax appropriate, depending on the exact point of equilibrium on the demand curve.⁹ Once again, a seemingly confident policy prescription turns on empirical conditions that can be assessed only with difficulty, if at all.

⁹See Homi Katrak, “Multi-National Monopolies and Commercial Policy,” *Oxford Economic Papers*, 29 (July 1977): 283–291; James A. Brander and Barbara J. Spencer, “Trade Warfare: Tariffs and Cartels,” *Journal of International Economics*, 16 (May 1984): 227–242; Ronald W. Jones, “Trade Taxes and Subsidies with Imperfect Competition,” *Economics Letters*, 23 (1987): 375–379.

The analysis of international duopoly applies as well to the country that imports supplies that compete with the output of the domestic duopolist. The duopoly once more offers a profit-shuffling opportunity to the home government. Home consumers buy at a price that incorporates monopoly profits—some going to the domestic duopolist, some to the foreigner. If sales are shifted to the domestic seller, consumers still suffer the deadweight loss, but the profit slice remains in the national income rather than vanishing across the border.¹⁰

In conclusion, the analysis indicates that the importing country should probably consider restricting imports whose foreign suppliers possess monopoly power. Such restrictions provide a less-than-optimal solution to the problem, however, because they increase the deadweight loss to domestic consumers even when they shift some profits away from foreign monopolists (or oligopolists). Lost from sight among these strategies for exploiting and combating monopoly power is the global interest of all participants in competitive prices (equal to long-run marginal costs). Such a global solution requires countries to agree that each will do its best to keep its domestic producers competitive, whether they sell at home or abroad.

A Monopoly Practice: Dumping

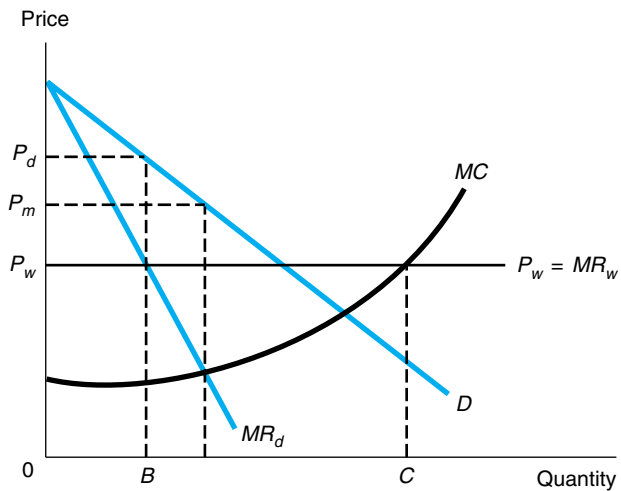
We introduce here a business practice associated with monopoly that plays a major role in trade policy. Its customary name is *dumping*, and its formal theoretical base is price discrimination. The idea is simply that a monopoly selling in two separable markets can profitably charge different prices to them, setting the higher price in the market with the less elastic demand. The term *dumping* refers to the situation of the market with more elastic demand where the monopolist sets a lower price. As a consumer, one obviously enjoys being dumped on. Why the pejorative term? Obviously, the competing producer does not enjoy facing a rival with a self-interest in charging a low price. We see in Chapter 13 that antidumping laws have become a popular way to protect domestic producers. Here we pave the way with a simple model of the seller employing price discrimination.

First of all, notice that a purely competitive firm would not sell identical goods in two different markets at different prices. Because the competitive firm perceives the market price to be unaffected by the quantity it sells, there is no reason to sell any output at less than the best price available. Therefore, dumping must be associated with departures from pure competition. Consider the domestic monopolist illustrated in Figure 12.4. Demand in the home market is given by D , marginal revenue by MR_d . If marginal cost is MC , the firm selling only in the home market maximizes profits by charging P_m , the sale price of the output for which $MC = MR_d$. The world price P_w is lower than P_m , but it still lies above MC over a substantial range of output, so the monopolist can profitably produce for export. Now suppose that different prices can be charged in the home and foreign markets, perhaps because a tariff protecting the

¹⁰An allegedly successful example of such a policy was studied by Richard Baldwin and Harry Flam, "Strategic Trade Policies in the Market for 30–40 Seat Commuter Aircraft," *Weltwirtschaftliches Archiv*, 125, 3 (1989): 484–500. Canada restricted imports from Brazil, shifting profits toward its domestic producer, while Brazilian export subsidies benefited world consumers.

