Political Economy Trade Negotiations: An Empirical Game Theory Analysis

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Abstract: The paper questions why agricultural trade compromise between the USA and EC is so difficult, whether a compensatory scheme be found that is both politically feasible and resource saving, and whether liberalizing policies by selected OECD countries will ease a trade compromise. These questions are addressed in a political economy context since, if the influence of special interests is ignored, trade compromises that both save resources and are politically feasible are unlikely to be searched for or found. The analysis entails the estimation of political preference weights, game theory, and a partial equilibrium world trade model based on 1988 data. The general answers are: the most influential special-interest groups face economic losses that, when coupled with their influence, tend to prevent a broad-based trade compromise given the current set of policy instruments; partial trade liberalization can occur if instruments are decoupled from production incentives, but free trade does not result; and partial liberalization by the rest of the OECD greatly increases the feasibility for the USA and EC to compromise. These results illustrate that interdependence in world trade has reached the point where bilateral action alone is unlikely to lead to real liberalization.

Introduction

The economic history of EC–US conflicts over agricultural policy has been long and rich in events. Clearly, the difficulty of obtaining an agricultural trade agreement during the Uruguay Round of GATT negotiations suggests that economic efficiency is not the only factor motivating the negotiations between these antagonists. Another motivation is the balance of political pressures exerted by special interest groups on the governments in these countries. This balance typically protects producers relative to consumers and taxpayers in general. Hence, the search for a trade compromise confronts this political balance in each country.

If the political influence of special interests is ignored, then a search for a set of trade compromises that saves resources and is politically feasible is unlikely to be successful. In other words, the conventional neoclassical trade analysis where alternative trade compromises are based on net social welfare gains in each country is almost surely inconsistent with the balance of political power in these countries. Thus, the traditional type of analysis is of limited usefulness since trade compromises that are politically feasible cannot be identified from the larger set of compromises that merely save resources. Moreover, the typical compensatory payment scheme that compensates losers based on taxing some of the rewards from gainers from liberalization is misleading because this scheme assumes that one dollar of compensation to a group with less political power is equal to a dollar's worth of compensation to a group that has more political power.

While the USA and EC tend to be the major antagonists in the Uruguay Round, other OECD countries are also major participants in world agricultural markets. For many, their agricultural economies are adversely affected by the US and EC policies. And, as a group, their agricultural policies also affect world market prices and hence the budget costs of policies in the USA and EC. Hence, acceptable trade compromises between the USA and EC in the Uruguay Round may be dependent on policy changes in other OECD countries.

The general focus of this paper is on the political economy of the US and EC negotiations under GATT and the possible influence that the other OECD countries may have on the politically feasible set of possible trade compromises. More specifically, game theory, coupled with political economy and a partial equilibrium world trade model, is used to address the following questions: why a trade compromise between the USA and EC is so difficult when the net social gains from liberalization appear to be potentially large; whether a compensatory scheme can be found that can potentially lead to trade compromises that are politically feasible and resource saving; whether trade liberalization in other OECD countries would facilitate a trade compromise between the USA and EC, or, stated another way, in the context of political economy, how dependent acceptable US and EC trade compromises are on trade liberalization by other OECD countries.

Conceptual Framework

Rausser and Freebairn (1974), Sarris and Freebairn (1983), and others (e.g., Tyers, 1989; and Riethmuller and Roe, 1986) have modelled the influence of special interest groups as the unconstrained maximization of a weighted, additive social welfare function over producer welfare, consumer welfare, and taxpayers. This paper adopts this approach and, for the remainder of the paper, refers to this type of a social welfare function as a political payoff function (PPF).

The PPF function for the USA or EC is:

$$(1)\quad V^i = \Sigma_j \lambda^i_j \pi^i_j(P^i_f, Z^i_f) + \lambda^i_c U^i(P^i_c, Z^i_c) + B^i(P^i_f, P^i_c, Z^i_j, Z^i_c, P_w)$$

where i denotes the country, $-i$ denotes the other country, and the λ^i_j is the political influence weight of the jth interest group (which is synonymous with the jth commodity) in the ith country. The λ^i_c denotes the weight for consumers in the ith country. The weight associated with the government's budget B^i is taken to be the numeraire.[2] The vector of domestic prices P^i_f, P^i_c appearing in the jth interest group's profit function π^i_j and the utility function U^i of consumers depend on domestic policy instruments that affect domestic price (e.g., target prices, tariffs, and consumption tax), while the vectors Z^i_j and Z^i_c reflect those instruments that have indirect effects such as land set-aside, food stamps, and so on. Since markets are assumed to clear, the government's budget depends on domestic prices and a vector of world market prices P_w. The interdependency in world trade comes about through the effect of the other country's policy on world markets. Hence, P_w is a function of countries' policy instruments.

