Volume Title: Issues in US-EC Trade Relations

Volume Author/Editor: Robert E. Baldwin, Carl B. Hamilton and Andre Sapir, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-03608-1

Volume URL: http://www.nber.org/books/bald88-1

Publication Date: 1988

Chapter Title: Strategic Trade, Embargoes, and Imperfect Competition

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Chapter URL: http://www.nber.org/chapters/c5958

Chapter pages in book: (p. 133 - 152)

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5 Strategic Trade, Embargoes, and Imperfect Competition

Henryk Kierzkowski

5.1 Introduction

"Strategic trade" is one of those catchwords frequently used in public debates and policy pronouncements which through repetition seems to have acquired an impression of clarity. The concept is, however, ambiguous and I therefore propose to begin my paper by discussing alternative usages of the term.

Thomas C. Schelling (1984) tells the following episode in his lovely book *Choice and Consequences:* "I was invited to talk about strategic aspects of social problems. I asked what that meant. I was told it meant whatever I meant. So, with the uneasy feeling that it had just been used on me, I set out to characterize the 'strategic approach.' " As for myself, I have decided to follow a different strategy—here is this word again! I set out to see what others meant by strategic trade. This is attempted in section 5.2 which looks at the evolution of the concept in the context of U.S.–Western European trade relations. The reader must be forewarned that he will not find there a precise definition of strategic trade. Nevertheless it is interesting to see how the emphases on different aspects of the term shifts over time.

Section 5.3 of this paper presents a model of strategic trade which lends itself to policy analysis. The question I ask is the following: Can protection of an industry considered to be strategic be justified when a possibility of embargo exists. It seems that a model of monopolistic competition is best suited to answer this question because it naturally

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I wish to thank Professors K. Abbott, G. Hufbauer, and P. Mathieu for helpful comments and suggestions.

leads to concentration of production in the hands of one or a few producers. But for an embargo to be really painful there must be costs associated with replacing foreign supplies denied by it. The time necessary to build a new or reestablish an industry constitutes such a cost.

I also argue in this paper that other policy measures can be taken to minimize costs of embargo. What is really necessary is that a country move from a position of strategic dependence to that of strategic interdependence. It would, however, be costly, unwise, and almost impossible to achieve a position of total strategic independence.

5.2 Historical Background

One might expect that the Articles of the General Agreement on Tariffs and Trade would contain a definition of strategic trade. Alas, this term does not exist for the organization dealing with international trade. Only Article XXI can be construed to refer to strategic trade, albeit indirectly, as it states that the Articles of GATT need not apply in cases where essential security interests are involved. Unfortunately, the concept of "essential security interests" is even more ambiguous than "strategic trade." It is up to individual contracting parties to the GATT to decide when security interests are, or are not, at stake. It is worth recalling that the countries invoking the security exception under GATT's Article XXI were hardly ever, if at all, challenged in the past.

The country which, in the aftermath of World War II, has been preoccupied with strategic trade and remains so is the United States. This concern is to some extent shared also by the Western European countries. It is revealing therefore to take a quick look at the history of U.S.-European relations in this field.

By the late 1940s the United States sought to regulate, through domestic legislation and international collaboration, exports of goods with military and strategic importance.[1] The Export Control Act of 1949 aimed at imposing limits on exports of military and strategic goods to countries with which the United States was not actually at war. Previously, similar acts had only been enacted during periods of military confrontation, wars, or in the face of extraordinary emergency.

In addition to domestic legislation limiting strategic trade, the United States attempted to forge international cooperation in this field. In 1950 the United States set up jointly with the United Kingdom, France, Italy, and the Benelux countries the so-called Coordinating Committee for East-West Trade (COCOM) with the aim of compiling and enforcing lists of strategic goods of which exports to communist countries were embargoed.

COCOM continues to exist and at present consists of all the NATO countries, with the exception of Iceland and Japan.[2] The COCOM

embargo list is revised and updated every two to three years. The embargoed goods fall under three different categories: (1) military weapons, (2) nuclear goods, and (3) strategic goods with military and civilian uses. The last group is of particular interest to the economist. Unfortunately, no detailed information is publicly available as to what constitutes a strategic good; it seems, however, that 80 percent are in the category of electronics.

The enactment of the Mutual Defense Assistance Control Act in 1951 resulted in another list of embargoed goods. The "Battle Act," as the Mutual Defense Assistance Control Act is known, called for denial of U.S. aid—military, economic and financial—to countries which exported embargoed goods. As long as Europe shared U.S concerns vis-à-vis communist countries and accepted U.S. political leadership, the Battle Act helped to develop a joint approach to the problem at hand.

It would seem that in the late '40s and the early '50s the United States had a very decisive influence in determining what constituted trade in strategic goods and in enforcing restrictions on exports of those goods. Since then, however, time and changing conditions have weakened the strength of the U.S. position. One can attribute this development to several factors. First of all, the United States ceased to be the dominant supplier of strategic goods, particularly when the term is used only with regard to military hardware and equipment. It becomes much more difficult to set and enforce a global embargo policy when the number of independent suppliers increases. Furthermore, the potential threat of "using the stick" in the form of the Battle Act became ineffective when Western Europe grew independent of U.S. economic assistance, that is, roughly speaking, at the end of the Marshall Plan.