FIGURE 12.4
Dumping and Discrimination Between Domestic and Foreign Markets

Monopoly faces demand curve D at home and world price P_w . If it can charge different prices at home and abroad, it sets P_d and P_w , respectively, selling OB at home and BC abroad.



home market keeps goods sold cheaply abroad from being reimported and undercutting the higher domestic price. A monopolist maximizes profits by setting a price that equates its marginal cost to the marginal revenue it can earn in each of its markets: If the marginal revenues were not equal, it would shift sales from the lower to the higher until the two are equalized. In Figure 12.4 the marginal revenue from foreign sales is equal to the world price P_w because that price is unaffected by the monopolist's level of exports. After it begins to export, the monopoly will sell in the domestic market at price P_d , which equates marginal revenue derived from the domestic market, MR_d , to that earned from foreign sales, MR_w . If total production is OC , marginal cost MC is equated to the common value of marginal revenue, and profits are maximized. Exports are BC , domestic sales OB . Notice that this discrimination between the domestic and foreign markets has caused a higher price to be charged in the domestic market than if no trade were occurring (P_d exceeds P_m).

Whereas the welfare effects of dumping on the *exporting* country are ambiguous, dumping's effects on the importer are clear. As long as the exporter finds that overseas markets are more competitive than the sheltered domestic market, the export price is set lower than the price to the exporter's home customers and lower than it would be in the absence of discrimination. The importing country therefore benefits from being offered a lower price. The welfare-maximizing importing country would encourage dumping. Evidently, importer governments view the practice through very different eyes.

Boeing versus Airbus

We close this section with a case study of a prominent international oligopoly: the rivalry between Boeing, now the sole U.S. producer of large passenger aircraft, and Airbus, a European consortium and Boeing's only rival. Boeing is the long-lived survivor of the U.S. industry, following the exit of McDonnell Douglas and Lockheed

Martin, its last two rivals. Airbus was assembled from a group of European companies with heavy involvement by the governments of France, Germany, and (later) the United Kingdom and Spain. In its early days Airbus received general and open development and production subsidies, which made it feasible for it to develop a series of aircraft models, most of which competed closely with Boeing's designs. In addition Airbus was quite skillful in both the advanced technology of its designs and the efficiency of its production process. Its share of the world market steadily increased, and since 2003 its annual deliveries have exceeded Boeing's. The latest round in their rivalry involves the market for very large aircraft to serve long-distance international routes—Airbus's gigantic A380 (555 passengers) and Boeing's 787 (a smaller craft efficient for very long distances). The two designs bet on somewhat different predictions about the evolution of the air travel market, but they are clearly close rivals. Either one of them would likely be a profitable venture for the manufacturer. Whether both can be profitable is much less clear.

The economic properties of the large-aircraft market are very distinctive. Fixed costs for design and setup for production are very high. Airbus had spent \$12 billion on the A380 even before its first test flight. Development of a new model seldom starts without some firm orders from airlines, but it falls far short of the number needed for ultimate profitability. Once production starts, unit costs decline, thanks to a steep learning curve; each doubling of cumulative output leads to a reduction of 20 percent in unit production costs. The manufacturer thus sinks a huge investment before gaining assurance that an aircraft design will be profitable (technically successful and commercially attractive). The buyers' side of the market adds another complication. Consider a large airline or aircraft leasing firm that contemplates a major purchase of either a Boeing or a competing Airbus model. It can stage an auction between the aircraft producers. The sunk development costs provide no floor for these bids, only the seller's (declining) marginal cost of production. Indeed, even the two rivals' marginal costs need not provide a price floor for an order that is critical for preserving a steady flow of production. In short, the market has a potent "winner-take-all" property. The faltering seller cannot finance new models and suffers higher production costs for extant ones.