Following Olson (1965), the interpretation of the PPF is that agricultural producers band together in lobbies to achieve through the government what they could not achieve in the market. However, the policies that they promote impinge on the welfare of other groups who lobby to counteract the agricultural lobby. Hence, in the PPF, a group's welfare weight λ_j reflects the relative political influence wielded by the group in the determination of policies. The ratio of any two weights (e.g., λ_j/λ_c) reflects the amount of income loss to consumers per dollar gain to the jth producer that would leave the government indifferent, all else constant. Hence, if $\lambda_j > \lambda_c$, then the government is indifferent between a policy that transfers one European Currency Unit (ECU)[3] to producers for λ_j/λ_c and a one-ECU loss to consumers.

The procedure for estimating these weights is based on an updated version of the world trade model that was initially developed by Mahé, Tavera, and Trochet (1988) and used to study the bilateral harmonization of US and EC agricultural policies (Mahé and Tavera, 1988). The model resembles the SWOPSIM model developed by the US Department of Agriculture (Roningen, 1986), except that it is designed to account for the actual policy instruments employed by countries. Consequently, it can account for both vertical and horizontal market interventions, including production and import quotas. It is a static partial equilibrium trade model that specifies production and demand elasticities for the USA, the EC, the region of Japan, the Nordic countries, Austria, Switzerland, Canada, Australia, and New Zealand, and, as an aggregate, the rest of the world. The model identifies eight commodities: wheat and coarse grains (grain), oilseed cakes, vegetable oil, feed-grain substitutes (including millings and other vegetable by-products, maize gluten feed, cassava, and citrus-pulp), beef, pigmeat and poultry, milk and milk products, and sugar. The model uses a set of production and demand elasticities similar to SWOPSIM. In a similar way to the procedure for initializing computable general equilibrium (CGE) models, the model is initialized to data for the base year 1988 so that its solution reproduces the base year data exactly. Simulation results are interpreted relative to the base year data.

Estimation of Political Preference Weights

To characterize the economic game between the USA and EC, it is necessary closely to approximate the actual US and EC policy instruments. Accordingly, the instruments embedded in the model include, for the USA, deficiency payments, land set-aside, an export enhancement programme, import quotas for sugar, price supports for dairy, and, for beef, a tariff-linked import quota. For the EC, instruments are the variable levy (which fixes consumer grain prices), co-responsibility payments (which allow producer prices to depart from consumer prices), consumer prices equal to world prices for oilseed cakes and feed-grain substitutes (by previous GATT agreement), oilseed producer prices supported by a subsidy, and milk, sugar, beef, pigmeat, and poultry supported by a variable levy system. A production quota on milk was also implemented.

The next step is to assume that governments in the USA and EC choose these policy instruments as though they sought to optimize the PPF, Equation (1). Then, assuming differentiability, it is possible to use the first order conditions from this presumed optimization process to solve for the weights in (1); i.e., for the λ^i_j. The trade model is thus used, in effect, to derive these numerical derivatives. The result is a set of first-order conditions for each country; in matrix terms:

$$(2)\quad \Delta V^i = \Sigma_j \lambda^i_j \Delta\pi^i_j(P^i_f, Z^i_j) + \lambda^i_c \Delta U^i(P^i_c, Z^i_c) + \Delta B^i(P^i_f, P^i_c, Z^i_j, Z^i_c, P_w) = 0$$

$$(3)\quad \Delta V^{-i} = \Sigma_j \lambda^{-i}_j \Delta\pi^{-i}_j(P^{-i}_f, Z^{-i}_j) + \lambda^{-i}_c \Delta U^{-i}(P^{-i}_c, Z^{-i}_c) + \Delta B^{-i}(P^{-i}_f, P^{-i}_c, Z^{-i}_j, Z^{-i}_c, P_w) = 0$$

