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Conflict and Cooperation in International Economic Relations

by

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I. Introduction

This chapter explores a number of conceptual and modeling issues that are germane to the analysis of conflict in international economic relations. Section II immediately following is devoted to a number of issues involving conflict that have been treated in the theory of international trade. The discussion focuses on departures from the free trade optimum that is the center piece of the theory of comparative advantage and the gains from trade. Also considered are conflict situations stemming from departures from full employment and external balance that figure importantly in international macroeconomic theory. In Section III, I draw on one of my research specialties, which is the use of computational models to analyze international economic relations and policies. In particular, I discuss the design and implementation of the Michigan Model of World Production and Trade, which is a multi-country and multi-sector general equilibrium model of the international trading system that my Michigan colleague, Alan V. Deardorff, and I have been working with since the mid-1970s. Four applications of the Michigan Model are discussed in order to illustrate how the model has been used to provide quantitative analysis of potentially conflictual and cooperative international economic actions and policies. Some concluding remarks are made in Section IV.

II. Conceptual and Modeling Issues in the Analysis of Conflict in International Economic Relations

The Theory of Comparative Advantage and the Gains from Trade

It may be useful to begin our discussion by reviewing briefly the theory of comparative advantage and the gains from trade, which is the central focus of international trade theory.

In the simplest version of this theory, it is assumed that there are two industries located in each of two countries that exist in isolation (autarky), and there is perfect competition in all markets for goods and factors of production. The productivity of factors (e.g., labor and capital) employed in the industries in each country is assumed to be different for unspecified technological reasons, which means that the relative prices of the two goods will be different under conditions of autarky. It is this difference in autarky prices that gives rise to the possibility of international specialization and mutually beneficial trade. Thus, if trade is permitted to occur, each country will specialize in the production and export of the good in which it has the greatest comparative advantage or least comparative disadvantage compared to the other country. This means that factors of production in each country will be shifted towards the country's export industry and away from what will become its import-competing industry. Factors of production are assumed to be perfectly mobile between industries within each country, but not to move between countries.

The assumption of perfect competition guarantees that there will be optimum use of factors of production since firms are not able to control the price at which they sell their output and will maximize their profits by simply equating their costs at the margin with the given market price. Individual consumers are assumed to have given preferences and to act rationally in making consumption decisions with respect to the market prices that are given to them and subject to a budget constraint imposed by the size of their incomes. As mentioned, factors of production will move frictionlessly between industries as firms

expand or contract output. Given the assumption of no barriers to the entry and exit of firms and the domestic movement of factors, this means that the role of government is designed primarily to foster competition and to maintain the social order. It will be evident that this "ideal" state of affairs will emerge as firms and consumers pursue their self interest. It is as if there were an "invisible hand" guiding the process.

The concept and ideal of free trade have remained at the core of international trade theory for more than two centuries. What is interesting for our purpose here is that unfettered international specialization and exchange will be welfare maximizing and that economic conflict does not appear therefore to be an issue. This should not be taken to mean, however, that international trade theory ends at this point, for this is certainly not the case. Rather, a great deal of attention has been devoted in the past half century or more to the theoretical analysis of departures from the free trade optimum. International economic conflict figures importantly in several of these cases that involve efforts by nations to engage in exploitative behavior that will improve their welfare at the expense of other nations. Let us turn then to consider the issues involved in analyzing various departures from the free trade optimum.[1]

Departures from the Free Trade Optimum

National Monopoly Power and the Optimum Tariff

The idealized assumptions of the classic argument for free trade imply the optimality of free trade only for the world as a whole. For individual countries, the optimality of free trade requires the additional assumption that the country is too small to have any influence, through its policies, over the prices at which it trades. Without this assumption, free trade is not optimal from a national perspective, and instead there exists an optimal degree of government intervention in trade, known as the optimal tariff, that works by turning the country's terms of trade in its favor.

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[1]The discussion that follows is drawn in part from Deardorff and Stern (1987a).

This argument is sometimes thought to require that the country in question be large and therefore to apply only to such large, industrialized countries as the United States. However, the size that is important is not the size of the country as a whole but rather its share of world trade in markets in which it exports and imports. Since many countries tend to specialize their exports in a fairly small range of goods—as the theory of comparative advantage predicts they should—even quite small countries may have enough market power over the prices of their exports for the optimal tariff argument to apply.

The optimal tariff argument has the important feature that it involves a benefit for the intervening country only at the expense of the country's trading partners. Indeed, since free trade is optimal for the world as a whole, it must be true that the rest of the world loses more than the tariff-levying country gains. It should be evident that a country that attempts to take advantage of its monopoly power in trade will create a situation of conflict with its major trading partners. The possibility of retaliation thus looms large in this setting, and it is likely to be the case that all countries will lose if they simultaneously pursue this kind of policy. This suggests that there may be complicated and perhaps unsolvable strategic issues that will arise when one or more countries attempt to exercise national monopoly power in foreign trade. But the more that governments realize the potentially damaging effects of optimal tariff intervention and retaliation, the more likely they might be to avoid taking such measures in the first place. Of course, this does not mean that national governments will always recognize the potential losses from their actions, in which case the world will be made worse off.

"Second-Best" Arguments for Government Intervention

A crucial assumption underlying the classic gains-from-trade proposition is that everything within the domestic economy is working properly: all domestic markets are perfectly competitive, prices and wages adjust freely so that markets clear, and that private and social costs and benefits coincide so that there are no positive or negative externalities or spillovers that arise in production or consumption. If any of the foregoing

conditions fails to hold, there exists a "domestic distortion," and the first-best optimal results of free trade are no longer assured. There may be grounds therefore for government intervention to correct domestic distortions and thereby restore the first-best optimum.