The U.S. and European Union (E.U.) governments have been at each other's throats over the question of whether each has supported its champion with inappropriate or illegal subsidies. Airbus's production subsidies and debt write-offs were quite evident at the outset. Nowadays they principally take the form of low-interest loans to cover the cost of developing a new model. Furthermore, these launch loans shift much of the downside risk to the member governments. When attacked for these policies, the European Union in rejoinder points to the extensive development contracts Boeing has received from the U.S. government. These contracts, of course, trigger large outlays by Boeing, but they are cost-plus and (Airbus argues) give Boeing substantial contributions toward joint costs of its passenger-aircraft business as well as spillover benefits from its government-funded research. The subsidy components in these contracts (and in similar types of assistance to Airbus by the European Union) are hard to measure but undoubtedly substantial. The United States counts \$17 billion in E.U. launch loans over the past thirty-five years; the European Union spots \$23 billion research and development (R&D) subsidies to Boeing over the past thirteen years.

The U.S.-E.U. dispute has simmered for a number of years. In 1992 the parties agreed to rule out production subsidies and to limit subsidy components in launch loans. The United States agreed to limit indirect aid through Defense Department and NASA contracts to 4 percent of Boeing's civil-aircraft revenues. The rivalry between the A380 and 787 models and their huge launch costs returned the political pot to a boil, especially when Airbus announced it would adapt one of its existing models to compete with the 787. The United States demanded the removal of subsidy elements from the government aid to the launch; the European Union held out for a limitation that left considerable subsidy in place. In May 2005 the United States terminated bilateral negotiations and brought a case against the European Union before the World Trade Organization (WTO) set up to resolve just such commercial conflicts (see Section 13.2). The European Union countersued, and the machinery for adjudicating the charges started to turn. The dispute settlement panel's task is formidable because the WTO's founding document contains a general provision restricting governments' production subsidies. It contemplated the later agreement on rules suitable to the government-involved aircraft industry, but this never happened.

Why have the U.S. and E.U. governments fought so tenaciously for their corporate champions? Initially the Europeans were concerned with maintaining some capability for producing military aircraft. However, economists have suggested a purely economic motive for the European Union. Without Airbus, there was little prospect of averting a worldwide Boeing monopoly. Especially given the stiff price competition that occurs even between aircraft duopolists, that would have spelled much higher prices for aircraft (and air travel). The United States would gain—Boeing's profits exceeding U.S. consumers' losses. But the Europeans (and others) would have lost. If the E.U. subsidies "bought" this freedom from monopoly prices, they could well have achieved a net benefit for the E.U. countries.

12.4 Intellectual Property Rights

Monopoly and conflicting national interests come together on the issue of intellectual property rights (IPRs)—patents, copyright, and trademarks. These intangible assets, forms of knowledge or information, are "public goods," nonrivalrous in consumption (my use of an intangible leaves unimpaired the amount of it available to you) and nonexcludable (you cannot keep me from using it). They pose a dilemma for economic welfare. Without a legal property right in a discovery, the innovator has no way to prevent others from copying it, and thus no source of income to cover R&D costs. Given that property right, however, the innovator charges a monopoly price for the new product.