It also has to be said that the maintenance of a joint U.S.-European policy towards exports of strategic goods to third countries required not only a good deal of political cooperation and cohesion among respective governments but also a strong backing on the part of concerned industries. The European business community eventually came to see great commercial opportunities in East-West trade and has become determined to exploit them.[3] The American business community, while not exactly following suit and openly advocating liberalization of trade restrictions with regard to strategic trade with the Soviet Union, certainly became aware of lost opportunities. When President Nixon made a dramatic shift in the U.S. policy toward the People's Republic of China, American industry (and the general public) by and large favored liberalization of restrictions on strategic trade.

In discussing the post–World War II history of strategic trade one must not overlook atomic weapons, equipment, and materials. Many countries joined efforts in developing rules governing trade in strategic

goods related to nuclear technology. In an attempt to check the spread of the nuclear threat, the Nuclear Nonproliferation Treaty was put into effect in 1968. The Nuclear Suppliers' Guidelines which followed the treaty requires the exporting countries to obtain assurances from the importers of nuclear material and equipment that the transferred goods and processes be used only for legitimate purposes. Once again, while sharing the basic objectives of the Nuclear Nonproliferation Treaty, conflicts and tensions have occasionally developed between the United States and Western Europe. Most recently, a nuclear reactor sale by West Germany to Brazil provoked strong objections from the U.S.

To sum up, strategic trade during the first two decades after the end of World War II concerned mainly goods with direct and indirect military use. The rules of the game were primarily defined by political considerations. Gradually, though, it emerged that the United States and Western Europe, in spite of being close political allies, did not always share the same views on the matter. As one American expert put it: "Since World War II, Canada, France, and Britain, and other important trading partners have vigorously opposed the extraterritorial reach of American export restrictions through diplomatic and legal means. Even the extraterritorial aspects of American controls on exports to the Soviet Union of militarily useful goods and technology—controls accepted in principle and administered cooperatively by our allies—have led to sustained irritation in Europe".[4] As time went by and the political cohesion of the Western allies weakened, tensions and differences of opinion between the United States and Western Europe mounted with regard to strategic trade with third countries. The most recent incident has involved the Siberian pipeline.

The main facts of the pipeline episode are still fresh in the memory of the general public, but are well worth repeating. From the beginning the Reagan administration saw the 3,700 mile pipeline from Siberia to Western Europe as exposing the receiving countries to excessive dependence on a Russian source of energy supply. Even though, according to various projections, the pipeline would never satisfy more than 5 percent of Western Europe's energy demand, the U.S. administration considered the willingness of its allies to go ahead with the deal as imprudent at best. Additional concern was provoked by the fact that the Soviet Union stood to earn $10–12 billion a year in hard currencies from gas exports. These earnings could be used to purchase Western goods and technology to increase Russian military strength.

Following the imposition of martial law in Poland on 13 December 1981, President Reagan ordered sanctions against the Soviet Union because of its "heavy and direct responsibility for the repression in Poland." Trade sanctions included severe limitations on exports of equipment and engineering know-how related to oil and gas exploration, production, and transmission. Following President Reagan's ac-

tion, exports and reexports of U.S. oil and gas equipment and associated technical data fell under very strict and specific licensing restrictions although more liberal and general licensing had formerly been allowed. Furthermore, outstanding validated licenses could be suspended or revoked.

It appears that the extraterritorial effects of the December 1981 regulations brought the United States into open conflict with certain Western European countries. U.S. firms were ordered to cease exports of pipeline-related equipment and technology to Western European buyers if they knew that the material would be reexported to the Soviet Union. Furthermore, the embargo of certain exports to the Soviet Union also applied to U.S. owned or controlled foreign firms. It was immaterial whether those firms made any use or not of U.S. materials or technology in their exports to the Russians.

While Western European countries were initially supportive of President Reagan's action, they were not prepared to follow the U.S. suit. Their support was limited to making public gestures of approval. When in June 1982 President Reagan decided to harden his stance against trade with the Russians, Western Europe came out strongly against the American embargo. Both the British and the French governments moved to block restrictions imposed by President Reagan on U.S. owned or controlled firms operating in England and France.

One of the major outside suppliers for the Siberian gas pipeline was the French subsidiary of the American company Dresser Industries based in Dallas, Texas. Its contract with the Soviet Union, signed prior to the imposition of the restrictions, called for delivery of 21 compressors worth $18–20 million. When the American parent company of Dresser France asked its subsidiary to obey the U.S. government sanctions, the French Minister of Industry answered by instructing the company to ignore the embargo and proceed with the contract.[5]

In response to the French government action, the U.S. Commerce Department decided to apply penalties by issuing a denial order. The order barred Dresser France from receiving any technology, services, and equipment from its parent or any other American firm. In the end, the U.S. government was able to bring Dresser France to a halt by ordering its parent company in Texas to interrupt the flow of crucial data provided on a continuous basis through telephone and satellite channels.

