New Technologies and Innovations in Agricultural Economics Instruction

edited by

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August, 1992

Proceedings of a Conference and Workshop hosted at the University of Kentucky, February, 1992. This conference was co-sponsored by the Southern Agricultural Economics Association and endorsed by the American Agricultural Economics Association.

Agricultural Trade Policy: An Instructional Game

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Students in international trade and agricultural policy classes are taught basic theoretical models which show the impacts of international trade on prices, quantities, and economic surpluses. The theoretical models can also be used to analyze the impacts of trade restrictions. The economic impacts of free trade and trade restrictions are generally analyzed for the case of two countries with all supply and demand curves constant and fully revealed to all traders. This basic model is an oversimplification of the real world situation. The impacts of these simplifying assumptions generally are not considered. The real world includes many traders with supply and demand relationships which are not clearly revealed to all traders. Students need to understand the major differences between the theoretical models and the real world situation. Simulation of international trading can be used to help students make the link between the theoretical models and the real world situation.

This paper describes a simulation approach for teaching international agricultural trade. In the simulation, negotiations are undertaken simultaneously by various pairs of importing and exporting countries. As each negotiation is completed the price and quantity traded are reported. A free trade situation is considered first and then alternative trade restrictions are considered.

Description of Simulated Trading

This section describes the components and operation of the instructional game used to simulate international agricultural trade under selected policy alternatives. Students make trading decisions for individual countries while negotiating with students representing other countries. A designated exporting country will sell to a designated importing country with prices and quantities being freely determined through negotiations.

Supply and demand curves are given for each country. Each exporting country can trade on the basis of its excess supply. Each importing country can trade on the basis of its excess demand. Each country should trade in such a way as to maximize economic surplus. Economic surplus is defined as consumer surplus plus producer surplus plus profit from trading. Profit from trading is the difference between equilibrium price within the country and average price for which the country trades multiplied by the quantity it traded.

The basic rules are as follows: (a) a selling country will negotiate privately with a buying country, and (b) the price and quantity of each trade will be reported. The policy scenarios are also given. A free trade scenario is used in the first round of trading. Export restrictions are used in the second round of trading. The maximum quantity that each exporting country can trade is identified for that country. The importing countries are informed that export restrictions are in effect, without knowing the specific levels imposed. In the third round, import restrictions are implemented. Again only the traders with the restrictions know precisely what they are. Other traders

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are informed that import restrictions only are in effect.

Performance Evaluation

Since each country faces different supply and demand curves, its performance is evaluated relative to optimum trade under free market conditions. Hence, the country's performance is based on how well it does relative to the best it could do theoretically. These performance results are summed over all rounds. A computer program has been written in GAUSS to evaluate the performance of each country. The program is called TRADE.PGM. It is interactive and user friendly.

Students are divided into a maximum of six groups with three exporting countries and three importing countries. For a given trade, the computer program will ask for the identification number of the exporting country (1, 2, or 3), the identification of the importing country (4, 5, or 6), the price for the trade, and the quantity traded. After all trades for a round, which is a trading period, are entered into the computer, the program will report the performance of each country. The process is repeated until all rounds or trading periods are ended.

Procedures for Implementation

A handout entitled "Agricultural Trade Policy: Conceptual Framework" should be given to the students first and gone over in class so the students will understand the basic concepts on which the instructional game is based. A copy of this handout is presented in Appendix A.

Secondly, the handout on general instructions should be given to the students and discussed. It appears to be critical that the students understand that the overall objective is to maximize the sum of consumer surplus, producer surplus and profits from trading. Hence exporters should sell for as high a price as possible and importers should buy for as low a price as possible. A copy of the general instructions are given in Appendix B.

Thirdly, the class is divided into a maximum of six groups, with each group representing a hypothetical country. Identification numbers (1 through 6) are given to each country (group of students). A figure with the relevant supply and demand curves is given to each country. Specific instructions are given to all students within each country.