Society hence faces a trade-off. Giving innovators generous property rights maximizes the incentive to produce new knowledge and also to reveal it for further development by others (without a property right, the innovator tries to keep the discovery a secret). But the monopoly price imposes deadweight losses. In the international economy this dilemma generates a clash of interests between countries that are heavy R&D spenders and innovators and those that mainly import innovations. The former coun-

tries' national incomes benefit from strong IPRs; the latter benefit from refusing to recognize such rights and free-riding on the valuable knowledge. Large sums are at issue. In the pharmaceutical industry, which depends heavily on patents, a new drug may take \$200 million and 15 years to develop; without patent protection, such investments could not be recovered, and R&D outlays would shrivel. Lack of effective copyright enforcement in some foreign countries costs the U.S. computer software industry an estimated \$7.2 billion annually, computer games producers \$3.1 billion, cinema filmmakers \$2.3 billion, and recording labels \$1.3 billion.¹¹

Public Policy

Intellectual property rights raise two major questions for public policy. First, whether a country benefits from offering only weak IPRs depends on its own level and pace of development. Capable domestic firms want IPRs of their own to enhance their revenue productivity. Also, they can benefit from knowledge spillovers from foreigners' intellectual properties—especially from subsidiaries of foreign multinational enterprises—and hence favor national IPR properties that attract foreign subsidiaries. In the 1990s dozens of countries strengthened their IPRs. Along with their expected developmental benefits, though, there is no denying that IPRs bring large static international redistributions of wealth. The United States is the biggest winner, Brazil and Canada the biggest losers. (Japan, interestingly, is a large loser.) Second, IPRs pose a case for collective action among nations, so that the benefits spilled abroad by one country when it strengthens its IPRs tend to be offset by spills from other countries tightening theirs. An international agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) came into force as part of the World Trade Organization (discussed in Chapter 13). It set minimum standards for national IPRs and mandated mechanisms for their enforcement. It caps a large number of narrower international agreements—bilateral agreements promoted by the United States and regional trading agreements such as the North American Free Trade Agreement (Chapter 14).

Counterfeit Goods

A contentious issue of intangible property rights is the counterfeiting of trademarked goods. A trademark is a valuable intellectual property because it establishes a maker's mark or guarantee of the design or performance of the trademarked good. The consumer unaided by trademarks must either make greater investments in testing or inspecting potential purchases or take more chances on the performance of the good purchased. It is estimated that counterfeit goods account for 5 to 7 percent of all merchandise entering into international trade. China is the origin of nearly two thirds of these goods. China has lately shown great skill at producing manufactures that are well made to foreign buyers' specifications. The counterfeiter lives by these same skills. The maker of fakes may be an independent local enterprise or a firm under contract to a

¹¹Most information contained in this section is drawn from Keith E. Maskus, *Intellectual Property Rights in the Global Economy* (Washington, DC: Institute for International Economics, 2000).

foreign importer or marketer, perhaps even making unauthorized sales of the very same trademarked goods that it produces under license. The counterfeiter's skills are devoted to making its goods indistinguishable from genuine trademarked goods for the buyer.

Indistinguishable is not the same as functionally equivalent—the counterfeit automobile part may fail in half the time of a genuine one, and the counterfeit pill may contain none of the genuine drug's active ingredient. The counterfeiters' prowess increases steadily. Devices or designs developed by the trademark owner to make genuine goods harder to imitate are themselves promptly imitated, and some fakes are close enough that the trademark owner must resort to scientific testing to tell which is which. The counterfeiters also have honed their skills at getting their fakes into distribution channels overseas, where complaisant distributors (with a cut of the counterfeiter's handsome profit) may intermingle them with genuine merchandise.

Trademark owners make significant expenditures running down counterfeiters and urging governments to prosecute. They also devise market strategies to repel fakes, such as a Yamaha motorcycle model designed to be made and sold cheaply in China—cheaply enough to leave little or no profit margin for the faker.

The Chinese government, appreciating its manufacturers' profits from successful fakes, at first took a very relaxed attitude toward punishing counterfeiters. As Chinese production skills have rapidly improved, however, native manufacturers have developed their own brands and stocks of customers' goodwill. The national interest thus swings away from turning a blind eye to local fakers. Similarly, approximately 92 percent of computer software used in China is said to be pirated, and the government became aware that a local computer software industry would never develop under those conditions. This change in national interest is furthered by China's accession in 2005 to the WTO, which commits it to adhere to the rules mentioned previously, including the enforcement of intellectual property rights.¹²

12.5 Summary

International trade helps make national markets competitive when the number of domestic producers is small. This gain can occur whether the noncompetitive domestic producer faces import competition or has a comparative advantage and exports to competitive foreign markets. Either way, the gains from curbing monopoly are a dividend atop the usual gains from trade for a small country.

