ELSEVIER

Agricultural Economics 10 (1994) 71–80

AGRICULTURAL ECONOMICS

Agricultural trade negotiations as a strategic game

Shiva S. Makki, Luther Tweeten *

Department of Agricultural Economics and Rural Sociology, The Ohio State University, 2120 Fyffe Road, Columbus, OH 43210, USA

James Gleckler

Department of Agriculture and Forestry, Northeastern Oklahoma A&M College, Miami, OK 74354, USA

(Accepted 15 January 1993)

Abstract

This study views multilateral trade negotiations as a strategic game among nations or regions, including taxpayer, consumer, and producer components. Payoffs are calculated from an intermediate-run international trade model initialized with 1989 data. For the public at large, the Nash equilibrium and socially optimal outcome is liberalization of trade – unilateral or multilateral. Maintenance of the status quo of market distortions costing the world billions of dollars each year is rational only if producer payoffs are sovereign so that strategies optimal for producers are considered optimal for nations. Remedial policies are discussed, including opportunities for economic education, political system reform, and less incentives for producers to scuttle multilateral trade negotiations.

The Uruguay Round of trade negotiations stalled because participants were unable to find common ground in agricultural trade and commodity program policies. Three key participants – the US, the EC, and Japan – heavily influenced trade negotiations (Harrison and Rutstrom, 1991). Over 100 countries are members of the GATT, but these three entities together accounting for two-thirds of world trade dominated proceedings of the GATT.

Frustration over the inability to exploit its comparative advantage in agriculture, huge trade deficits, and mounting budgetary costs of export subsidies prompted the U.S. initially to press for total liberalization of agricultural trade. It has since softened its position. The EC has been unwilling to depart substantially from the high market price supports, trade barriers, and export subsidies under the Common Agricultural Policy which have made the Community the second largest exporter of farm commodities. Meanwhile, Japan, the third key actor, has maintained a low profile in the negotiations, torn between its need for open world markets to maintain industrial growth on the one hand and its concern for food security on the other.

Recently, attempts have been made to explain trade protectionism in a game theoretic framework. Harrison and Rutstrom (1991) analyzed

* Corresponding author.

Elsevier Science B.V.
SSDI 0169-5150(93)E0018-I

trade wars and trade negotiations in a game framework using a global numerical trade model developed by Whalley (1985, 1986). They demonstrate as do other studies that the world as a whole gains substantially from multilateral liberalization. Karp and McCalla (1983), studying the world corn market using game theory, noted how one sector of an economy could be harmed while national welfare (income) is maximized. Johnson, Mahe and Roe (1990) derived optimal strategies for an agricultural trade game between the U.S. and the EC based on 1986 data. They concluded that "Freer trade, not free trade, results because it remains politically optimal for consumers to bear part of the cost of agricultural policies." Buckwell and Medland (1991) point out that even though the normative aspects of a trade model are correct, they may still be irrelevant to policy makers. They emphasize the need for more use of political economy in modelling trade liberalization.

While these studies strengthen the case for free trade, they do not explain the impasse in trade negotiations. The studies were based on 1986 or prior data. Estimates are needed that are more timely, that help to explain the disappointing performance of the Uruguay Round, that include more sectors (consumers, producers, etc.) and more than the two principal antagonists (the U.S. and the EC), and that point to negotiating strategies to break the Uruguay Round stalemate.

Analysis herein and other studies report deadweight gains in national (and world) income from freer agricultural trade. [1] Yet, governments continue to pursue policies that reduce national income (Krugman, 1991). Elements of political economy viewed in the context of game theory provide insight in the seemingly irrational behavior of countries in international agricultural trade (Karp, 1984; Chan, 1988). The objective of this study is to develop and analyze the payoff matrix for agricultural trade liberalization versus the status quo for the U.S. versus the EC, Japan, and the rest of the world. That matrix helps to explain the failure of past and the promise for future trade negotiations. The analysis has two major components:

(1) Estimating and comparing the aggregate benefits to society, consumers, producers, and taxpayers from unilateral and multilateral trade liberalization.
(2) Evaluating benefits and strategies in a game theoretical framework for major participants in international trade negotiations, and interpreting the results.