What is interesting and important here is that government intervention in trade may not be the best policy to use when there are domestic distortions. Suppose, for example, that firms are producing an insufficient amount of a good that confers a positive external benefit on society. An import tariff could be used to encourage domestic production, but this would distort consumer choice and welfare because of the higher domestic price involved. In this circumstance, a production subsidy would be the best policy to use since it would lead firms to increase their output of the good that confers positive social benefit while leaving consumers free to consume at undistorted market prices. The optimal or first-best policy is the one that addresses the original distortion most directly. A tariff is thus second-best compared to a subsidy. By introducing two distortions rather than one, trade intervention may succeed in solving one problem but only at the same time that it causes another.[2]

Similar examples are rife in the theory of protection. The classic example is the "infant industry" argument, where a tariff is said to protect a young industry while it learns to be efficient. The assumption here is that some market failure—such as an imperfection in the loan market or the impossibility of keeping new technical knowledge from being copied—makes it impossible for competitive firms to take advantage of what would otherwise be a profitable opportunity. A tariff or other import restriction can therefore be used temporarily to make the operation profitable even in the short run while the learning process is underway. Naturally, though, the success of such a policy depends crucially on a correct diagnosis of which industries offer the potential for such

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[2]Alan Deardorff—see Deardorff and Stern (1987a, p. 39)—has likened trade policy to "doing acupuncture with a fork: no matter how carefully you insert one prong, the other is like to do damage."

improvement over time. Also it may be difficult politically to remove protection once it has been put in place.

As in the case of the production externality discussed above, the infant industry argument may be valid in the sense that a tariff may be beneficial. But it is also true that some other policy would be superior. Once again a production subsidy, equal in size to the tariff, would yield the same benefits to producers as the tariff without causing the additional costly distortion of consumer choice. Even better might be a policy that subsidizes or guarantees loans to the industry, if the capital market was the real source of the distortion, or a policy that permits firms to appropriate technology if that was the problem.

Many other arguments for intervention can similarly be traced to the presumption of a distortion somewhere in the domestic economy. But what should be stressed in all of these cases is the need for a correct diagnosis of the distortions at issue and the point that they could be better dealt with by means other than trade policies. While this kind of reasoning is generally accepted by most international trade economists, it is not by any means accepted by practical policymakers who are in the business of trying to make only marginal improvements in the economic environment. If they can find some feasible policy that will work, they are unlikely to worry that some other policy might have worked better.

Thus, it may be argued that first-best policies are politically unacceptable and therefore that trade interference, though only second best in economic theory, may be first best in terms of political reality. This may be true, but it is a dangerous argument for several reasons. First, if trade intervention is politically more acceptable than domestic taxes and subsidies, it is probably because its true effects are less well understood by the electorate. If the public would not approve a direct subsidy to an industry, for whatever reason, then that fact should perhaps be taken as evidence that protection of that industry through trade intervention is also socially undesirable because of the consumption

distortions involved. Second, it is always a very difficult empirical question whether the benefits of offsetting a domestic distortion exceed the costs that arise from the second distortion caused by trade intervention. While it is very difficult to calculate precise estimates of the costs and benefits of different policies, there is nonetheless substantial empirical evidence that suggests that the net effects of trade intervention are detrimental to welfare. A very strong case can thus be made for using first-best policies. A final and important consideration for our purpose here is that reliance on first-best policies to correct domestic distortions avoids the potential for conflict between nations that trade intervention entails.

Trade Intervention in Imperfectly Competitive Markets

Recognizing that many markets, domestic and international, are imperfectly competitive, growing attention has been directed in recent years to analysis of trade and trade policy in an imperfectly competitive world. It is clear that the classical case for the gains from trade does not apply directly in such a world. However, we do not yet have a very clear understanding of the alternatives. Instead we have several suggestive ideas about the role of trade policy in particular situations that have not yet been established with any generality.

The first such idea is probably also the most important and is also very simple. If a domestic market is not competitive, competition can be fostered by removing barriers to trade. Often a major reason that domestic markets are dominated by a small number of producers is that these producers are protected from foreign competition by tariffs or other trade restrictions. If given a choice, producers for the domestic market will opt for quantitative import restrictions, since these increase the profit that can be made by monopoly pricing in the domestic market. The trade policy that will best improve this situation does not require any subtle effort to offset the effects of monopoly power. Instead a simple opening of markets to free international trade will remove the market power itself and restore the benefits of competition. A domestic market with only a few

domestic firms may therefore approximate free competition if those few firms must compete with a larger number of foreign producers. The removal of trade barriers in these circumstances will accordingly remove a source of international conflict and promote national and world welfare.

Unfortunately, there is sometimes no assurance that even worldwide free trade will confer the benefits of perfect competition in all markets. Some products are not tradable or are not readily available as substitutes from abroad. In addition, the world market itself may be imperfectly competitive, due perhaps to the historical dominance of a few firms or the nature of the product. Many products in today's international trade more and more seem to lend themselves to product differentiation and the use of large-scale and aggressive marketing techniques. In such cases, while free trade still increases competition, the nature of that competition is sufficiently imperfect that the benefits from it are no longer assured.

Two issues need to be addressed here. First, to what extent are our earlier arguments undermined by the persistence of imperfect competition even under free trade? In particular, is it still true that trade intervention constitutes only a second-best means of dealing with domestic distortions? Second, do imperfect market structures give rise to any new arguments for trade intervention other than the traditional ones?

The first question just mentioned cannot be answered definitively since there is no single model of imperfect competition that can provide the basis for a conclusive proof. But, as shown in Deardorff and Stern (1987a, pp. 43-44), it seems likely that the general principle favoring a domestic policy rather than trade intervention to remove a distortion would continue to hold in cases of imperfect competition.

As for the second question, free trade may fail to ensure perfect competition even in traded goods if world markets are not perfectly competitive. If world markets are monopolistic or controlled by a small number of oligopolistic firms and excess profits are being made at the expense of either foreign or domestic consumers, this suggests that

trade intervention may benefit a country if it is able to capture a larger share of these profits. This idea has considerable appeal. Certainly politically if you must be exploited, it is better to be exploited by domestic residents than by foreigners. Even economically there may be a valid case for trade intervention. Two possible cases are considered in Deardorff and Stern (1987a, pp. 46–50).