Conversely, a country also can gain if its export activity enjoys monopoly status, either alone or in collusion with other producers. The OPEC cartel annexed enormous monopoly profits, although these were ultimately limited by the existence of substitute energy sources, competition from independent oil producers, and the incomplete cooperation of cartel members. International commodity agreements, even with the ostensible goal of stabilizing rather than raising prices, have nonetheless usually collapsed from attempts to hold the price above a market-clearing level in the short run.

¹²Carol Matlack et al., "Fakes!" *Business Week* (February 7, 2005): 54–64.

A nation can extract available monopoly profits on its exports either by letting its national monopolist do the job or by setting an optimal tax on competitively produced exports. The former method has the disadvantage that the monopolist also imposes an undesirable loss on domestic consumers. When it shares monopoly power with a few other producers, its first objective is to collude with them for maximum joint profits (as with OPEC). If this proves infeasible, the government may be able to nudge the home producer into a more profitable position in the international oligopoly. Symmetrically, a country can increase its welfare when sellers of its imports enjoy some monopoly power. A tax on imports may cause the monopolist to reduce its price, or policies can be used to shunt business toward a competing domestic oligopolist (whose excess profits *are* part of the national income).

Dumping is a form of price discrimination between a competitive foreign market and a less competitive domestic market. One might expect importing countries to welcome the practice, but instead it is generally restricted for being unfair to domestic producers.

The market rivalry between Boeing and Airbus has its counterpart in the wrangling between the U.S. and E.U. governments over each other's subsidies to its national firm. This rivalry is owing to the "winner-take-all" structure of this industry (very high fixed costs and a steep learning curve affecting production costs).

Intellectual property rights (IPRs)—patents, copyrights, trademarks—allow producers to cover the costs of their investments in technological and cultural innovations and consumers' goodwill. This benefit comes at the cost of monopoly pricing of outputs embodying their IPR. These monopoly profits cause a conflict between countries that are big generators of IPRs (United States) and those that make large payments abroad for the use of others' IPRs (Brazil). Nonetheless, more and more countries see their interests best served by awarding strong IPRs.

China, a fecund and skillful producer of counterfeit goods, finds its interests shifting toward enforcement of trademarks as its own manufacturers grow skillful in producing high-quality trademarked goods that attract fakes.

CHAPTER PROBLEMS

1. The effect of import competition on a domestic monopolist was illustrated in Figure 12.1 in terms of general equilibrium. It can be illustrated equally well in terms of the standard graphical treatment of the monopolist in partial equilibrium. Draw this diagram, indicating the closed-economy monopolist's output and price determined by the intersection of its marginal revenue and marginal cost curves, and then show what happens when it is confronted by a fixed world price for its output.
2. Economists discussing the feasibility of international commodity-price stabilization agreements have pointed out that price stabilization is easier if the commodity can be stored at low cost. Why should that be so?
3. A country can exert its monopoly power over an export good either by organizing its competitive producers into a single monopoly seller or by imposing an export tax that

corresponds to the monopoly's profit-maximizing markup of the export price over its marginal cost. Which policy yields the higher level of welfare, and why?