Before turning to the empirical results, we briefly review the conceptual framework.

1. Game theory and international trade

International agricultural trade markets involve power, strategies, and counter strategies (see Karp and McCalla, 1983). Game theory, which models the actions and reactions of two or more players with disparate or conflicting objectives, provides a conceptual tool for analyzing and understanding such a market. By analyzing the rational behavior of politically powerful interest groups acting in their self-interest, game theory helps to explain national trade policies and multilateral trade negotiating behavior.

Some terms used extensively in the ensuing discussion are explained briefly. The *players* are the participants in the game who make decisions. Each player's goal is to maximize its benefits by choice of action. For this analysis, the trade negotiation players are the U.S., the EC, Japan, and the rest of the world. A *strategy* [2] by a player i, denoted by S_i, is a rule that dictates which action it should choose at each instant of the game, given the available information and strategies of the other player(s). Player i's strategy space $\Omega_{ij} = \{S_{ij}\}$ is the set of strategies available to it.

[1] Several studies show sizable net economic welfare gains to society from agricultural trade liberalization (see Roningen and Dixit, 1989; Tyers and Anderson, 1988; Haley, Herlihy and Johnston, 1991; and the references therein).

[2] In the present study terms like strategy and action are used synonymously. However, they are intuitively distinguishable. Strategies are mental, while actions are physical. Strategies, unlike actions, are unobservable.

Assumptions. The following four assumptions are made to consolidate the Nash bargaining solution.

(A1) Each player has full information on each country's economic payoffs, which are deterministic rather than stochastic.

(A2) Negotiators (players) from each country have equal bargaining skill.

(A3) Each player is rational, playing an optimal pure strategy guided by the benefits it derives in the one-off game.

(A4) Trade negotiators are assumed as specified to represent taxpayers, consumers, producers, or society in each game.

Assumption (A4) means that the negotiator's objective is not *necessarily* identical with national welfare. Presumably, the politically strongest interests ultimately prevail in the final outcome.

For simplicity, the trade game modeled herein has two mutually exclusive strategies, S_j ($j = 1, 2$): (a) maintain the *status quo* or (b) *liberalize* trade and commodity programs that distort trade. [3] Player i's payoff for the strategy j, $\Pi i(S_j)$, is the net benefit it receives after all players have picked their strategies and the game is complete. In the modeled games, the payoff is the additional gain in terms of welfare benefits to society (national benefits or NB), or to its components comprised of taxpayers (government savings or GS), consumers (consumer surplus or CS), and producers (producer surplus or PS). A strategy combination S_j^* is a Nash equilibrium if, for any player i:

$$\Pi i(S_j^*, S_{-j}^*) \geq \Pi i(S_j', S_{-j}^*) \quad \forall S_j$$

where S_{-j}^* is the strategy of the opponent. In other words, a Nash equilibrium is a set of strategies such that no player, given the actions of its rival, can increase its payoffs by choosing a strategy other than its equilibrium strategy.

An example. Consider a hypothetical game between two players, country A and country B (Table 1). The payoffs are hypothetical but are chosen to portend empirical findings shown later. The strategy space is defined by:

$$\Omega_{ij} = \begin{cases} S_{i1} & \text{to maintain the status quo} \\ S_{i2} & \text{to liberalize} \end{cases}$$

$i = A, B$

$j = 1, 2$

Table 1
Payoffs matrix

		Player B strategies	
		Status quo	Liberalize
		Payoff (A, B)	
Player A	Status quo	(0, 0)	(−1, 2)
	Liberalize	(2, −1)	(4, 4)

Each player is strategically rational in choosing its welfare maximizing option in this one-off, full information, symmetric game. The payoff is the same to each player in a like situation, but need not be.