The pipeline episode, and especially the Dresser case, shows the extraordinary vulnerability that modern technology imposes on trading partners. Consequently, the concept of strategic trade must be considerably widened for it goes far beyond the confines of military uses.

The concept of strategic trade must also cover various types of services. What seems interesting is that certain services such as design, engineering, and data processing have acquired strategic characteristics

in the production process—there are no substitutes for them. While it used to be that production of these services and production of respective goods had to coincide geographically, modern technology allows these two stages to be increasingly separated. This separation could involve a high degree of strategic dependence. Thus Dresser France could be run on information provided by its parent company from Dallas or it could stop functioning if some vital services provided long-distance were withheld.

In analyzing U.S.–Western European conflicts over strategic trade, legal scholars tend to focus on the question of the extraterritorial application of American law as being the main source of the problem. I think the conflict is more fundamental. The basic reason for U.S.–Western European frictions stems from differences in the hierarchical importance attached to commercial policy in relation to foreign policy. In the view of American policy makers, foreign trade is part and parcel of foreign policy, and commercial policy should be subjugated to U.S. foreign political interests. Europeans, on the other hand, accept much less willingly the dominance of foreign policy over trade policy.

Much more interdependence is seen in Europe in this respect, and occasionally foreign commercial interests seem to influence heavily, if not dictate, foreign policy. I hasten to add that this is particularly true of France and England, the two countries which still have global or at least regional strategies and whose political influence continues to count. Mrs. Thatcher frankly admits to be batting for England when she goes to Arab Gulf countries and triggers off an avalanche of commercial contracts. It is clear even to a casual observer that the French attitude towards the Iran-Iraq war is primarily determined by economic interests.

It would seem, therefore, that there are rather strict limits to which Western European countries are prepared to subjugate their commercial interests to their own foreign policy, and certainly they are much less willing to abdicate their trade policy to the requirements of U.S. foreign policy. Today, there are also strong doubts about the efficacy of economic measures the United States proposes to take; the most recent example was provided by U.S. proposals for a trade embargo against Libya and Nicaragua. Also, there is often a feeling of unfairness in U.S. demands for sacrifices from its European allies. During the pipeline episode Michel Jobert, the French Foreign Trade minister, put it very blatantly: "[I]f the United States wants to respect its oil embargo, let it start by not delivering eight million tons of grain."

It is my opinion that in spite of friendship and mutually shared long-term objectives, U.S.–Western European confrontations over issues of strategic trade will continue in the future. These conflicts will tend to follow the same pattern: A political or even a military confrontation with a third country will provoke the United States to take drastic

economic measures, among them the barring of certain types of trade. U.S.-USSR tension will probably continue to be a frequent starting point of these crises.[6] There may well be other initial causes for embargoes. Libya, the Middle East, and Central America are geographic areas where a major crisis could easily erupt and force the United States to take decisive action.

It can be almost taken for granted, for reasons indicated above, that Europe will behave in a much more restrained way than the United States, and it will certainly be less willing to use economic sanctions or join a U.S. initiated embargo. Confrontations with a third country will occasionally also lead to U.S.–Western Europe conflict. To ensure maximum efficiency of embargo measures, the United States may be forced to restrict exports of certain goods, technology, or services to its allies as well, or at least to U.S. firms operating in Western Europe. It is even probable that a denial of certain types of technology and services would be more likely and a more punishing action than the refusal of goods.

What kind of costs and advantages are associated with strategic trade and associated embargoes? What policies should the government follow? I turn to these two issues in the next section.

5.3 Modeling Strategic Trade

I now wish to develop a model of strategic trade which would incorporate at least some parameters affecting U.S.–Western European trade relations, either bilaterally or vis-à-vis third countries. Let me first address the question of the degree of market competition and strategic trade. Government policies towards this type of trade crucially depend on market structure.

5.3.1 The Standard Model

In the standard trade model, perfect competition is assumed to prevail in the markets for goods and services. Trading equilibrium usually involves nonspecialization when countries have similar factor endowments. In equilibrium, exportables and importables are produced by a large number of firms. Firms can expand their output at will. Furthermore, reallocation of resources between sectors involves no adjustment costs.

The model of international trade under perfect competition seems rather ill-suited to analyze the question at hand. For, in the absence of specialization, an interruption of U.S. exports to Europe for one political reason or another could not produce disastrous effects. A lack of goods previously produced in the United States could be immediately replaced by their perfect substitutes produced in Europe. If Western

Europe decided to take no action of its own and continue to export to the United States, it would start running a trade account surplus. Of course, Europe could retaliate by banning its exports to the United States.

If worst came to worst, an escalation of restrictions on exports could eliminate trade altogether. Both the United States and Western Europe would suffer welfare losses. In the limiting case one would move from free trade before embargo to autarchy after the imposition of embargo. Welfare losses would be exactly equal to the gains from free trade, and they would fall on both sides. What is important, however, is that the autarchy position could be reached immediately and at no extra cost.