4. Suppose that a nation could tackle a monopoly over imported goods either by persuading the World Court to transform the monopoly into a competitive industry or by banning imports of the monopoly's goods and giving the business instead to a domestic monopolist. Could the latter policy increase the nation's welfare? Why would it be inferior to the former?
5. A trademark gives a legal monopoly over the brand name of a product. Controversies arise because counterfeits of trademarked goods are sold in international trade. Suppose that a Taiwanese counterfeit of a Swiss watch is imported to the United States and sold at a low price; it may or may not be equivalent to the Swiss product in physical quality. How is U.S. economic welfare affected by the practice? What difference would it make if the trademark's owner were American rather than Swiss?
6. In the case of Boeing versus Airbus, evaluate the effects on welfare of the policy chosen by the United States in its dealings with Boeing and with the European Union.
7. A foreign manufacturer of a differentiated good is considering whether or not to export it to the United States. The manufacturer has a monopoly at home, but in the U.S. market it faces close competition and would have to sell at a price lower than the one that maximizes profits in its home market. Nonetheless, such export sales would be profitable for it. However, if it charges different prices at home and abroad, it is sure that its U.S. sales agency will be penalized heavily under U.S. antidumping laws. Explain why the manufacturer might choose, under those circumstances, not to export to the United States at all.
8. In 1988 the Ivory Coast, producer of a third of the world's cocoa, was upset by the decline of the world price from \$3.00 to \$1.50 a kilogram over the preceding two years. That fall had resulted from heavy planting of cocoa trees in the late 1970s. The president of the Ivory Coast announced that his country would sell no cocoa at a price less than \$2.00 a kilogram. Other cocoa-producing countries, however, were clearly willing to sell their available supplies at the world market price. Assume that cocoa supply is fixed (in the short run) and that marketwide demand elasticity is one (that is, world sales must be reduced by 1 percent to effect a 1 percent increase in price). What fraction of its crop must the Ivory Coast hold off the market to make \$2.00 the equilibrium world price? What fraction must it withhold if the elasticity of demand is only one half?

SUGGESTIONS FOR FURTHER READING

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- Krugman, Paul R., ed. *Strategic Trade Policy and the New International Economics* (Cambridge, MA: MIT Press, 1986). Summarizes theoretical research.
- Lawrence, Robert Z., and Charles Schultze, eds. *An American Trade Strategy: Options for the 1990s* (Washington, DC: Brookings Institution, 1990). Debate over strategic trade policy for the United States.
- Maskus, Keith E. *Intellectual Property Rights in the Global Economy* (Washington, DC: Institute for International Economics, 2000). Thorough treatment of national and international interests in intellectual property rights.
- Mutti, John, and Bernard Yeung. "Section 337 and the Protection of Intellectual Property in the United States: The Complainants and the Impact," *Review of Economics and Statistics*, 78 (August 1996): 510–520. A potentially legitimate form of import restriction: excluding imports that violate domestic firms' patents, copyrights, and trademarks.

APPENDIX

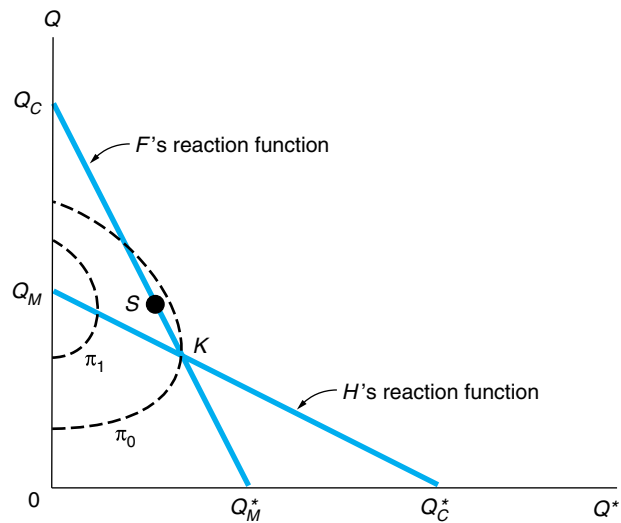
International Duopoly and National Strategy

The following is a simple formal analysis of the model used by most researchers to identify a country's opportunity to gain from profit-shifting. Suppose that the home firm (H) produces output Q while its foreign rival (F) produces Q^* . They do not collude with each other but make their decisions independently. Specifically, each selects the quantity of output that it expects will maximize its profits on the assumption that the other's quantity is given and unaffected. Each has the same average unit costs, which are independent of its output (no scale economies or diseconomies).