It is to each player's advantage to liberalize whether the other player does so or not (Table 1). The liberalizing country gains even when the other player maintains its status quo. This optimal strategy differs from that of the classic prisoners' dilemma game, which is a noncooperative game because each prisoner is questioned separately and chooses a strategy that is sub-optimal compared to that of a cooperative game.

Table 1 shows a cooperative game (choices can be agreed upon a priori by players) but the optimal strategy for each player is the same as if it were a non-cooperative game. The above matrix reveals that trade liberalization is a positive sum game. The payoff (4, 4) in Table 1 is the Nash equilibrium (optimal position for one player given the action of the other player), Pareto-optimal (makes each player better off compared to the status quo without making the other player worse off), and socially optimal (maximizes the sum of the presumably additive outcomes).

If social welfare choices like the above really face members of the GATT, why do policymakers fail to create a world free of trade barriers? The following empirical analysis helps to explain why.

[3] Direct, decoupled lumpsum payments which do not markedly influence production, consumption, or trade incentives may be used to transfer income among producers, consumers, and taxpayers under liberalized trade.

Table 2
Benefits from trade liberalization

Country or region [a]	Unilateral liberalization				Multilateral liberalization			
	PS	CS	GS	NB [b]	PS	CS	S	NB [b]
				($ million)				
Australia	−133	−3	150	14	581	−361	150	370
Canada	−1533	75	1812	354	−617	−703	1812	492
EC	−15280	15808	40694	4597	−12337	12162	4069	3894
Japan	14080	16418	2263	4601	−13292	14154	2263	3125
U.S.	−11434	763	13392	2721	−7642	−3167	13392	2583
W. Europe (Non-EC)	−3057	3576	269	788	−2567	2881	269	583

PS, producers surplus; CS, consumers surplus; GS, government savings; and NB, net benefits (PS + CS + GS).
[a] All world countries were included in the trade model used to calculate Table 2. To save space, however, only the major traders results are reported.
[b] These net social benefits underestimate total deadweight gains from liberalization because they do not include savings from reduced lobbying, program administration, and environmental degradation costs.

2. Empirical analysis

Trade liberalization is analyzed using a multiregional, multicommodity trade simulation model developed at The Ohio State University using the SWOPSIM spreadsheet (Roningen, 1986). The model simulates the effects of policy changes on prices, production, consumption, and trade. It embodies neoclassical trade theory using excess demand and excess supply functions. Market distortions are built into the model with wedges between domestic and world prices, and price transmission elasticities of less than 1.0. Policies are quantified as *subsidy equivalents* to producers, consumers, exporters, and/or importers. [4] Under the liberalization scenario the price wedge is removed, and the price transmission elasticity is set at 1.0. Then the model reaches a new equilibrium.

The model was initialized using 1989 data and intermediate-run parameters. The new set of production, consumption, trade, and price estimates are for 4–6 years after 1989, provided all other conditions remain the same. The results, representing changes from 1989, are in 1989 prices.

Multilateral and unilateral trade liberalizations are simulated. Multilateral liberalization means elimination of all trade distorting policies in every country; unilateral liberalization means each country removes its market interventions while others maintain theirs. The model is for ten commodities in seven markets. They are beef, pork, poultry meat, wheat, corn, other coarse grains, rice, oilseeds, oilmeal, and sugar in the U.S., the EC, Japan, Western Europe (non EC-12), Canada, Australia, and a residual of other nations. The model simultaneously estimates changes in market conditions for each of these commodities in each country, accounting for cross relationships among commodities through behavioral equations (Sullivan et al., 1989).

3. Economic welfare benefits: Unilateral versus multilateral liberalization

The estimated gains to producers, consumers, taxpayers, and national entities from liberalizing existing trade policies for 1989 are summarized in Table 2. According to the results, all developed nations or regions in the model would gain from free trade.