If, however, in addition to the United States other countries could supply Europe with products it needs, worst would not have to come to worst. Trade diversion would occur without Europe's being pushed back into the position of autarchy. To be sure, trade diversion would involve welfare losses as certain very efficient producers in the U.S would have to be replaced by less efficient producers elsewhere. Thus, the existence of alternative sources of supply could substantially reduce welfare losses inflicted on Western Europe by the United States.

Enough has been said already to make clear that the standard trade model could be extended to the analysis of embargo, but it does not produce interesting results. The welfare cost of embargo can at most equal the gains associated with free trade. In a multicountry trading system, these losses must be even smaller.

What are the policy implications of embargo analysis in the competitive set-up? In particular, should Western Europe reduce its dependence on trade with the United States in "sensitive" areas in anticipation of possible trade disruptions? The answer is an emphatic no. By taking preventive (and protective) action Europe would deny itself the benefits of free trade without achieving anything in return. Our conclusion follows from the proposition that free trade some of the time is better than autarchy all the time. However, this conclusion hinges on specific assumptions associated with the standard trade model.

5.3.2 Imperfect Competition Models

Let us now move to the opposite case, namely that of monopoly. Suppose that we deal with an industry in which the existence of increasing returns to scale leads to one producer's taking over the whole market. We can think of the aircraft (or even better the satellite) industry as being one such example. To set the stage for the analysis I first wish to consider equilibrium in the United States and Western Europe prior to trade.

Western Europe's airplane is called the Airbus; the American counterpart goes under the name of Boeing. Both aircraft have very similar

technical features—size, carrying capacity, speed, fuel efficiency, and so on. Once produced they can operate exactly n years provided that proper maintenance service is applied. In the Ricardian vein, one may assume that labor is the only factor of production. The amount of labor required to produce one Airbus is a, while it takes a^* units of labor to manufacture one Boeing. (From now on variables with asterisks will refer to the United States.)

In addition to its use in the production of airplanes, labor needs to be expanded to service them. The respective input-requirement coefficients per unit of time are s and s^*, respectively. The nature of technology is such that only the producer has the know-how for servicing its airplane. Thus when final users buy airplanes they also commit themselves to buying a future stream of services.

Suppose that, after a period of autarchy, trade in airplanes and associated services becomes possible between the United States and Western Europe. For the sake of simplicity let us assume that both economies are stationary. Thus, the United States and Western Europe will build their respective airplane fleets (of either Airbuses or Boeings), and then they will try to maintain a constant number of airplanes in operation.

Which company will build the entire stock of planes for the American and European users depends on their relative competitiveness. Note that the concept of relative competitiveness now embraces production of goods as well as services.[7] The concept could also cover their cost of financing. With regard to the latter factor, if Boeings and Airbuses were bought under credit conditions arranged by the producers or their governments, the sale of every airplane would carry an interest rate charge which would depend on the price of the airplane and the respective interest rates, i and i^*.

I do not wish to go into the discussion of what will be the actual price of the airplane charged by the dominant producer when the new equilibrium emerges. In order to determine who will prevail in the market it is rather more important to ask what is the very minimum price that each producer could charge without losing money.[8]

The cost of keeping an airplane in operation consists of three elements in this model: First, the depreciation cost which is the price of the airplane divided by the length of its useful life. The costs of producing an airplane are aw and a^*w^*. The lowest depreciation cost could thus be aw/n and a^*w^*/n. Second, in addition to production costs there are also servicing costs. These costs are sw and s^*w^*. Finally, there are also interest rate charges. (It is assumed, quite realistically, that the airplane producers also provide financing.)

It is quite plausible that there exist economies of scale in servicing and in that case $s = s(X + X^*)$ and $s^* = s^*(X + X^*)$ with the properties

that $s' < 0$, $s^{*\prime} < 0$, $s'' > 0$ and $s^{*\prime\prime} > 0$. $X + X^*$ denotes the total production of airplanes for the North American and the European markets in the steady-state equilibrium. In order to capture economies of scale, servicing is done in one location, say, Seattle, Washington; London, England; or Toulouse in the south of France. The assumption of the existence of economies of scale in servicing of airplanes, ships, or oil rigs contains a large dose of realism.

We are now in a position to ask which producer is likely to capture the combined Europe–North American market. The winner will be the producer who will be able to offer a lower joint price of the airplane (or rather depreciation), maintenance servicing, and cost of financing. These prices are given by equations (1) and (2) and can be best thought of as the minimum prices the two producers would charge for leasing a plane.

$$P = s(X + X^*)w + aw/n + iaw. \tag{1}$$

$$P^* = s^*(X + X^*)w^* + a^*w^*/n + i^*a^*w^*. \tag{2}$$

Equations (1) and (2) clearly show that one's comparative advantage may stem from one or more possible sources. With production and servicing technologies assumed identical, the country with the lower wage rate and the lower interest rate would capture the whole market. The latter element is very interesting because it is usually absent in trade models. Lower interest rates in the United States, with other conditions being the same, would allow the Boeing producer to sweep the whole market regardless of its size. This case is illustrated in figure 5.1a. The PP curve shows the minimum cost curve for the European producer and the P^*P^* curve represents the same thing for the U.S. producer.