where, i = the USA, $-i$ = the EC, and ΔV, $\Delta\pi$, ΔU, and ΔB are vectors of numerical derivatives obtained for small changes in the policy instruments of each country. Numerical estimates of the weights in (1) are then derived from:

$$(4)\quad [\lambda^i] = [\Delta\pi^i_j(P^i_f, Z^i_j)\ \Delta U^i(P^i_c, Z^i_c)]^{-1} - [\Delta B^i(P^i_f, P^i_c, Z^i_j, Z^i_c, P_w)]$$

$$(5)\quad [\lambda^{-i}] = [\Delta\pi^{-i}_j(P^{-i}_f, Z^{-i}_j)\ \Delta U^{-i}(P^{-i}_c, Z^{-i}_c)]^{-1} - [\Delta B^{-i}(P^{-i}_f, P^{-i}_c, Z^{-i}_j, Z^{-i}_c, P_w)]$$

The results from these computations appear in Table 1. Notice that those sectors that are the most protected in each country receive the highest weight. At the higher end of the scale, this includes producers of sugar and dairy products in both countries, while consumers and producers of pigmeat and poultry appear at the lower end of the scale. Clearly, the interpretation of these weights as revealing the political influence of the various groups in determining US and EC agricultural policy in 1988 must be conjectural. Hence, it is preferable to ask what these weights imply about the US and EC trade policy negotiations and whether the implications seem consistent with other information available about these negotiations. Their literal interpretation was mentioned above. For instance, the ratio $\lambda_{sugar}/\lambda_c$ for the USA is \$1.90. This suggests that the US government was

Table 1—Policy-Goal Function Weights and Their Ranking by Interest Group for the USA and EC, Based on 1986

	USA		EC	
	Rank	Weight (λ_{US})	Rank	Weight (λ_{EC})
Sugar	1	1.56	1	1.57
Dairy products	2	1.29	2	1.46
Feed	3	1.23	4	1.32
Grain	4	1.15	3	1.34
Budget	5	1.00	6	1.00
Beef	6	0.92	4	1.32
Consumers	7	0.87	8	0.83
Pigmeat and poultry	8	0.85	7	0.95

willing, at the margin, to give up $1.90 in consumer loss for every dollar it transferred to sugar producers in 1988. Of course, dividing $1.90 by the US population of sugar consumers and dividing $1.00 by the number of US sugar producers indicates that the marginal rate of substitution, on a per-capita basis, is small for the individual consumer relative to the producer gain. It is well known that distortions from government intervention tend to occur whenever the gain from intervention substantially benefits a few at a small individual cost to many.

A One-Period Noncooperative Game

The procedure is to solve the world trade model for various trade liberalization scenarios for both the USA and EC. The net social gains obtained from the model for each of the above-mentioned special interest groups are then substituted into Equation (1) and a payoff matrix is formed. This procedure is consistent with game theory where the premise is that governments seek a treaty action space that makes at least one government no worse off than the *status quo* policies. These results are reported in the first panel of Table 2 for three alternative trade liberalizing scenarios. The scenarios are:

USA:

sq—The *status quo* of 1988.
ber—Ban on producer subsidies and export subsidies for all commodities except beef, sugar, and dairy products. Self-sufficiency in dairy products is allowed, while sugar and beef quotas remain at the *status quo*.
pft—A 30-percent decrease in the nominal protection coefficient for all commodities.
ft—Free trade in all commodities.

EC:

sq—The *status quo* of 1988.
ber—Ban on export restitution; *ad valorem* tariffs are used to attain self-sufficiency in grains, beef, pigmeat, poultry, dairy products, and sugar; price differentials, in percent, between producers and consumers remain at the *status quo*; the farm price of oilseed cakes is unchanged.
pft—A 30-percent decrease in the nominal protection coefficient for all commodities.
ft—Free trade in all commodities.