[4] Producer subsidy equivalent is a measure of the income required to compensate producers for the removal of government programs, while the consumer subsidy equivalent is a measure of the amount of income needed to compensate consumers for terminating government support. In the "free market" liberalization scenarios, policies such as research and extension that create social benefits are retained while supply controls and other policies that create deadweight losses are terminated.

The table reveals that the three major entities – the U.S., the EC, and Japan – not only dominate gains, but each gains more by unilateral than by multilateral liberalization. The U.S. would gain about 5% more by unilateral than by multilateral trade liberalization. The EC and Japan would gain 18% and 47% more, respectively, by unilateral than by multilateral liberalization. Japan as a major net food importer would benefit from unilateral liberalization which would raise world food prices less than would multilateral liberalization. Other analysts also found advantages for unilateral versus multilateral liberalization (Roningen et al., 1987; Tyers and Anderson, 1988).

Taxpayers in every country or region gain from liberalization, whether unilateral or multilateral (Table 2). In fact, most of the gains to the U.S. would be taxpayer benefits (reported as government savings in the table). In contrast, producers lose from trade liberalization.

Consumers in the U.S., Canada, and Australia lose with multilateral liberalization because of increased world and domestic prices. In contrast, consumers in the EC, Japan, and Western Europe gain with liberalization because the sharp domestic price drop from their high past support levels more than offsets an import price rise.

4. Game theoretic analysis: Payoffs to different strategies

It is useful to isolate bargaining between key country players and interest groups to probe further why liberalization does not occur despite the seemingly compelling case for it in Table 2. The payoffs shown in the following tables are the additional welfare gains to the nation from liberalization compared to the status quo. Game payoffs are analyzed in separate tables for total net benefits, taxpayer benefits, consumer benefits, and producer benefits. Each of these cases is presented as a U.S. game with the EC, Japan, and the rest of the world (RW). [5]

[5] RW includes the EC and Japan.

Table 3
Payoffs matrix: net national benefits

		Strategies	
		Status quo	Liberalize
		$ million (U.S. vs. opponent)	
United States		(a) EC	
	Status quo	(0, 0)	(171, 4597)
	Liberalize	(2721, 333)	(2608, 4062)
		(b) Japan	
	Status quo	(0, 0)	(12, 4601)
	Liberalize	(2721, −665)	(2690, 3895)
		(c) RW	
	Status quo	(0, 0)	(145, 8208)
	Liberalize	(2721, −1799)	(2583, 5758)

Table 3a reports the game played between the U.S. and the EC. The best strategy for the U.S. is to liberalize its policies irrespective of what the EC does. The gain would be marginally higher ($2721 million) for the U.S. if it unilaterally liberalizes while the EC irrationally maintains the status quo. Similarly, the best outcome for the EC is to liberalize while the U.S. irrationally maintains the status quo. But after the U.S. or EC liberalizes, the rational strategy for the opponent also is to liberalize. Both entities are better off with payoffs of $2608 and $4062 million, respectively. Joint liberalization is both a Nash equilibrium and social optimum because the joint benefits ($6670 million) exceed those of any other combination of actions in the game. It is also Pareto-superior to the joint status quo. However, joint liberalization is not Pareto-superior to off-diagonal elements as noted above. That is, the U.S. is made worse off when the EC liberalizes after the U.S. has liberalized, and the EC is made worse off when the U.S. liberalizes after the EC has liberalized.

The situation is similar in the game between the U.S. and Japan (Table 3b). Both players are better off by liberalizing their policies. The U.S. or Japan gains from liberalizing its trade irrespective of what the other does. Each would be better off by liberalizing while the other foolishly maintains the status quo. But joint liberalization is the

Nash equilibrium, Pareto-superior (to joint status quo), and socially optimal strategy.