Interestingly enough, comparative advantage in "financial packaging" can lead to domination of a market for goods and services. This advantage may be real or policy-induced. Figure 5.1a shows how governments can give domestic firms a competitive advantage by providing them with interest-rate subsidies. What seems of particular importance is that the "break" need not be big to lead to market dominance.

Another interesting case of competitive advantage is depicted in figure 5.1b. Here the only difference between the Boeing and Airbus producers is that $w^* > w$, and $s^*(X + X^*) < s(X + X^*)$, i.e., the U.S. wages are higher but the U.S. is more efficient in servicing at any level of output. The net result of this case is that when the market is relatively small, the low-wage country tends to dominate it; however, for a sufficiently large market, the country more efficient in producing services becomes the sole supplier.

While the foregoing analysis suggests which producer may capture the market, it does not tell us what the equilibrium price will be. Surely,

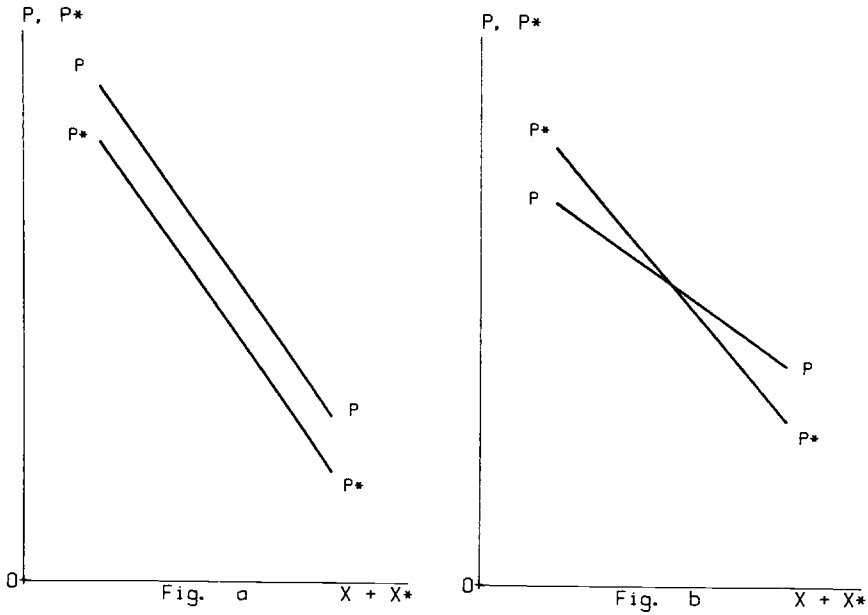

Fig. 5.1 Minimum prices and market size

that price will not be equal to P or P^* but it will also contain some pure monopoly profit. How much higher the actual price will be above the minimum cost of production is irrelevant for our analysis. It can be said, however, that the size of pure monopoly profit will depend on the P/P^* ratio and the threat of potential reentry. It will also depend on the commercial policy pursued by the importing country. When monopoly profits are present, some of them can be recaptured by the importing country through tariffs, taxes, and so on. The trading equilibrium price will be lower than the autarchy price. Consequently, the steady state output of airplanes for each market should be expected to be higher than before the opening to trade. Finally, the welfare level reached by each trading partner will be higher than under autarchy.

I now turn to the consequences of an embargo. Suppose that Europe ends up being the importer of airplanes and associated services. One would expect that Europe would switch to Boeings only gradually rather than all at once. In any case, the transition should not take more than n periods after trade is allowed. Assume that as of time t_0 Europe's entire fleet already consists of Boeings. Once it switches to Boeings, Europe could be dealt a very severe blow by being denied, not so much American airplanes, but rather maintenance services. This is easily accomplished in this model because servicing of Boeings owned by Europe is done, because of economies of scale, in Seattle, Washington.

The U.S. government could turn off the flow of maintenance services at will without worrying about the problem of extraterritorial application of the U.S. law.

Suppose that indeed an embargo is imposed at time t_k. The stock of Boeings held by Western Europe becomes completely useless under the extreme assumption that Europe is unable to service American airplanes. This is the major cost of the embargo. If the cut-off of services was perceived permanent by Western Europe, a new fleet based on Airbuses would have to be built from scratch.[9] This surely could not be accomplished instantaneously. Suppose that it would take T periods to get the production running again and then the new steady-state position could be reached at once. The fact that adjustment takes time (it may involve other costs as well) means that from t_k to t_{k+T} Europe would be deprived of using airplanes. At the end of the transition period, Europe would return back to the autarchy position. Note that a permanent embargo would lead to autarchy even if Europe could service the existing fleet of Boeings. Europe's servicing capability could only reduce the adjustment cost.