Economic Results

In general, liberalization causes large increases in the world prices of grains, beef, sugar, and dairy products, decreases in the prices of oilseed cakes and feed-grain substitutes, and smaller changes in the prices of pigmeat and poultry. Three factors drive these results: crop production shifts in the USA from grains to oilseeds; feed input substitution occurs in the EC; and the EC substitutes grains for oilseed cakes and feed-grain substitutes. EC beef, dairy, pigmeat, and poultry producers also have lower feed input demand as the feed sector contracts.

As is well known, the EC variable levy system transfers income to producers from consumers and the budget. Hence, EC liberalization gives rise to large consumer gains that range from 6,400 million ECUs for *pft* to 24,400 million ECUs for free trade. Budget savings are also large but always smaller than the consumer surplus gains. Furthermore, most EC budget savings are realized under *ber* since most budget outlays are from export restitutions.

In the US case, most income transfers to producers occur through the budget, except for dairy products, beef, and sugar policies. Hence, consumer surplus gains in the USA range from only 2,200 million ECUs under *pft* to 7,510 million ECUs under free trade when sugar and dairy products are liberalized. In contrast, the budget savings range from 5,600 million

ECUs under *pft* to 16,540 million ECUs under free trade. Consequently, the greatest marginal budget saving occurs from *sq* to *pft* when deficiency payments on grains are removed.

The welfare effects of bilateral liberalization are dominated by own-country effects; i.e., liberalization in the USA does have welfare consequences in the EC and *vice-versa*, but they are always small compared to effects of any unilateral liberalization. For example, the budget savings in the USA from *ft* is at least 16,000 million ECUs, but the greatest change in budget savings to the USA from an EC liberalization is only 200 million ECUs from *sq* to *ber*. Those results motivate the political economy results reported next; i.e., that, with the exception of the results reported in Figure 1, neither the USA nor the EC is willing to choose policies that "pay off" the other country to induce it to liberalize.

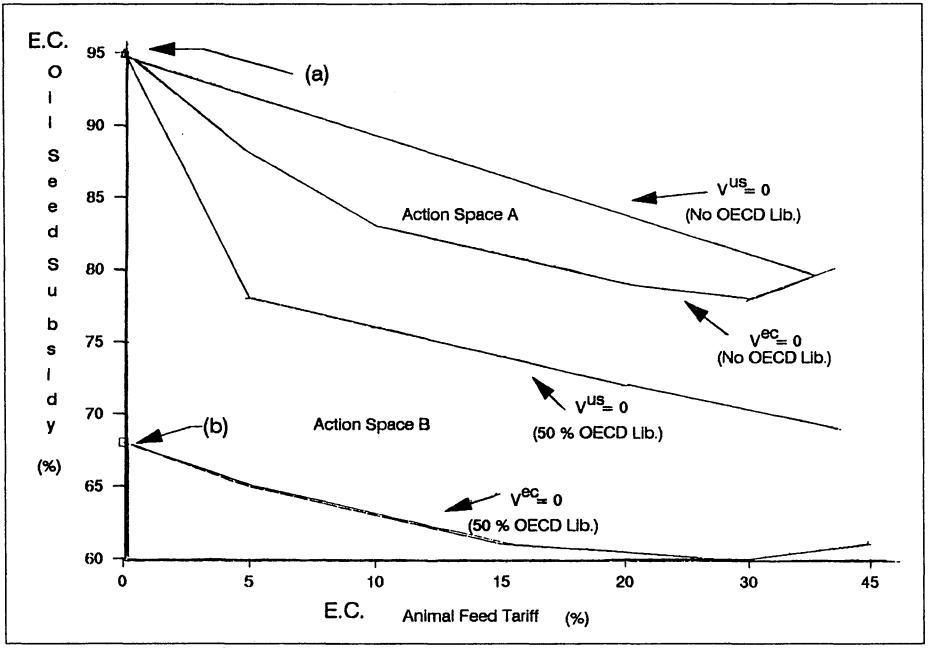

Figure 1—US–EC Indifference Curves: Treaty Action Space, Rebalancing Grain and Feed

Political Economy Results: Game One

As mentioned, economic efficiency is not the only criterion motivating the negotiations. Hence, the economic results discussed above need to consider that influences of special interests vary as suggested in Table 1. Translating the welfare payoffs from the economic results into Equation (1) to obtain the political implications of trade liberalization gives rise to the political economy game depicted in Table 2.