A more or less similar scenario emerges when the U.S. plays against the rest of the world (Table 3c). Both players are better off with payoffs $2583 and $5758 million, respectively, from liberalizing their policies relative to the status quo. Liberalization by both is a Nash equilibrium. The U.S. payoff is more with unilateral ($2721 million) than with multilateral liberalization ($2583 million). The status quo for the U.S. and liberalization for the RW provides a greater joint sum of payoffs ($8353 million), but the gain over multilateral liberalization ($8341 million) is trivial.

For the main players (the U.S., the EC, Japan, and the RW) the optimal strategy based on payoffs in Table 3 is for each to sabotage the Uruguay Round, return home, and unilaterally liberalize trade. If each is rational and does so, the result would be post-Uruguay Round multilateral liberalization. Each player presumably knows this, hence each might well find it advantageous to remain at the negotiating table to work out protocols of multilateral liberalization policies minimizing the unfavorable adjustments [6] inevitably attending free trade.

A breakthrough in agricultural negotiations would unleash freer trade benefits in other fields now held hostage by agriculture. These global benefits from a multilateral free trade agreement could be much greater than those in previous tables showing results for agriculture alone.

One possible explanation is that results in Table 3 are incorrect. That explanation is rejected because independent results by other analysts using other models for other years also show major gains from freer trade, with unilateral liberalization gains exceeding those for multilateral liberalization for major players (Anderson and Tyers, 1987; Roningen et al., 1987).

The above strategic game results notwithstanding, world trade distortions will not soon be removed. Clearly, the explanation for continuing trade distortions is not to be found in net national welfare payoffs. We probe further by examining gains to each national interest group – taxpayers, consumers, and producers –potentially influencing the negotiations.

Table 4
Taxpayer's payoffs matrix

		Strategies	
		Status quo	Liberalize
		$ million (U.S. vs. opponent)	
United States		EC	
	Status quo	(0, 0)	(0, 4069)
	Liberalize	(13392, 310)	(13392, 4069)
		Japan	
	Status quo	(0, 0)	(0, 2263)
	Liberalize	(13392, 0)	(13392, 2263)
		RW	
	Status quo	(0, 0)	(0, 8563)
	Liberalize	(13392, 310)	(13392, 8563)

Taxpayer benefits. Consider taxpayers (presumed here to equate with government) playing the game on behalf of the nation. The payoffs to each nation or region in Table 4 are the savings to taxpayers following the suspension of all trade-distorting policies. Taxpayers would overwhelmingly support trade liberalization. In all three games in Table 4 the Nash equilibrium is liberalization by both players. The game matrix also supports unilateral liberalization if multilateral liberalization is not possible. Irrespective of what the other player does, it always pays to liberalize.

Consumer benefits. Payoffs in this game are the additional consumer surplus welfare gains (losses) relative to the status quo following trade liberalization. Table 5 reveals no unique Nash solution in this game. The equilibrium strategy for the U.S. varies with the opponent. For example, when the game is between the U.S. and the EC, the Nash equilibrium is liberalization by both players. The best strategy for the EC is to liberalize its policies. After the EC liberalizes, the best response for the U.S. is to minimize its losses by

[6] The benefits of trade liberalization are neither immediate nor direct. Koester (1991) points out that in New Zealand the composition of agricultural production changed significantly in the years after liberalization.

Table 5
Consumer's payoffs matrix

		Strategies	
		Status quo	Liberalize
		$ million (U.S. vs. opponent)	
United States		EC	
	Status quo	(0, 0)	(−3074, 15808)
	Liberalize	(763, 37)	(−2069, 13450)
		Japan	
	Status quo	(0, 0)	(12, 16418)
	Liberalize	(763, −960)	(204, 15410)
		RW	
	Status quo	(0, 0)	(−2965, 9979)
	Liberalize	(763, −11570)	(−3167, −136)

liberalizing. U.S. consumers are worse off than if the EC had maintained the status quo, however. Similarly, the highest payoff to EC consumers is for the U.S. to maintain the status quo while the EC liberalizes trade.