The first involves an effort to capture a portion of foreign monopoly profits by means of an import tariff. In this case, the importing country gains from the tariff only if the price paid to the foreign monopolist falls. The tariff works here much like the optimum tariff mentioned above in so far as it improves the importing country's terms of trade. But, as before, a situation of conflict is created and there is no guarantee that this profit-seeking policy will succeed if the foreign government retaliates by taking measures on its own to prevent or offset the shifting of profits abroad.

A second case involves the use of trade intervention to alter the outcomes of "strategic games" played by imperfectly competitive firms so as to increase the profits that can be shared by them with their sponsoring governments. In effect, the government uses its policy to precommit firms to behavior that would otherwise appear to be—and be known by their competitors to be—suboptimal. It turns out that the theoretical models used in generating such results are rather fragile conceptually so that changes in key assumptions can be shown to negate or even reverse the conclusion that profit shifting is possible. Furthermore, this case for intervention is once again exploitative and therefore may give rise to retaliation. Thus, if both governments were to try to play this particular game, both countries will be worse off. Again, to the extent that this is recognized by governments who desist from exploitative measures, it reduces the scope for international conflict.

Countervailing and Strategic Intervention

However one may feel about the case in economic theory for free trade, the fact remains that countries do make extensive use of policies that interfere with trade, perhaps

for the reasons that have been discussed. This raises the question of whether the cases for and against intervention are altered at all for countries whose trading partners use such policies.

There seem to be two distinct rationales for responding to the trade policies of other countries. One is to try to neutralize, offset, or countervail the presumed adverse effects of a foreign country's trade policies. The other is to try strategically to discourage the use of such policies by foreign countries by threatening, or actually implementing, policies that will affect them adversely. The difference between these two approaches is the following. In the former case the policy is to be chosen with a view to benefiting the domestic economy directly. In the latter case, since the purpose of the policy is to alter behavior abroad, a policy might be chosen in spite of having adverse effects domestically.

Countervailing intervention makes sense only if it benefits the domestic economy on its own account. It is not enough that it partially undoes the effect of the foreign country trade policy to which it responds. The familiar example of this use of trade policy is the national and GATT-sanctioned use of countervailing duties to offset the effect of foreign export subsidies. This countervailing policy normally does benefit the country using it, but only to the extent that the importing country is large enough to improve its terms of trade by imposing the duty. Where this is the case, the country could have benefited from a duty even had there been no foreign subsidy, assuming that it could have avoided retaliation. The question then is whether the fact of the subsidy, together perhaps with the official sanctioning of a countervailing duty, reduces the likelihood of retaliation. Only in this case does it appear that the use of a countervailing duty is a responsible policy in a competitive environment.

If instead we have an imperfectly competitive world, subsidies may be used to give a country's producers a competitive edge in a foreign market. In this case, a countervailing duty of some sort may be an optimal response on the part of the importing country's government as it tries to balance the gain from cheaper subsidized imports

against the loss of monopoly profit earned by its domestic firms. While this is a possibility, it suggests the more general question of whether countervailing measures may be justified as a means of discouraging the use of export subsidies in the first place. This takes us into the topic of strategic intervention.

We have seen that there are a number of arguments suggesting that trade intervention may benefit one country at the expense of others. Many of these arguments, relating especially to national monopoly power and use of the optimal tariff, have long been familiar to international trade economists. But interest in the analysis of trade under conditions of imperfect competition has seemed to expand the scope for strategic intervention and in turn has led to new interest in the strategic issues of how countries may use intervention to exploit others and to keep from being exploited by them. Rather than attempt here to discuss particular contributions that have been made in the literature, it is perhaps of greater importance to focus attention on the question of how policymakers should act in a world of exploitative trade intervention.

In simple terms, what we have is the classic Prisoners' Dilemma game, in which each player has an incentive to act at the other's expense, and both lose if both act. Although it is clearly optimal for them collectively to refrain from acting (from intervening in trade), each has an incentive to depart from that optimum if it is ever reached. What is interesting here, according to analyses by trade theorists such as Thursby and Jensen (1983) and political scientists such as Axelrod (1983), is that the greater is the perceived likelihood that a government expects that its trade intervention will be retaliated against, the closer will the solution lie to free trade. This suggests that although trade intervention itself is harmful for reasons already discussed, it may nonetheless be desirable that countries expect intervention by other countries in response to intervention they themselves may undertake.

Alternatively one could attempt to pursue negotiated solutions to games such as the foregoing. Such negotiations, however, pose the well known problem of enforcing

whatever agreement is reached. On the other hand, the incentives to enter into such negotiations are strong, even if one has no intention of abiding by their outcome. It is therefore not surprising that the trade policy community has managed to keep such negotiations going during a large part of post-World War II history.

Trade Intervention for Foreign Policy Reasons

The strategic uses of trade intervention just discussed were focused specifically on influencing analogous policies abroad. But trade intervention is sometimes also used as a means of influencing foreign policies that have nothing to do with trade. Because countries depend on and gain from trade, policies that interfere with trade can serve as weapons and can be used for a variety of aims. Still, one must ask whether trade intervention can succeed in changing foreign country policies and, if so, whether it is worth the cost.

To take the second issue first, trade as a political weapon makes sense only if it is capable of inflicting relatively a lot of harm abroad compared to any disruption it causes at home. For too small a country this would clearly not be the case, but for a large country like the United States, it does seem likely that we could do rather severe damage to at least some of our smaller trading partners at relatively little obvious cost to ourselves. But one must be very careful here, especially because markets often work far better than anyone expects. Even the United States might find that long-run effects of its policies will go against it in ways that would be hard to predict. When foreign markets and foreign suppliers are lost, either because the United States accidentally hurts them more than intended or because they look elsewhere for a more certain trading environment, the U.S. claim that it was only manipulating trade to promote the general welfare will fall on deaf ears.