By inspection, the *status quo* is the unique Nash equilibrium; it is a strongly dominant action for the USA and EC. Note also that when the USA plays the *status quo*, it always gains from EC liberalization, and *vice-versa*.[4] Hence, it appears in the self interest of each to encourage the other to liberalize while maintaining its own *status quo*. Moreover, there is no bilateral liberalization from which the EC gains; it always loses. But the USA gains if it pursues *pft* or *ber* and the EC pursues *pft* or *ft*. The EC would not be interested in these options, since it loses in each of these mutual liberalizations. Finally, it is irrational for the USA to propose *ft*, *ft* because it experiences a loss without decoupled payments.

Table 2—Policy-Goal Function Values for Alternative US and EC Trade Liberalization Strategies and Decoupled Payments (1988)

Panel one	Game One: Using 1986 Action Space							
	sq		*pft*		*ber*		*ft*	
sq	0,	0	182,	−292	412,	−1699	697,	−5407
pft	−112,	251	138,	−56	−457,	−1722	1272,	−5551
ber	−560,	517	−598,	480	−234,	−1554	233,	−4691
ft	−2075,	1020	−2024,	1154	−1472,	−1433	−877,	−4409
Panel two	**Game Two: Using Decoupled Payment**							
	sq		*pft′*		*ber′*		*ft′*	
sq	0,	0	182,	2208	412,	2057	697,	16
pft	1102,	251	1179,	2298	1271,	2061	3140,	−47
ber	2216,	517	2212,	2431	2484,	2242	2968,	640
ft	1559,	1020	1600,	2571	2099,	2255	2600,	868
Panel three	**Game Three: Effects of OECD Liberalization**							
	sq[a]		*pft*		*ber*		*ft*	
sq	294,	551	476,	285	681,	−1657	971,	−5085
pft	312,	794	542,	420	1018,	−1737	1796,	−5356
ber	−376,	1272	−249,	1071	15,	−1505	445,	−4360
ft	−1704,	1757	−1599,	1634	−984,	−1419	−444,	−4156

Note: Shaded areas denote solution to game. [a]*sq*, *sq* is positive since both the USA and EC benefit from OECD liberalization.

Notice that these results are remarkably consistent with the US and EC negotiating positions. The USA wishes to pursue trade liberalization provided the EC liberalizes. In this case, the USA is politically better off, and, at the same time, resources are saved (i.e., net social economic gains are positive). But it is not in the political interest of the USA to pursue trade liberalization on its own, nor to seek full liberalization. In this case, the economic results suggest that the USA would save resources by unilateral liberalization; but, in political terms, it loses (Col. 1, Table 2).

Suppose the budget savings from the various trade-liberalizing scenarios were reallocated to the losers from liberalization. Of course, in reality these decoupled payments would be in terms of maintaining the environment, helping farmers to adjust to lower farm prices, and so on. However, the payments are not allocated in the traditional compensatory way. Instead, payments are made to the loser with the highest political weight first, and then to the next most influential loser, and so on, until either all losers are fully compensated or all the budget savings from liberalization are exhausted. This distributional rule maximizes the PPF, given that the total transfer is no larger than the budget savings from trade liberalization and that no one is over-compensated.

Political Economy Results: Game Two

The (′) appended in the payoff matrix of Game Two (Table 2) to an action reflects the addition of the transfer to each of Game One's liberalizations. Inspecting Game Two, only *pft′*, *ft′* is not a treaty action. The payoffs of *ft′*, *ft′* are consistent with the initial US proposal of free trade, and *ft′*, *ft′* is the symmetric liberalization (liberalizations down the diagonal) that gives the USA the greatest payoff. This would suggest that the US proposal for free trade

with decoupled payments is the treaty action that benefits it most. Subsequent US proposals have reduced the US payoff while offering others more, which is what one would expect in barter.

The Nash equilibrium of Game Two is *ber'*, *pft'*, because *pft'* is a dominant strategy for the EC and because *ber'* is a best response of the USA to all EC actions except *ft'*. The *status quo* is no longer the dominant strategy of the USA and EC, because the introduction of compensation allows the USA and EC to transfer income more efficiently between the budget and producers. It is in their own interests partly to liberalize regardless of the other's action.