When the U.S. plays Japan, the dominant strategy Nash equilibrium is joint liberalization. On the other hand, if the game is between the U.S. and the RW, the Nash equilibrium is to maintain the status quo for the U.S. and liberalization for the rest of the world.

In short, results are not consistent when the game is played by consumers. Such inconsistencies make consumers less influential in trade negotiations. This tendency is reinforced by the fact that consumers are numerous and hence hard to coordinate. Each consumer feels too little impact to warrant political activism to influence outcomes.

Producer benefits. Finally, consider producers playing the game on behalf of the nation (Table 6). The payoffs to each nation are the additional producer surplus welfare gains following trade liberalization. The table reveals that the game is not a typical prisoners' dilemma, but the converse of it. In the prisoners' dilemma, the non-cooperative game Nash equilibrium is the least desirable joint outcome measured by the sum of years in prison by the players. The socially desired outcome that minimizes joint losses could only be achieved by cooperation.

Given payoffs in Table 6, neither the U.S. nor the EC has incentive to liberalize its trade policies. If the U.S. maintains the status quo, EC producers lose $15,280 million if they liberalize but lose nothing if they maintain the status quo. If the U.S. liberalizes, EC producers lose $13,457 million if they liberalize but lose only $14 million if they retain existing policies. U.S. producers expecting the EC to maintain the status quo will minimize losses by also retaining the status quo. Continuation of the status quo is, therefore, the Nash equilibrium. U.S. producers would gain even more if the EC would liberalize while the U.S.

Table 6
Producer's payoffs matrix

		Strategies	
		Status quo	Liberalize
		$ million (U.S. vs. opponent)	
United States		EC	
	Status quo	(0, 0)	(3245, −15280)
	Liberalize	(−11,434, −14)	(−8715, −13457)
		Japan	
	Status quo	(0, 0)	(471, −14080)
	Liberalize	(−11434, 295)	(−10905, −13778)
		RW	
	Status quo	(0, 0)	(3110, −10,334)
	Liberalize	(−11434, 9979)	(−7642, −2669)

maintains the status quo, but that strategy by the EC would be irrational.

The game against Japan or the RW yields similar results (Table 6). The U.S. wants Japan to liberalize its policies and vice versa, with both opting for the status quo in equilibrium. If the RW (rather foolishly) chooses to liberalize, the best strategy for the U.S. is to maintain the status quo. If the U.S. keeps the existing structure, the best response for the RW is also to maintain current policies.

In short, rational producers unequivocally favor maintaining distortions. The Nash equilibrium in all producer scenarios is for both players to maintain the status quo. Unlike the prisoners' dilemma, the Nash equilibria in Table 6 are also jointly optimal for producers in a cooperative game. Because producers are relatively few in numbers, are well organized, and each could incur sufficient loss to warrant active political opposition to liberalization, lobbying against removal of trade distortions is likely to be intense.

For each countries' producers, the best outcome is retention of distortions in their country and liberalization everywhere else. But that strategy is not a Nash equilibrium. For producers, the optimal strategy is to sabotage the Uruguay Round.

Producers' choices may be circumscribed, however. If American policies are liberalized, the nation's producers lose less with multilateral than with unilateral liberalization. This circumstance could make the success of multilateral trade negotiations a more attractive goal for producers. Instead, Congress has made failure of multilateral negotiations attractive to producers by threatening to raise market interventions if talks collapse.