Finally, the game is played for three trading periods or rounds. In each round the students follow the specific instructions for that round only. For example, the export restrictions of the second round are not in effect during the third round. Each group of students acting as a country trades with another student group or country until all trades are complete or until the time limit is reached. The results of each trade are reported to the class immediately after the round is complete. The results can be simultaneously entered into a computer. The performance of each country is determined by the computer and reported to the class at the end of each round. The country with the highest cumulative performance over all rounds is the winner of the instructional game.

Discussion of Results

The trading results from one class are presented as an example to show how the simulation works and to show how the results might be interpreted. Interpretation of the results by the instructor for the class is an integral part of the learning process. The example of trading results are reported in Table 1.

In the first round, which was the free trade scenario, the average price was $11.53 and 25.75 units of the product were traded. In the second round, exporters had restrictions on how much they could sell. The sellers should have recognized that they had an advantage in the market and charged a higher price. Instead the average price

dropped to $11.33 with a quantity of 13.5 units being traded. In the third round, import restrictions were in effect. As expected the price dropped further, because the importers had an advantage in trading. In this case the average price was $11 with 13.25 units being traded. The results from the computer program indicated that the three importers outperformed the exporters. This result was attributed primarily to the exporters' failure to charge higher prices when export restrictions were in effect.

Table 1. An Example of Simulated Trading Results

	Seller	Buyer	Price	Quantity
Round 1				
	3	5	11.50	10
	2	4	12.00	6
	2	5	10.75	3
	1	4	11.50	6.75
			11.53[a]	25.75[b]
Round 2				
	3	5	11.00	3
	2	5	10.50	1
	1	5	12.50	1
	1	5	11.00	2
	3	4	11.50	2
	2	6	11.75	2
	3	6	11.75	1
	2	4	11.50	1
	2	5	10.50	.5
			11.33[a]	13.5[b]
Round 3				
	2	5	11.50	2
	1	5	11.25	2
	1	4	11.00	2.5
	2	6	11.00	4
	1	5	10.00	.5
	2	4	11.00	1.25
	3	6	10.00	1
			11[a]	13.25[b]

[a]Average price.

[b]Total quantity traded.

Appendix A

Agricultural Trade Policy: Conceptual Framework

There are two basic approaches used to assess the impact of trade policies on international agricultural trade. The first approach considers an individual country which is too small to influence world market prices. In that case, the world market price is assumed to be fixed. The second approach considers the situation in which a country is large enough to influence the world market price. To analyze this second case both importing and exporting countries have to be considered simultaneously. This paper presents a conceptual framework for assessing the impacts of trade barriers by countries that are large enough to influence world market price.

The framework will be developed for two trading countries, but it could be readily extended to several countries. For example, it might be appropriate to group importing countries together and/or to group exporting countries together.

The free trade situation for two countries is shown in Figure 1. The supply and demand curves for the exporting country are represented by S_x and D_x, respectively, in frame A of Figure 1. The supply and demand curves for the importing country are represented by S_m and D_m, respectively, in frame C of Figure 1. The world market, which is composed of excess supply from the exporting country (ES) and excess demand from the importing country (ED), is brought together in frame B of Figure 1.

First, consider the case without trade. The relatively abundant supply in the market shown in frame A would result in a low price, P_0, if trade was not permitted. Alternatively, the market shown in frame C would result in a high price, P_1, if trade was not permitted, because supply in this market is relatively low.

With free trade, equilibrium world price (P_w) is determined where excess supply (ES) intersects excess demand (ED) in frame B. Equilibrium quantity traded is Q_t. At a price of P_w, the exporting country will export Q_t and the importing country will import Q_t.

The impacts of trade barriers are shown in Figure 2. The supply and demand curves are the same as shown in Figure 1, but trade barriers will affect prices and quantities.