Their behavior is illustrated in Figure 12.A.1, which shows the foreign firm's output on the horizontal axis and the domestic firm's on the vertical axis. The device used to derive the market equilibrium is a *reaction function*, constructed as follows: Consider H 's choice of output, given whatever quantity F has decided to produce. If F were producing nothing, H would maximize profits by producing the output that maximizes monopoly profits from the world market. This is indicated by Q_M on the vertical axis. Now suppose instead that F had chosen to produce the competitive world output. The best response of H is to produce no output (point Q^*). When F selects any quantity that lies between nothing and the world competitive output, H 's best responses will lie along the line between Q_M and Q^* . This is H 's reaction function.

FIGURE 12.A.1**Possible Equilibria with Home and Foreign Duopolists**

Duopolists might reach a Cournot equilibrium (K), or government may help the home duopolist to attain the more profitable Stackelberg equilibrium (S).



So far the discussion has not explained F 's choice of output, only explored its consequences for H 's output. Constructing F 's reaction function is exactly symmetrical with constructing H 's. If H was producing the world competitive output, Q_C , F would choose to produce nothing; if H was producing nothing, F would select Q_M^* . F 's reaction function is the line connecting these two points. The industry equilibrium output for this duopoly is indicated by point K , where the two reaction functions intersect. This is called a *Cournot equilibrium*. It has the property that each duopolist is producing its most profitable output, consistent with the output choice made by the rival. Each makes some profit because (it can be shown) the industry output is less than the world competitive output. It is also greater than the world monopoly output, so the duopolists together make less profit than would a world monopolist.

To understand the government's options for profit-shifting, we must consider the firms' profits more closely. H makes the maximum possible profit if production lies at Q_M , with H producing the world monopoly output and F producing nothing. Points farther to the right along H 's reaction function yield lower and lower profits, going to zero at Q_C^* . Consider some profit level arbitrarily lower than the world monopoly profit. It could be attained at some point on H 's reaction function, but also by other pairs of duopolist outputs not lying on the reaction function. Those points would lie on a locus such as π_1 , which can be shown to have the shape illustrated in the figure. π_1 is called an *isoprofit locus* because every point on it yields the same profit. An important property is that at its intersection with H 's reaction function it is tangent to a line perpendicular to the horizontal axis; indeed, that property defines the reaction function itself.

Now consider H 's profit at the Cournot equilibrium, which lies on isoprofit locus π_0 . Notice that a stretch of F 's reaction function lies within π_0 , meaning that if H selected a higher output than that corresponding to the Cournot equilibrium (but not too much higher), not only would F reduce its output but H 's profits would increase.

Should H now seize this new strategic opportunity, it maximizes profit by committing to select an output that corresponds to point S on F 's reaction function. When H takes the initiative and picks its best point on F 's reaction function, the result is known as a *leader-follower* or Stackelberg equilibrium. Although H 's profit is higher at S than at K , the opposite holds for F ; the meek do not inherit the earth.

With this apparatus in hand, we return to the question of public policy toward international duopoly. H 's profit is part of the home country's national income; F 's is not. Therefore, some points lying above K on F 's reaction function have the clear potential for increasing the home country's welfare. Profit is shifted from the foreign to the domestic duopolist, and home consumers also gain (because total output increases and price falls). The question is, what can the home government do to achieve this result? In the Cournot model, as noted in the text, a subsidy can have this effect. What determines whether equilibrium K or S materializes? Economic theory has no general answer to this because it depends on assumed perceptions of the market rivals. There has been much interest, however, in the possibility that government might make some binding commitment, such as a subsidy to H 's research and development spending, that would effectively shift H 's reaction function upward (increase the output it selects given any output of F) and make the Cournot equilibrium coincide with point S .¹³

¹³Barbara J. Spencer and James S. Brander, "International R&D Rivalry and Industrial Strategy," *Review of Economic Studies*, 50 (October 1983): 707–722.