In order to evaluate the welfare effects of the embargo, one needs to introduce Europe's welfare function. Suppose it is of the following form: $U = U(x,y)$, where x is the flow of *consumer* services provided by the existing stock of airplanes and y stands for consumption of all other goods (for simplicity's sake "all other goods" are nondurable). The utility function often has a property that $U(0,y) = U(x,0) = 0$, i.e., both goods are indispensable. In that case the utility level achieved by Europe at different points in time can be shown in figure 5.2.

The level of utility achieved between t_0 and t_k corresponds to the trading equilibrium and it can be called $U(T)$. The utility level enjoyed for $t > t_{k+T}$ represents the autarchy level and can be denoted $U(A)$. By our previous argument, it must be true that $U(A) < U(T)$. We can now evaluate the present value of the stream of utility generated between $t_0 \leq t \leq \infty$. The rate of time preference is assumed to be r.

$$\Psi_1 = \int_{t_0}^{t_k} U(\ldots)e^{-rt}dt + \int_{t_{k+T}}^{\infty} U(\ldots)e^{-rt}dt. \tag{3}$$

If Western Europe never switched to Boeing its welfare would be

$$\Psi_2 = \int_{0}^{\infty} U(\ldots)e^{-rt}dt. \tag{4}$$

Comparison of equations (3) and (4) clearly shows that reliance on American airplanes can increase or reduce Western Europe's welfare depending on whether

$$\int_{t_0}^{t_k} (U(\ldots) - U(\ldots))e^{-rt}dt \lesseqgtr \int_{t_k}^{t_{k+T}} U(\ldots)e^{-rt}dt\ . \tag{5}$$

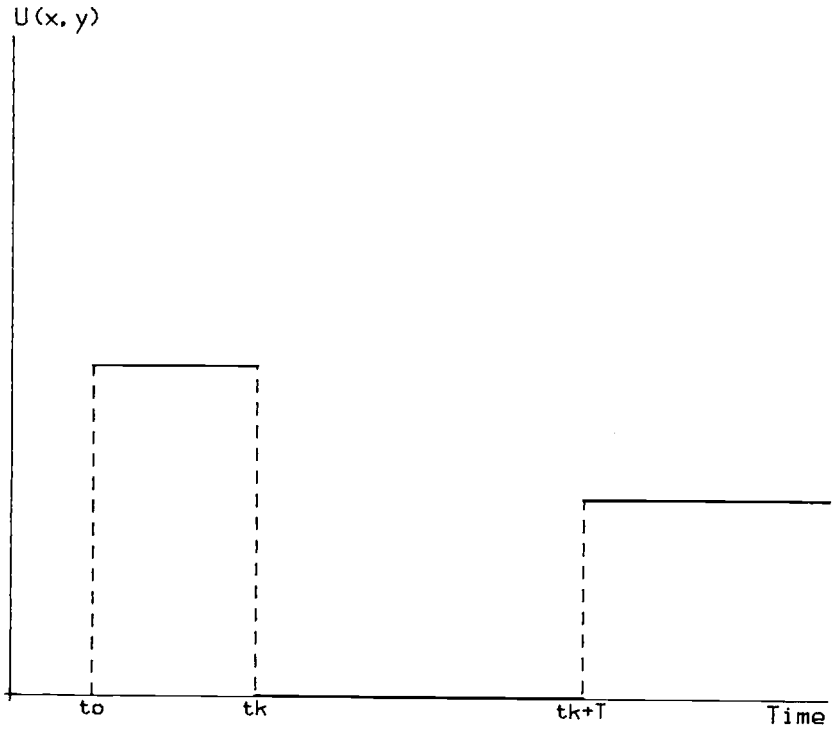

Fig. 5.2 Welfare over time

The above condition says that trade some of the time may not be superior to autarchy all the time. The reason is that gains from trade achieved between t_0 and t_k may not be big enough to compensate for subsequent welfare losses. It should be stressed that this result does not depend on the assumed utility function. If the utility function had the property that $U(x,0) > 0$ and $U(0,y) > 0$, the utility level achieved between time t_k and t_{k+T} would be positive but necessarily smaller than $U(A)$ because some resources would have to be engaged in rebuilding Europe's airfleet.

Our analysis so far has not allowed for uncertainty of an embargo's being imposed, but this problem could easily be taken care of. One need only introduce the probability of an embargo occurring over a time interval. Suppose that, if no embargo had occurred by time t, the probability of this happening over the time interval $(t, t+dt)$ is given by e^{-zt}. Now the probability that an embargo will be imposed during the interval $(0,\infty)$ is $\int_0^\infty e^{-zt}dt$. Given this probability one could reformulate our problem in terms of the expected present value of welfare.

Recent literature on international trade under monopolistic competition suggests that there are cases where restricted trade is superior

to free trade. In the case of an embargo, one needs to know whether no trade is better than restricted trade. Equation (5) holds the answer to the question. It is clearly possible to envisage a situation where a threat of embargo would cause a country to eliminate its dependence on foreign trade. Having constructed such a case we want to stress its special character and point out that other policy measures should be considered before a country retreats into autarchy.