First, consider a restriction on exports. Let the exporting country limit its exports to only Q_t' in Figure 2. The result of the export restriction is a smaller quantity placed on the world market. This quantity could be traded for any price ranging from P_0' to P_1'. However, the exporting country should have an advantage since it is limiting the quantity. Theoretically, the exporting country should be able to charge the high price, P_1', because the importing country would be willing to pay P_1' for a limited quantity of Q_t'.

Secondly, consider a restriction on imports but no restriction on exports. Let the importing country limit its imports to only Q_t' in Figure 2. The import restriction results in less being purchased than exporters would like to sell. The price might range anywhere between P_0' and P_1'. However, the importing country should have an advantage in negotiations. Theoretically, the importing country could pay only P_0', because that is the price at which the exporting country would supply Q_t'.

Appendix B

Agricultural Trade Policy: General Instructions

Objective: Each country should trade in such a way as to maximize economic surplus. Economic surplus is defined as consumer surplus plus producer surplus plus profit from trading. Profit from trading is the difference between equilibrium price within the country and average price for which the country trades multiplied by the quantity it traded.

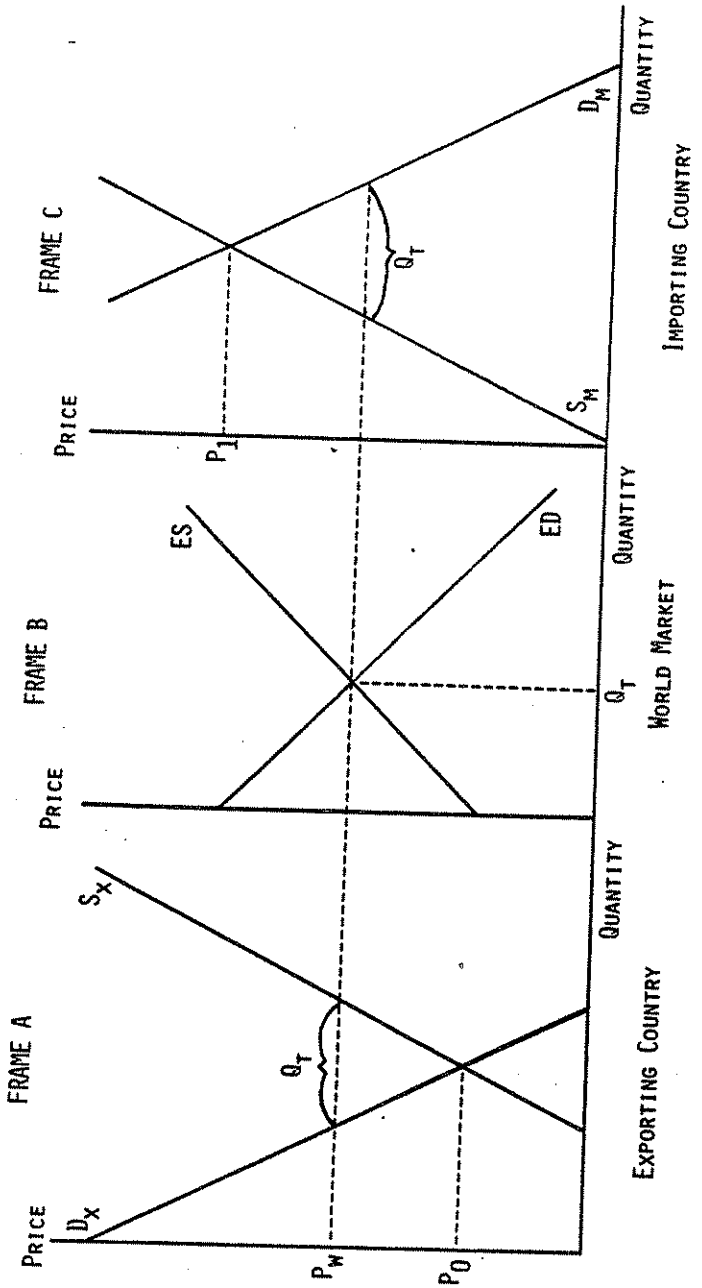

Figure 1. Impacts of International Trade

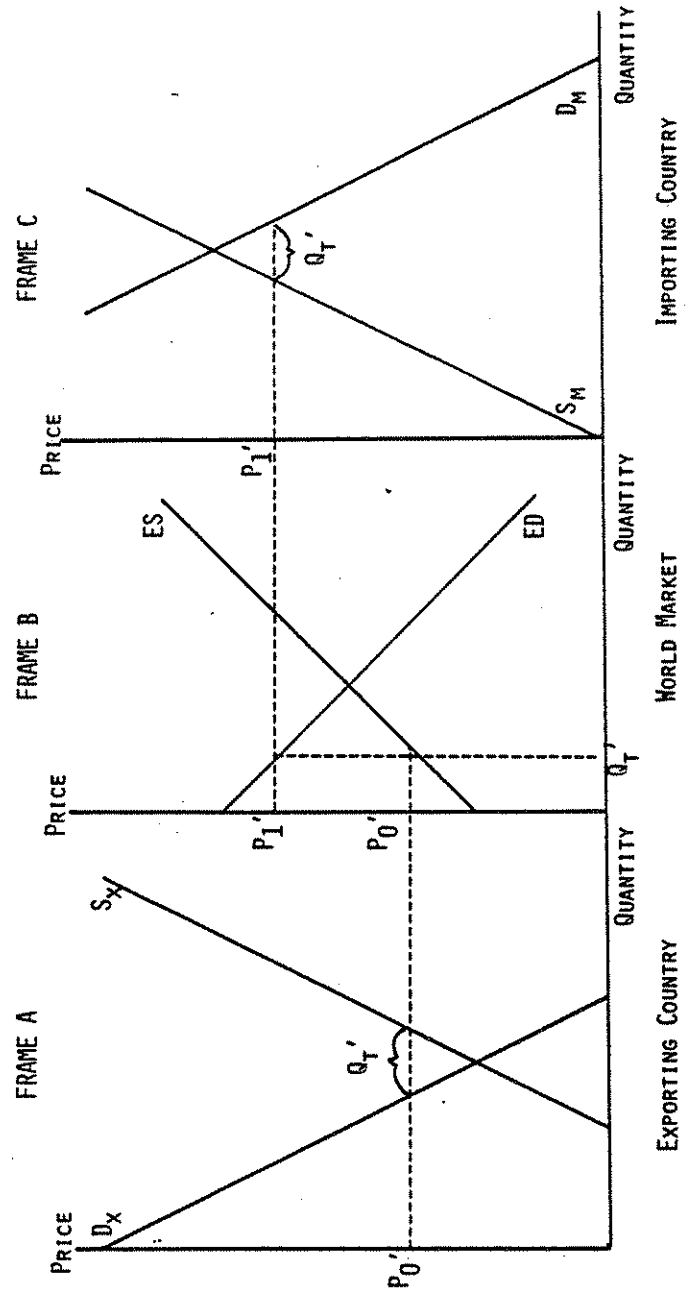

Figure 2. Impacts of Trade Restrictions

Sellers should sell for as high a price as possible. Buyers should buy for as low a price as possible. This will help raise profit from trading.

The optimum level of trading at a given price is the difference between supply and demand.

Since each country faces different supply and demand curves, its performance is evaluated relative to optimum trade under free market conditions. Hence, the country's performance is based on how well it does relative to the best it could do. These performance results are summed over all rounds.

Rules

1. Countries 1, 2, and 3 are sellers or exporters. Countries 4, 5, and 6 are buyers or importers.

2. A seller will negotiate privately with a buyer.

3. The price and quantity of each trade will be reported.

4. For each round all trades have to be completed within 5 minutes.