There is also reason to doubt that even draconian trade policies such as embargoes can ever be very effective in changing the behavior of foreign governments and their constituencies. Trade can have powerful effects. But when used as a weapon, it seems more likely to generate resistance, rather than fear, in the hearts of its victims.

The world's considerable experience with the use of embargoes does not suggest that they have been very successful in drawing concessions from those they were intended to influence. On the other hand, it is conceivable that trade policy might be more successful in influencing policies abroad if it were oriented toward providing positive rather than negative incentives in the political sphere. This is certainly worth exploring further.

International Factor Movements

It was noted in our earlier discussion of the theory of comparative advantage and the gains from trade that factors of production were assumed to move costlessly between industries within countries but not to move internationally. While this assumption of international factor immobility helps to clarify the role of trade and its impact on the returns to factors of production, it is of course unrealistic in view of the often substantial movements of labor and capital from one country to another that in fact occur.

For our purpose here, it is movements of real capital rather than financial capital that are important. Such movements of real capital constitute foreign direct investment (FDI) by international firms. There is a large body of theory of the determinants of FDI, but its main motivation derives from the apparent profitability involved in the internal control by the parent company of the operations of foreign affiliates. There are significant gains in economic efficiency and consumer welfare in both investing and host countries that result from FDI. But in some circumstances there may be costs as well, and conflicts may emerge as governments seek to regulate the investment activities of international firms. In host countries, for example, disputes may arise if it is believed that foreign firms can charge monopoly prices and thus earn excessive profits that they then transfer abroad in large measure. There may be complaints that indigenous workers are not given adequate opportunity to acquire skills and training, and that the host country is held back because it cannot acquire and develop foreign technologies on its own. It may be believed furthermore that foreign firms undermine the efficacy of host country economic policies and maybe even threaten host country political sovereignty. As for investing countries,

they may have their own concerns about the loss of jobs and technological benefits, including spillover effects, as operations are transferred abroad. Strategic and national defense considerations may also be important in some cases.

Population movements between countries have been taking place for centuries for both economic and political reasons. These movements have been subject to varying degrees of control and restriction, depending upon the historical circumstances and countries involved. It is generally accepted that host countries maintain the right to limit immigration, whereas countries that attempt to constrain emigration especially for political reasons may be subject to international criticism. Just as in the case of FDI, the international movement of labor may be beneficial to both the sending and receiving countries in so far as it increases economic efficiency and welfare. But there may be costs here as well. The sending country may lose as its stock of human capital is diminished, particularly since those who leave may be among the most skilled and highly productive .workers. Offsetting effects here would include somewhat higher wages for those that remain and the receipt of remittances from those who moved abroad. In the receiving country, immigration may displace domestic workers and result in lower wages, and there may be added social costs depending upon the use that immigrants make of the available social infrastructure.

It is evident then that FDI and the international movement of labor may provide the basis for conflict between nations, apart from the conflicts that may arise as countries attempt to deal with the various departures from the free trade optimum that have been discussed. What is interesting here is that the international community has not developed mechanisms and institutions for dealing with problems posed by FDI and the international movement of workers. Policies here remain the province of individual nations.

Departures from Full Employment / External Balance

The standard model of comparative advantage and the gains from trade assumes that all factors of production are continuously employed, given that markets for goods,

services, and factors are perfectly competitive and function smoothly. Any unemployment of factors that occurs is treated as if it were a domestic distortion arising from difficulties in adjustment especially in the short or medium run or because of the existence of market imperfections that act as a barrier to entry or exit of factors in particular sectors. As was discussed, the first-best policy to deal with distortions is a domestic tax/subsidy that is directed at the source of the distortion. Trade policy will generally be second best or even worse than second best because of the production and consumption costs involved.

This same conclusion applies at the macroeconomic level. Departures from full employment may occur for a variety of reasons. For example, there may be exogenous real shocks due to an unexpected increase in oil prices or some other type of supply disruption. It is also possible that there may be unemployment or inflationary pressures because of cyclical fluctuations in economic activity. Such fluctuations may originate domestically or be transmitted from other countries via induced changes in imports and exports and international capital movements. Finally, changes in monetary and/or fiscal policies may in themselves constitute a disturbance that will affect aggregate employment and involve international transmission effects working through changes in foreign trade and capital flows.

A moment's reflection suggests that these types of disturbances can have profound effects on aggregate employment, prices, the balance of payments, and exchange rates, and, accordingly, give rise to conflictual situations internationally as countries seek to offset the domestic consequences of the disturbances or to shield themselves from the adverse transmission of foreign influences. Trade intervention seems obviously a suboptimal way of dealing with these macroeconomic disturbances when the underlying problems stem from difficulties of adjustment in the markets for goods and services, labor, and foreign exchange.

International macroeconomic issues and problems have been analyzed at length over the years. To relate these issues and problems to the subject of this chapter, it may

be helpful to distinguish between the defensive and offensive uses of policies in trying to cope with various types of macroeconomic disturbances and interactions. For example, if a country were to impose import restrictions to raise the level of employment and improve its current account balance, this could be considered an offensive policy since it would represent an effort by one country to improve its position at the expense of another. A currency devaluation designed for the same purpose would work similarly since it would improve conditions in the home country while at the same time worsening conditions abroad. Policies designed to improve a country's macroeconomic performance through changes in exports and imports thus appear to be exploitative, and, to the extent that other countries may respond in kind, output and employment will be reduced at home and abroad. By the same line of reasoning, the defensive use of macroeconomic policies may appear to be justified if a country wishes to shield itself from the effects of foreign induced changes in international trade and capital movements.