Continuing trade distortions to benefit producers could be quite rational and even welfare maximizing for the public at large under certain circumstances. One might be if producers are less wealthy and have higher marginal utility of income than others. That hypothesis cannot stand scrutiny for at least three reasons: (1) For benefits to U.S. farmers of $11.4 billion from maintaining distortions to outweigh benefits to consumers and taxpayers of $14.2 billion from unilateral liberalization in 1989 (see Table 2) would require marginal utility of farm income to be $14.2/$11.4 billion = 1.25 times or 25% higher for farmers than nonfarmers at any given income, a difference not supported by empirical findings (Tweeten and Mlay, 1989). (2) Wealth of commercial farmers who receive the majority of rents from intervention averages about ten times that of nonfarmers. Thus it is not possible to build a case for income transfers to farmers from diminishing marginal utility of income/wealth. (3) Finally, decoupled direct payments from governments can maintain farm income if necessary while minimizing market distortions now costing the world billions of dollars of deadweight losses each year.

A second hypothesis is that the distortions are the result of a truly representative political process which rewards producers based on their voting power. The small share, 2%, of the U.S. population on the farm refutes this hypothesis.

The best explanation is that distortions continue because the well-organized, well-funded, producer political lobby is successful in imposing its interests (apparent in Table 6) on Congress without effective opposition from consumers and taxpayers of the nation. Agricultural interest groups extend beyond farmers to include farm workers and relatives, environmentalists, and nonfarm industries with a farm economic base. However, many farm input supply, product marketing, and environmental activities would benefit from a more market-oriented agriculture. On the whole, consumers and taxpayers are disorganized, poorly informed, and inclined to romantic-nostalgic images of producers that do not square with today's reality (CNP, 1991). In the political arena, a few big losers (producers) can be more than a match for millions of small gainers (consumers and taxpayers) even though total benefits to the latter would exceed losses to producers by billions of dollars each year. Similar explanations can account for continuing trade distortions in other countries.

Inability to liberalize trade appears to rest mainly with failure of the political process. It is not that trade negotiations or negotiators are irrational. It is that they are quite rational in

protecting the interests of producers rather than taxpayers, consumers, or the public at large.

5. Summary and Conclusions

Multilateral trade negotiations are stalled by the inability of the developed countries to agree on proposals to liberalize agricultural trade. Analysis herein indicates that net economic benefits to major players in international trade negotiations are maximized by liberalization – whether unilateral, bilateral, or multilateral; and whether the game is one-off or repeated; cooperative or noncooperative. The strategic game approach used in this study not only strengthens the argument for free trade, but also provides plausible explanations for the breakdown of talks in Geneva. Estimates for 1989 reaffirm results of earlier studies showing that liberalization is the optimal strategy when overall economic welfare benefits are considered. At issue is why do large distortions in agricultural trade persist and multilateral trade liberalization negotiations founder when the world would appear to be better off from unilateral or multilateral liberalization.

International trade negotiation payoffs viewed as a strategic game provide some clues. Taxpayers, consumers, and producers are assumed to play the game on behalf of the nation they represent. Optimal strategies differ widely when the underlying players are changed. The dominant strategy is unilateral or multilateral liberalization when taxpayers play the game. The game has no consistent equilibrium when consumers play the game. Such inconsistencies dampen the influence of consumers in trade negotiations. Consumer influence is also diminished because free trade benefits are too small per consumer to warrant political activism. Consumers often are widely dispersed, unorganized, and unaware of benefits.

Producers, on the other hand, have reason to maintain current interventions in markets. They could be the biggest losers if nations succeed in liberalizing agricultural trade. Continuing agricultural market distortions make sense only from the perspective of payoffs to agricultural producers, although price stability, food security, and family farm objectives not considered in this study also may play a role. [7] The strategic game results imply that producers control the trade negotiating agenda. Producer sovereignty reigns rather than the consumer sovereignty of neoclassical economics or the public interest sovereignty of the democratic ideal.

One challenge is to narrow the difference between producer and national interests so that producers will not block trade liberalization. Because Treasury savings and consumer gains from trade liberalization far exceed the losses to producers, the government can compensate farmers for their welfare losses. One approach is direct payments unrelated to future production, consumption, and trade. Some of the highest payoff "compensation" can be adjustment assistance in the form of job training, information, counseling, and moving assistance for producers and their families to obtain better opportunities elsewhere. A more informed public would be a constructive influence on trade institutions. Finally, political institution reform could diminish the power of special interest groups who block trade reform and could enhance the power of encompassing institutions more inclined to serve long-term public interests.