Strategic dependence of Western Europe on American airplanes or rather maintenance services provided by the Boeing producer could be eliminated altogether if maintenance could be done by Europeans themselves. That may or may not be possible depending on a particular product and the market structure. This dependence could at least be reduced if servicing was done by the Boeing producer, but in Europe rather than in Seattle, Washington. In this situation, the ability of the U.S. government to enforce an embargo could be substantially reduced. (Yet one should not forget the Dresser France case discussed earlier.) The last conclusion should be good news for those who are in favor of liberalization of trade in services and freedom of establishment. Of course, freedom of setting up servicing stations in Europe does not imply that the Boeing producer would want to do it. In fact, the assumed existence of economies of scale in servicing pushes for a central location of servicing activities in any case. To have a servicing network in Western Europe in addition to the one in North America would reduce benefits from scale economies. However, Western Europe could well insist on such a solution before switching to Boeing. Some efficiency could be foregone for greater security.

In the model developed above, price bidding would result in a monopolistic market structure. The producer who is potentially able to offer a lower price takes over the whole market. It is interesting to consider now the case of duopoly and see how our analysis and policy conclusions change.

Our basic model can be readily modified so that it leads to a duopolistic market structure. It suffices to assume that when trade is allowed to take place, the two producers follow the Cournot strategy in determining their supplies for each market. Such a model has been recently applied by Brander (1981), Brander and Krugman (1983), and others, so there is no need to dwell on details. It turns out that we can even assume constant marginal costs in production of airplanes and their servicing without affecting the results in a substantial way. The general line of the argument goes as follows.

Under the Cournot strategy, the Boeing producer sets the optimal levels of output for the American and Western European markets assuming that the Airbus producer will keep his respective level of production unchanged. The Cournot model is symmetrical, hence the

European producer follows the same logic. Solving the model results in four reaction functions, two for each producer. One pair of such reaction functions is shown in figure 5.3 with regard to the European market.

The vertical axis measures the steady state number of Boeings sold every period in the European market. The number of Airbuses sold in the same market is measured along the horizontal axis.

The European reaction function, *EE*, is steeper than the American reaction function, *AA*. The fact that the two curves intersect means that both airplanes will be used in Europe. A similar solution holds for the U.S. market. In figure 5.3 the U.S. duopolist is shown to have a more than 50 percent share of the market. This would happen if either $a^* < a$, or $c^* < c$, or both inequalities happen to hold.

In the duopoly model, simultaneous presence of the two producers in the Western European market implies that an embargo on sales of Boeings or denial of maintenance services cannot deal a devastating blow to Europe. While it is still true that Western Europe's stock of Boeings can be rendered useless, there are European planes in operation and, even more important, there is a continuing stream of new

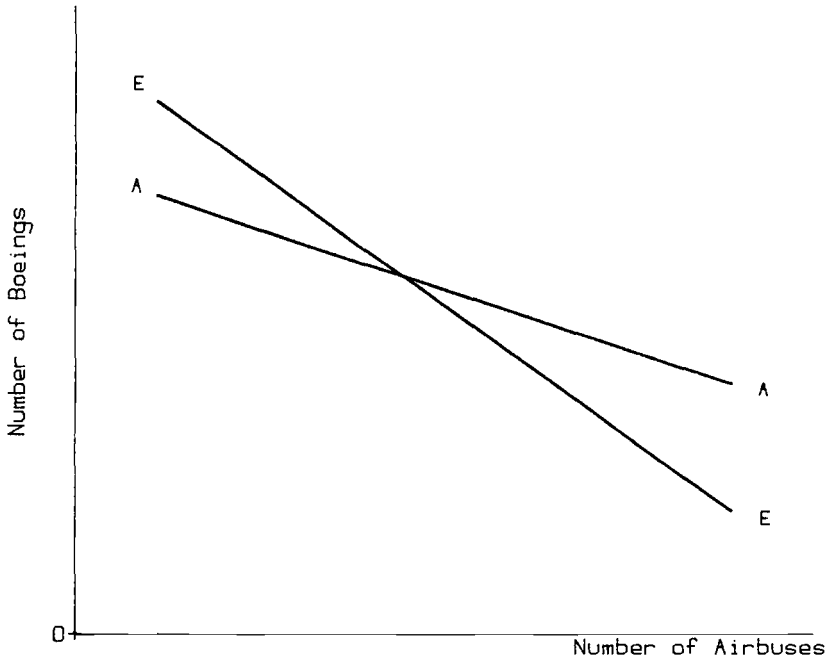

Fig. 5.3 Market equilibrium in duopoly

production. No rebuilding of the European airplane industry would be required in this case. Of course, a U.S. embargo would produce welfare losses which would be mutual and at most equal in size to the gains from trade. The fundamental difference between the two cases discussed so far is that the former involved strategic dependence while the latter strategic interdependence.

It can, of course, happen that the two reaction functions in figure 5.3 intersect on the vertical axis. A suitably large technological superiority of the U.S. producer would make this result possible. In this situation, the market would not be shared and we would be back to monopoly.