There is a very interesting and important lesson of macroeconomic policy that has emerged from the foregoing theoretical reasoning that is similar to our earlier point concerning first-best policies. The difference here arises from the international transmission effects noted. Thus, suppose for example that we have two countries that are both experiencing a recession or inflation. In either case, the optimal policy for each country would be to undertake domestic expansionary or contractionary macroeconomic policies designed to deal with the unemployment or inflationary pressures. If one country were to use trade or exchange-rate policies, this would be exploitative since it would exaggerate the other country's problems.

One can also imagine situations in which one country may be experiencing a recession and another country experiencing inflationary pressure. Depending on the type of exchange-rate system in effect, this may or may not result in a conflict situation. It will if exchange rates are fixed since expansionary domestic policies in the country with the recession will worsen the country's current account balance and have opposite effects

abroad, and conversely if the country with inflation were to implement contractionary domestic policies. This problem does not arise, at least in theory, if the exchange rate is flexible since the exchange-rate movement should help to stabilize each economy.

In any event, the point is that there might be conditions when international harmony will be obtained by nations introducing macroeconomic policies that are targeted on domestic objectives. But international disharmony may ensue if countries use trade or exchange-rate measures for dealing with domestic problems or if countries introduce incorrect domestic macroeconomic policies that work in a destabilizing manner internationally. In these instances, it may be desirable accordingly for countries to attempt to cooperate by coordinating their policy actions rather than going it alone.

V. A Computational Modeling Approach to Analyzing Multilateral Trading Arrangements and Policies

The preceding discussion was intended to clarify the issues that arise in the analysis of conflict between nations when there are departures from the free trade optimum or departures from full employment/external balance. We now turn to one line of applied economic research—computational modeling—that has been used extensively to investigate a variety of important issues of potential policy conflicts and cooperation in the global trading system. The focus here will be on the Michigan Model of World Production and Trade.

The Michigan Model was developed initially in the mid-1970s to analyze the economic effects of the Tokyo Round of Multilateral Trade Negotiations in the GATT. It is a computer-based general equilibrium model of the world trading system, providing sectoral detail for the 18 major industrialized countries, 16 major developing countries, and the rest-of-world. Complete details on the theoretical structure and equations of the model, data, and solution procedure are given in Deardorff and Stern (1986).

Of the many applications of the Michigan Model that have been carried out over the years, four have been chosen for discussion here. These include: (1) analysis of

unilateral U.S. introduction of tariffs coupled with defensive responses of other major trading countries; (2) safeguards policies to deal with import disruptions; (3) evaluation of alternative negotiating options in the Uruguay Round of Multilateral Trade Negotiations; and (4) comparison of the employment effects of a unilateral U.S. embargo and a multilateral embargo by all major Western trading countries on the export and import of armaments.

Tariffs and Defensive Responses

One important source of conflict in the international economic system in the 1980s stems from the disruptive effects of the Reagan Administration's monetary/fiscal policy mix on the U.S. foreign sector. At the political level in the United States, it is probably understood, though not always acknowledged readily in public statements, that the U.S. foreign trade imbalance is a macroeconomic phenomenon related to the U.S. budget imbalance. Yet, because a political stalemate has developed over whether to raise taxes and/or reduce expenditures in order to reduce the budget deficit, emphasis has been shifted instead to trying to correct the U.S. trade deficit. Thus, in 1985 and 1986 especially, a spate of legislative proposals designed to assist trade-impacted sectors of the economy were introduced in the Congress. Several of these proposals involved the imposition of a general tariff surcharge on U.S. imports from all sources as a well as a surcharge on imports from countries with large bilateral trade surpluses vis-a-vis the United States.

U.S. legislation actually condones the use of import restrictions under certain specified conditions, although, if the United States were to act unilaterally to impose an import surcharge, it would technically be in violation of its obligations under the GATT not to increase its statutory tariff rates. It would also be subject to foreign retaliation under GATT provisions. But this is not to say that circumstances might arise in which the United States did decide to act unilaterally. To investigate this issue, the Michigan Model was used to determine how our major trading partners might respond to the imposition of

a unilateral U.S. import surcharge. The alternative responses of our trading partners include: (1) passive acceptance of the U.S. import surcharge; (2) defensive response designed to neutralize the adverse effects of the surcharge; and (3) retaliation in kind, either on a multilateral basis or with reference to all or selected categories of U.S. exports to the country.

As described in Deardorff and Stern (1987b), the modeling procedure followed was first to assume that the United States imposed a general import surcharge of 10% on imports from all sources, and that initially there were no changes of any kind implemented abroad. This would indicate what might be expected if there were passive acceptance of the U.S. action. It would also be indicative of the initial effects of the import surcharge prior to any reaction abroad. Assuming that our major trading partners had certain objectives that they wished to attain with respect to avoiding worsening of their terms of trade, balance of trade, and aggregate employment, the model was used to calculate how each country might be affected by the surcharge. Further calculations were then carried out to determine how large a surcharge would be required in each country in order to undo the adverse effects that the U.S. surcharge might have.

The results are interesting in so far as six industrialized countries—Australia, Austria, Canada, Finland, Norway, and Switzerland—showed a zero response. This is because a U.S. surcharge might affect them positively or because their own responses to a U.S. surcharge might prove detrimental to them. But what is also interesting is that the results suggest that these countries might not be spared damage since they could be affected adversely by actions that other countries might take in response to the U.S. action. The results further suggested that Japan, West Germany, Italy, and the United Kingdom would be adversely affected by the U.S. action and might feel compelled to introduce countermeasures to defend themselves. But the results showed the defensive responses of these countries to be rather complex because a given country might not know or be able to anticipate the effects of the responses of all other countries.

Of course, it would be most desirable for the international economic system if the United States were to avoid introducing an import surcharge in the first place. But what this modeling exercise revealed was that some of our trading partners would be spared damage from a U.S. import surcharge because the main effects would be felt by other countries. And, further, for those countries that might be adversely affected, it would be difficult for them to frame an appropriate response unless they could determine the outcome of the complex interactions affecting all of the major countries in the world trading system. In any event, since a retaliatory process would make things worse for all those nations directly involved, this could reinforce the incentive for international cooperation.