Free trade with compensation is not the dominant strategy, because the budget savings are not sufficient fully to compensate the losers. This occurs because the compensatory scheme allows transfers only from the budget (and not from consumers) to producers. For the EC, the equilibrium occurs if it exports (if it continues to pay smaller restitutions) and if it subsidizes oilseed production. When the EC is autarchic, no more restitution savings can be obtained, but it remains politically expedient to transfer income from consumers to producers through higher domestic prices. For the USA, the savings result largely from reductions in grain support prices. Consumer support of dairy, beef, and sugar producers is still politically desirable. Thus, freer trade results. Free trade does not.

OECD Effect on an EC–US Trade Compromise

The rest of the OECD is assumed to decrease its level of trade protection by 50 percent. The analysis of Game One is then repeated. These results appear in Panel three of Table 2. An important component of the EC's negotiating position is its interest in trading US and EC cuts in the support price of grain and oilseed cakes for EC tariffs on oilseed cakes and feed-grain substitutes. Whether these trade-offs can lead to a treaty that leaves both countries no worse off than the *status quo* is determined by the extent to which their respective policy indifference curves, based on Equation (1), "overlap." These results appear in Figure 1.

Let us consider Panel three, Table 2. When the rest of the OECD pursues partial liberalization (50 percent), world prices rise, particularly for grains, as import demand grows in Japan and the Nordic countries while exports from Canada and Australia decline somewhat. Because world prices rise, trade liberalization by the USA and EC is made easier since farm prices in the USA and EC do not fall as far as they did in Game One, and budget savings are greater. The solution to this game is also a dominant Nash strategy for both countries; the solution, in the absence of compensation, is *pft-sq*. Hence, it is in the interests of the USA and the EC to induce other OECD countries to pursue trade liberalization because, in so doing, the USA and EC can accomplish a treaty that would not, in the absence of our compensation scheme, be acceptable. In other words, the question of a treaty is really a multilateral problem, not just a bilateral US–EC issue. Interdependencies in world agricultural trade have reached the point where bilateral action is unlikely to lead to real trade liberalization.

Now, let us consider the second subcomponent, the trade-off between US and EC cuts in grains for EC tariffs on feed imports. In Figure 1, Action Space A denotes the treaty action space when the OECD and USA pursue the *status quo* and the EC harmonizes. The top line contains the smallest harmonizations the USA will accept, as measured by $V^{US} = 0$. The bottom line contains the largest harmonizations the EC will accept, as measured by $V^{EC} = 0$.

Next, the same analysis is repeated assuming that the rest of the OECD liberalizes its grain and oilseed protection by 50 percent. The top and bottom policy indifference curves for Action Space B have the same interpretations as in Action Space A. The US indifference curve for B is obtained by US liberalizations in grain and feed, holding the EC at the *status quo*, until the USA reaches its *status quo* value before OECD liberalization, point (a). At this point, $V^{US} = 0$. The remainder of the curve is then generated for the loci of points shown in Figure 1. At point (b), the EC liberalizes its grains and oilseed cakes subsidies until $V^{EC} = 0$. The remaining loci of points are obtained holding $V^{EC} = 0$.

Coordinate points in Space B yield non-negative values for V^{US} and V^{EC}. Hence, OECD liberalization and the US–EC response to it increase the area of treaty action space and increase the overall reductions that could be obtained from the EC, relative to the smaller Action Space A; i.e., even larger possibilities exist for a US–EC compromise in these selected commodities. While the political economy and economic gains (net social welfare) are larger than in the case of Space B, they are still small relative to Panel two and three of Table 2.

Notes

[1]Institut National de la Recherche Agronomique, France, and University of Minnesota, respectively.

[2]Since the maximum of V^i is unchanged with a linear transformation, only relative rather than absolute weights are relevant.

[3]Monetary units in the empirical model are in ECUs.

[4]Gains (losses) refer to an increase (decrease) in the value of the PPF for the respective country unless otherwise indicated.

References

Mahé, L.P., and Tavera, T., "Bilateral Harmonization of EC and US Agricultural Policies," *European Review of Agricultural Economics*, Vol. 15, 1988, pp. 327–348.