6. Acknowledgements

Comments of Norman Rask and Ian Sheldon are very much appreciated.

7. References

Anderson, K. and Tyers, R. (1987) Global effects of liberalizing trade in agriculture. Trade Policy Research Centre, London.

[7] Issues of food security, price stability, environmental protection, and family farm preservation are beyond the scope of this study. However, it should not necessarily be assumed that current market distortions serve these worthy objectives. Producers' interest groups have reason to convince the public that trade and commodity program interventions in markets promote these objectives.

Buckwell, A. and Medland, J. (1991) The effects of trade liberalization: problems of modelling the effects of liberalizing agricultural trade. Eur. Econ. Rev., 35: 552–561.

CNP (1991) U.S. Agriculture: Myth, reality, and national policy. Center for National Policy, Washington, DC.

Chan, K.S. (1988) Trade negotiations in a Nash Bargaining Model. J. Int. Econ., 25: 353–363.

Haley, S.L., Herlihy, M.T. and Johnston, B. (1991) Estimating trade liberalization effects for U.S. grains and cotton. Rev. Agric. Economics., 13: 19–43.

Harrison, G.W. and Rutstrom, E.E. (1991) Trade wars, trade negotiations and applied game theory. Econ. J., 101: 420–435.

Johnson, M., Mahe, L. and Roe, T. (1990) Politically acceptable trade compromises between the EC and the U.S.: a game theory approach. Working Paper 90-5, International Agricultural Trade Research Consortium, St. Paul, MN.

Karp, L.S. (1984) Suggestions for a research agenda in modelling trade policy. ERS Staff Report AGES861215, U.S. Department of Agriculture, Washington, DC.

Karp, L.S. and McCalla, A.F. (1983) Dynamic games and international trade: an application to the world corn market. Am. J. Agric. Econ., 63: 641–650.

Koester, U. (1991) The experience with liberalization policies: the case of agricultural sector. Eur. Econ. Rev., 35: 562–570.

Krugman, P. (1991) The move toward free trade zones. Econ. Rev., 76: 5–26.

Roningen, V. (1986) A static world policy simulation (SWOPSIM) modeling framework. ERS Staff Report AGES860625, U.S. Department of Agriculture, Washington, DC.

Roningen, V. and Dixit, P. (1989) Economic implications of agricultural policy reforms in industrial market economies. ERS Staff Report AGES 89-36. U.S. Department of Agriculture, Washington, DC.

Roningen, V., Sullivan, J. and Waino, J. (1987) The impact of the removal of support to agriculture in developed countries. Paper presented at the Annual Meeting of the American Agricultural Economics Association, East Lansing, MI. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Sullivan, J., Waino, J. and Roningen, V. (1989) A database for trade liberalization studies. ERS Staff Report AGES 89-12, U.S. Department of Agriculture, Washington, DC.

Tweeten, L. and Mlay, G. (1989) Marginal utility of income estimated and applied to problems in agriculture. Agric. Policy Anal. Background Paper B-21, Department of Agricultural Economics, Oklahoma State University, Stillwater, OK.

Tyers, R. and Anderson, K. (1988) Liberalizing OECD agricultural policies in the Uruguay Round: effects on trade and welfare. J. Agric. Econ., 39: 197–215.

Whalley, J. (1985) Trade Liberalization among Major World Trading Areas. MIT Press, Cambridge, MA.

Whalley, J. (1986) Impacts of a 50% tariff reduction in an eight-region global trade model. In: T.N. Srinivasan and J. Whalley (Editors), General Equilibrium Trade Policy Modelling. MIT Press, Cambridge, MA.