Safeguards Policies

Nations may at times be subjected to a sudden surge of imports that can be disruptive to firms and workers in an import-competing industry. It is in recognition of the possible adjustment problems that can occur in these circumstances that safeguards or escape clause arrangements have become part of national trade laws and have been incorporated into the Articles of the GATT. While these formal arrangements have unfortunately been bypassed by the use of other means of "administered protection" in many importing countries, it remains the case that an import surge routinely gives rise to some sort of protective response in the affected country or countries. What is interesting for our purpose here is that policy responses to import surges are often implemented without much consideration of their effects on other trading countries. Since safeguards issues are currently (1989) being addressed in the Uruguay Round of Multilateral Trade Negotiations, it appeared worthwhile to examine the implications, both for the world economy and for the protected industries, of the systematic use of safeguards policies of various types.

Thus, in Deardorff and Stern (1989a), the Michigan Model was used to analyze the effects of alternative safeguards policies that might be undertaken by the United

States and other industrialized countries in response to an unexpected surge in the imports of clothing from developing countries. This particular experiment was chosen in light of the crucial importance especially to the newly industrializing countries (NICs) of continuing access to the import markets of the advanced countries. The objective was to explore the general equilibrium effects of alternative safeguards policies across both industries and countries, taking into account the possibility that an import surge is likely to affect not just one country but many and consequently that safeguards actions will be pursued by many importing countries simultaneously.

The procedure followed was to assume that there was a 10% increase in clothing imports in all of the major industrialized countries at the same time. The model was then solved for the effects of this import surge on trade and employment in all sectors for the 34 countries covered in the model. The results of this solution were then used to construct a variety of safeguards policies responding to the import surge, based on the effects that the surge was calculated to have in the absence of any policy response. The policy responses were then introduced into the model together with the import surge itself in order to calculate the effects of the two together. Eight alternative policy responses to the import surge were explored, including: (1) maintenance of existing quotas on clothing imports in all industrialized countries; (2) a unilateral U.S. tariff on clothing imports; (3) a unilateral U.S. quota on clothing imports; (4) a multilateral tariff by all industrialized importing countries; (5) a multilateral import quota; (6) a unilateral U.S. production subsidy to domestic clothing producers; (7) a multilateral production subsidy to domestic clothing producers; and (8) a multilateral subsidy to keep employment unchanged in all industries.

What is interesting about the results is that the use of import protection—tariffs and quotas—turned out to be questionable even when practiced by only one country, since it shifted the burden of adjustment onto other countries. Furthermore, when protective safeguards actions were assumed to be taken by countries multilaterally, then even the beneficial effects in the protecting countries were undermined to some extent. This was

especially the case since the protective policies served to raise the prices of production inputs in the protecting countries, thus having adverse effects on employment and output in export industries and perhaps also in the clothing industry itself. It was not clear therefore that the industrialized countries as a group would gain collectively from using trade policy measures for safeguards purposes. In contrast, when domestic policies were assumed to be used in dealing with the assumed import surge, they were noticeably more effective in limiting the decline in employment. This was particularly the case for the multilateral production subsidy—policy 7 above—which seemed capable of achieving what trade policies could not: a marked improvement in the employment situation in all industrialized countries.

The results of the Michigan Model experiments thus suggest that unilateral safeguards measures may shift adjustment burdens onto other countries and that trade policy measures may be particularly detrimental to the importing countries' own interests. Unilateral policy responses to an import surge appear to be undesirable therefore from the standpoint of the international economic system. The safeguards policy that appears to work best in terms of mitigating employment declines due to a broad import surge is when all the industrializing countries act together to subsidize domestic output. In designing a safeguards code in the GATT negotiations, the message of this research is that it might be desirable to rule out tariff and quota measures and instead to specify that domestic subsidies be used. This conclusion, it should be noted, is consistent with the central theoretical message of our earlier discussion that the use of trade policy measures is generally suboptimal. While it is not clear at the time of writing how the Uruguay Round negotiations on safeguards will turn out, it may well be that a safeguards code will permit the use of trade policies as well as domestic measures. If countries were then to use trade polices for safeguards purposes, this could have undesirable international consequences for the reasons that the aforementioned research has suggested.

Negotiating Options in the Uruguay Round of Multilateral Trade Negotiations

The Uruguay Round, which was launched officially in September 1986 and is scheduled to be concluded at the end of 1990, is the eighth round of multilateral negotiations that has been held under GATT auspices since the end of World War II. Because there are many different trade liberalization options available to individual countries and groups of countries, it is important to consider the potential economic effects of these options in order to help define national interests and to suggest ways in which tradeoffs may be chosen among the different items on the negotiating agenda. The Michigan Model is well suited for this type of computational analysis. As mentioned above, it was originally developed to analyze negotiating options in the Tokyo Round negotiations. In this connection, Deardorff and Stern (1979) were commissioned by the Senate Finance Committee of the U.S. Congress to the Michigan Model to evaluate the actual offers that were negotiated in the Tokyo Round by the United States and other major countries. This was done as part of the Committee's mandate to seek independent and impartial studies of the possible economic effects of the negotiations as an input into the Congressional deliberations on whether to ratify the changes in tariffs and other policies that the U.S. had agreed to implement.

In Deardorff and Stern (1989b,c), we addressed the issue of multilateral trade liberalization once again by analyzing several different scenarios pertinent to the ongoing Uruguay Round. The scenarios were chosen to illustrate what might be expected to occur if it were possible to eliminate completely existing tariffs and/or nontariff barriers (NTBs) in the world's major trading countries. Of course, the scenarios chosen for analysis may not in actuality correspond to what was being proposed in the Uruguay Round or what might in fact actually be implemented. Nonetheless, we believed that the modeling results would be useful in helping the United States and other countries choose among the available options that would best serve their own national interests and in developing a

consensus about which options might be mutually beneficial for the various countries participating in the negotiations.