Mahé, L., Tavera, C., and Trochet, T., "An Analysis of Interaction between EC and US Policies with a Simplified World Trade Model: MISS," Background Paper for the Report to the Commission of the European Communities on Disharmonies in EC and US Agricultural Policies, Institut National de la Recherche Agronomique, Rennes, France, 1988.

Olson, M., *The Logic of Collective Action*, Harvard University Press, Cambridge, Mass., USA, 1965.

Rausser, G.C., and Freebairn, J., "Estimation of Policy Preference Functions: An Application to US Beef Import Quotas," *Review of Economics and Statistics*, Vol. 56, 1974, pp. 437–449.

Riethmuller, P., and Roe, T., "Government Intervention in Commodity Markets: The Case of Japanese Rice and Wheat Policy," *Journal of Policy Modeling*, Vol. 8, 1986, pp. 327–349.

Roningen, V.O., "A Static World Policy Simulation (SWOPSIM) Modeling Framework," Staff Report No. AGES–960625, Economic Research Service, US Department of Agriculture, Washington, D.C., USA, 1986.

Sarris, A.H., and Freebairn, J., "Endogenous Price Policies and International Wheat Prices," *American Journal of Agricultural Economics*, Vol. 65, 1983, pp. 214–224.

Tyers, R., *Implicit Policy Preferences and the Assessment of Negotiable Trade Policy Reforms*, Centre for International Economic Studies, University of Adelaide, Australia, 1989.

Discussion Opening—*Jacques Loyat* (Ministère de l'Agriculture et de la Forêt, France)

Mahé and Roe present an interesting contribution to the debate on EC–US conflicts over agricultural policies. The interest originates in the analysis of political power under GATT negotiations. I will discuss briefly the theoretical basis of the paper and its empirical approach.

There are two major streams of new thinking in trade theory. The first incorporates imperfect competition, by relaxing traditional assumptions of constant returns to scale, homogeneous products, and competitive markets. The second assimilates the theory of public

choice. Some assume that governments possess a societal welfare function; others assume that governments respond to interest group pressures and set policies accordingly. In the present paper, the authors explicitly assume imperfect competition for international agricultural trade through interest groups. Here agents are price takers and economic rigidities are represented by the elasticities of the model; only governments are assumed to have strategic power.

The game is a one-period non-cooperative game between two governments. First, the model being a static comparative one, it is necessarily a one-period game. Second, even if preplay communication between players is possible, play is non-cooperative if commitments are not enforceable. This last assumption could be questioned for the EC and USA under GATT agreements.

But a more important aspect is surely the nature of the equilibrium that is realized; i.e., a Nash equilibrium. Even if we know how to define a Nash equilibrium, we do not really know how it is realized. A Nash equilibrium may or may not exist under a pure strategy game; all the more with a one-period game. The estimation of the political preference weights of the political goal functions is made through the unique 1988 equilibrium. It is therefore assumed that the 1988 equilibrium was a Nash equilibrium, from the moment when the governments were engaged in a severe negotiation for policy change. There are good reasons to think that the 1988 equilibrium was not a Nash equilibrium. The preference weights are fixed whatever the Nash equilibrium may be, but I would rather think that when the protection levels change, the weights themselves will change.

Four games are played by each government. The authors do not explain the choice of the different policies, and they do not discuss the feasibility of the scenarios generated by the MISS model. I observe that there is no symmetry between EC and US games. Let me take the case of *ber* policies, which give the Nash equilibrium in Game Two. For the USA, beef, sugar, and dairy products are unchanged; there is a ban on producer subsidies, and export subsidies for all other products. For the EC, there is ban on export restitutions, and the objective is to reach self-sufficiency in grains, beef, pigmeat, poultry, dairy products, and sugar. The *ber* scenarios are evidently not politically equivalent for the EC and USA. Everything happens as if export strategies were playing no role for the EC government, while it is implicitly one of the main objectives of the US government.

By way of conclusion, this paper is interesting because it throws trade under imperfect competition into some relief. The empirical conclusions may not be sufficiently robust to give normative advice. A further step in this imperfect competition approach would be the discussion of other strategies by governments and traders and an analysis of international market structures. This could throw a new light on trade negotiations.

[Other discussion of this paper appears on page 352.]