The analysis of the duopoly case shows that the weak case for policy intervention in anticipation of an embargo becomes even weaker when slightly more competition is allowed. To carry the analysis even further, let us turn to the case of Chamberlinian monopolistic competition. With no barriers to entry, monopoly profits invite new producers to enter the airplane industry. Thus the pretrade equilibrium allows a large number of producers in the United States and Western Europe. Under trade, the equilibrium number of producers is certainly larger than the number of producers in either country under autarchy. With no technological superiority, American and European producers coexist. Profits are zero and this condition is assured by free entry of European and American firms.

It could happen, however, that U.S. producers would be more efficient than European manufactures. In this case the trading equilibrium involves zero monopoly profits assured by the presence of a large number of firms, all of which are American. Western European strategic vulnerability reappears again. Now we are back to equation (5) which weights embargo costs against trade benefits. A need for policy intervention in anticipation of an embargo could be envisaged in this case. However, one could justified support of at most one European producer prior to the imposition of an embargo. No additional security could be achieved by having more than one European producer, but the cost of subsidizing them would increase. Of course if an embargo were to occur, then but only then Western Europe should encourage new entrants to dilute monopoly profits.

5.4 Conclusion

The purpose of this paper has been to look into the question of strategic trade, embargoes, and monopolistic competition in the context of U.S.–Western European trade relations. It should be stressed that the subject matter could be more naturally treated with reference to countries with fundamentally antagonistic policies and attitudes. However, controversies over strategic trade between the United States and

Western Europe may and indeed do arise. I have given a brief summary of these controversies in section 5.2.

In modeling embargoes and raising related policy issues, it is important to start with the right trade model. I argued that the traditional trade model based on perfect competition is not very useful in this respect. Countries with similar factor endowments do not develop strategic dependence in this model in the sense of relying entirely on outside supply for an important good or service. Also, lack of adjustment costs means that the imposition of an embargo at most means denial of trade gains. This denial is a two-edged sword; both countries lose.

By contrast with the traditional paradigm, monopolistic competition offers a setting where strategic dependence and assymetry of losses arise naturally as a result of a tendency to limit the number of firms. This is sharply seen in the case of monopoly. I analyzed this case in some detail because it could result in the justification of domestic protection. But even in the situation of monopoly, measures can be taken to reduce the degree of strategic dependence. The measure that might achieve this goal without hampering efficiency is liberalization of foreign investment and freedom of establishment. The basic argument is that a foreign monopoly operating within national frontiers of a country is less likely to deny goods and services to the host country (even if ordered by its own government to do so). Internationalization of production and investment thus diminishes the threat of effective embargo and reduces the need to take protective policy measures impeding efficient allocation of resources.

It is important to stress that the issue of strategic trade cannot be limited to trade in goods alone. Strategic dependence or interdependence resulting from provision of services has become an increasingly important characteristic of U.S.–Western European economic relations. Here again, more competition combined with standardization of services, and the separation of the provision of goods from the provision of services could reduce the degree of strategic dependence.

Notes

1. A very thorough review of U.S. attitudes and legislation in this area is provided in Winter and Carlson (1979).

2. It is interesting to note that there is no formal treaty establishing COCOM. Since COCOM is an informal organization, the EC countries participate in it on an individual basis.

3. Abbott (1981) points out that Europe and Japan have expressed in recent years a strong desire to liberalize COCOM lists.

4. Quoted from Abbott (1984, 90–91).

5. Actually Dresser Industries had initially asked Dresser France to comply with the request of the French government that the contract be honored. The

U.S. parent company was caught in quite an impossible situation: complying with the French government's request would expose it to American penalties, and obeying its own government risked French penalties. In an attempt to escape U.S. penalties for violating sanctions, Dresser Industries filed suit in U.S. federal court.

6. A direct political conflict of the United States with one or more Western European countries does not seem likely at this stage. It has happened extremely rarely in the past. Hufbauer and Schott (1985) in their comprehensive study of 103 cases of economic sanctions imposed since 1914, include only two instances of "head-on collisions" between the U.S. and Western allies, One case pitted the Americans against the Dutch over the issue of recognition of Indonesia. In the second and better-known case, President Eisenhower took drastic measures against the U.K. and France after these two countries intervened in the Suez Canal region.

7. The concept of relative competitiveness based on joint production of goods and services is developed in Djajic and Kierzkowski (1986) in a general equilibrium framework. The Djajic-Kierzkowski model is based on perfect competition and focuses on optimal choice of quality of durable goods. It can be argued that joint production of goods and services is even more likely to occur in a monopolistic environment. Indeed producers may be tempted to design products in such a way that they would also have to supply services. The combined market over which the producer would have some monopoly power would thus be increased.

8. In this model, as in Djajic and Kierzkowski (1986), the ultimate user of the durable good makes his selection of the desired model on cost-minimizing grounds.

9. Of course, an embargo need not be considered permanent. In fact, history does not know cases of permanent embargoes. However, our analysis carries through for embargoes of sufficiently long duration.

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