The scenarios analyzed were as follows:

1. Elimination of all post-Tokyo Round (1987) tariffs in the 18 major industrialized countries.

2. Elimination of NTBs in the major industrialized countries (excluding agriculture and textiles and clothing).

3. Elimination of domestic agricultural production subsidies in the major indstrialized countries.

4. Elimination of NTBs on textiles and clothing imports in the major industrialized countries.

5. Elimination of all tariffs and NTBs in the major industrialized countries (scenarios 1 + 2 + 3 + 4).

The results of each of these scenarios are too detailed to be reported here, but some of the overall conclusions can be mentioned. For scenario 5, which involves elimination of all existing barriers by the major industrialized countries, it was estimated that world exports would rise by around $70 billion, which was an increase of 5.1% above the 1980 level. U.S. exports would rise by an estimated $9 billion. The number of U.S. workers who would have to change jobs was an estimated 285,000, which was only 0.29% of the U.S. labor force. On a sectoral level, U.S. agriculture showed the largest estimated increase in employment of about 2% of the 1980 agricultural labor force. Employment in most other major sectors varied by much smaller percentages, depending upon the particular negotiating option chosen for eliminating tariffs and NTBs. Given the structure of the Michigan Model and the different scenarios noted, it was possible to calculate employment impacts by sector for each country in the model. These results disclosed several instances in a number of countries in which there could be considerable dislocations in labor markets if the trade liberalization were to take place all at once. This suggested

the desirability of phasing in any liberalization over an extended period in an effort to mitigate any adjustment costs that might occur.

While, as just mentioned, there were instances of sizable net employment changes at the industry level in individual countries, the results also suggested that there were many industries in which the estimated employment changes were relatively small for the different scenarios analyzed. The reason for the small results is that the reductions in tariffs were small, reflecting the fact the tariff rates had already been reduced appreciably as the result of the seven previous rounds of GATT negotiations since the end of World War II. Also, the tariff equivalents of the NTBs were on the whole fairly small. In addition to the scenarios noted above, experiments were run involving the assumed removal of tariffs in the major developing countries. In all previous GATT rounds, these countries were exempted from having to reduce their tariffs. However, in the past decade especially, the East Asian NICs have come under increasing pressure to reduce their import restrictions. We thus calculated what might happen if trade barriers were to be removed in all of the major industrialized and developing countries. The results suggested an even larger increase in world exports than the 5.1% increase noted above for scenario 4 and, further, employment reductions in some sectors might be smaller because of the broader liberalization involved.

Of course, the final negotiating positions of the United States and other participants in the Uruguay Round will depend on how they view their interests as related to both the reduction of tariffs and NTBs and the negotiation of rules governing other items on the negotiating agenda, especially safeguards policies, international transactions in services, and protection of rights to intellectual property (e.g., patents, copyrights, and trademarks). In any event, the types of calculations that have been made using the Michigan Model should be helpful in identifying the sectors in the United States and other countries that are potential beneficiaries from greater liberalization as well as sectors that could be vulnerable to the increased competitive pressures that liberalization may

engender. Such information may therefore reinforce international cooperation and the accomplishments of the GATT on important matters of trade policy in the international economic system.

Unilateral/Multilateral Arms Trade Embargo

A question that has often been discussed is how important international trade in armaments is to employment and output in individual industries in the United States and other major countries and how these industries might be affected if this trade were to be stopped. This question is obviously pertinent should it ever be possible to effect unilateral or multilateral reductions of trade in armaments directly or via reductions in military spending.

Grobar, Stern, and Deardorff (1989) have used the Michigan Model to investigate the importance of international trade in armaments in the major Western industrialized and developing countries. For this purpose, a data set of the exports and imports of armaments for 1980 was constructed for the 34 Western countries included in the model. The trade was disaggregated into military ships, aircraft, communications equipment, and a variety of other military goods. Total exports of armaments by the major Western countries were $18.3 billion in 1980, with the United States accounting for about one-third of the total. The other major arms exporters included France, Italy, the United Kingdom, and West Germany. Israel was the largest arms exporter among the major developing countries. The arms trade was concorded to seven industries included in the Michigan Model that produce military goods: wood products; rubber products; iron and steel; metal products; nonelectrical machinery; electrical machinery; and transport equipment.

It was then possible to calculate the ratios of military exports and imports to total exports and imports for each of the industries for each country in the model. Using these ratios, the importance of trade in military goods with respect to industry output and employment in each country could be determined. The procedure was to assume, first, that the United States imposed a unilateral embargo on its exports and imports of

armaments. To implement this, it was assumed that the industry ratios of military to total exports and imports were reduced to zero, and these values were entered as exogenous changes in the model. The model was then solved to yield a variety of percentage changes in the important economic variables by sector as well as economy-wide weighted averages. Absolute changes were then calculated using the 1980 reference year data. The second experiment involving a multilateral embargo was carried out on the assumption that all of the countries in the model reduced their military trade ratios to zero.

The estimated aggregate results of the unilateral U.S. arms trade embargo were to reduce U.S. total exports and imports by about $2 billion, which was about 1% of their 1980 levels. Some 140 thousand U.S. workers were estimated to have to change jobs as the result of the U.S. embargo. This was a comparatively small 0.14% of total 1980 U.S. employment. There were similarly small changes in the U.S. terms of trade, the exchange rate, and domestic prices. The aggregate effects on the other countries were also small. At the industry level, the largest estimated net reductions in U.S. employment were in transport equipment (1.9% percent of 1980 employment) and electric machinery (1.7%). These same sectors showed an expansion of employment in the other industrialized countries.

The aggregate results for the multilateral embargo indicated a slightly larger decline in U.S. total exports and imports as compared to the U.S. unilateral embargo. For all countries, total exports and imports were reduced by more than $9.9 billion, which was less than 1% of total 1980 trade. An estimated 118 thousand U.S. workers—0.12% of 1980 employment—were estimated to have to change jobs. At the sectoral level, the results for the United States were similar to the U.S. unilateral embargo. But for other countries, the results depended on whether they were net exporters or net importers of military goods. France and Italy showed employment declines in the transport equipment and electric machinery industries while Japan showed an increase in employment in these

industries as did most of the smaller countries. In percentage terms, the detailed industry results suggested that there might be significant adjustment pressures in a number of industries in several industrialized and developing countries, although the orders of magnitude were not of major proportions in most instances.

The general conclusion of this analysis is that the importance of trade in armaments for aggregate and sectoral employment in the United States and other major Western trading countries should not be exaggerated. Of course, there is the larger question of what the effects would be if a sizable reduction in domestic military spending in the major countries were possible. In order to investigate this question, information is needed on the sectoral composition of military spending to correspond to the trade in military goods already included in the model. It would then be possible to use the model to assess the aggregate and sectoral effects of unilateral and/or multilateral reductions in military spending together with embargoes on trade in military goods.

Of course, it remains to be seen whether unilateral or multilateral arms trade embargoes or reduced military spending can be attained. This will depend upon whether the international political environment is conducive to making the necessary changes. To the extent that economic analysis may be helpful in evaluating different alternatives and informing actual decisions, the Michigan Model could be used to establish whether particular policy options of reducing arms trade and/or domestic military expenditures would be disruptive to aggregate and sectoral output and employment in the United States and other major countries. The answer here would obviously depend on the size and timing of the changes involved. Thus, in the analysis of negotiating options in the Uruguay Round, we saw that the possibly disruptive effects of trade liberalization could be mitigated by phasing in the reduction or removal of the tariffs and NTBs involved. Presumably, reductions in military expenditures and trade could be phased in as well over a period of years.

Lessons from Computational Modeling

Having used the Michigan Model for several years to analyze a variety of trade policy issues, we have learned a great deal about the advantages and drawbacks of computational modeling.

The first and by far most significant lesson has been how important it is to have a multicountry/multisector model in order to analyze the effects of changes in trade policies. Time and again, it has been found that foreign tariffs and NTBs have a major impact on an individual country in addition to the impact that the country's own policies may have. A second lesson is that policy makers and their constituents are greatly concerned about the employment and output effects of changes in trade policies in the short-to-medium run. This concern underscores the need for a modeling capability that allows for disequilibrium in labor markets in response to changes in trade policies. In using the Michigan Model, close contact with staff economists in the U.S. Government agencies, the Congress, and the major international organizations concerned with trade matters. The various papers describing the model experiments and results have been widely circulated in government circles, and, on occasion, government agencies have commissioned studies of important trade policy issues using the Michigan Model. While it is difficult for to know whether the computational results of the model have been taken explicitly into account in making policy decisions, many government officials and their staff are certainly cognizant of the capability and uses of the model.

Over the years, certain drawbacks of the Michigan Model have become evident. These include the inability of the model to handle bilateral (as opposed to multilateral) policy changes, problems of separating real from purely financial effects of policy changes, and the need to take imperfect competition and economies of scale into account especially in certain manufacturing industries. In continuing work on computational modeling, an effort is being made to construct modeling options that address these limitations. It is planned accordingly to continue providing computational estimates of the economic effects
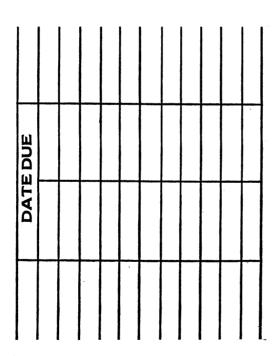
of actual and hypothetical changes in trade policies. Of course, political considerations will ultimately govern the choice and implementation of policies. But government officials will hopefully continue to find the computational results of the Michigan Model useful in evaluating existing policies and deliberating among different options for making changes in policies.

VI. Conclusion

An effort has been made in this chapter to demonstrate how issues of conflict in international economic relations are handled conceptually in the theory of international trade and international macroeconomics.

In order to illustrate how certain issues could be analyzed in a pragmatic manner, we described briefly four applications of the Michigan Model of World Production and Trade. In the cases of tariffs and safeguards policies, the focus was on how unilateral U.S. actions would affect other countries. As far as tariffs are concerned, because of the possibility of retaliation, the conclusion was that it would be best if the policy action were not taken in the first place. With respect to safeguards policies, it appeared that the preferred policy was a multilateral domestic production subsidy rather than a unilateral/ multilateral import tariff or quota. The analysis of negotiating options in the Uruguay Round was intended to show how countries might choose to formulate their negotiating positions and identify tradeoffs on particular options in the light of their national interests. The emphasis here was on the employment effects of different options, and the setting was one of cooperation for mutual gain by means of trade liberalization under the authority and influence of the GATT. The focus of the experiments on unilateral/multilateral embargoes of international trade in armaments was again on employment effects in the major Western countries. It was shown in particular that the United States would experience only comparatively minor employment shifts if trade in armaments were eliminated. Other countries might experience more disruption of employment, but the effects could be mitigated by phasing in the changes in policies. In this last case, it would require

agreement at the highest political levels to effect the reductions in trade armaments. In reaching such a decision, it would be important to know how disruptive such changes would be. The Michigan Model results suggest that the effects involved would be manageable. If this conclusion were accepted by those countries concerned, then cooperative steps could be taken to defuse the potential for conflict to arise as the result of international trade in armaments.

The Michigan Model is only one example of the contribution that international economists can make to the analysis of conflict and cooperation in the international economic system. One can point to other economic modeling efforts that deal with different aspects of the global trading and payments system. The insights from empirical economic modeling thus have much to offer to analysts and government officials who are involved in the international policy process.

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