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Nonequilibrium Fixed-Price Schemes in Agricultural Trade¹

By Alex F. McCalla and Elmer W. Learn

THE KENNEDY ROUND negotiations of the General Agreement on Tariffs and Trade (GATT) occasioned the public presentation of a number of proposals for "organizing agricultural trade." The proposals of the European Economic Community (EEC) had as their central characteristics the fixing of a world price, though not an equilibrium price, consistent with domestic agricultural objectives and the disposing of excess supplies in developing nations. These proposals, known at various stages in their evolution as the Pisani-Baumgartner plan, Mansholt I, and Mansholt II, can be characterized as nonequilibrium fixed-price schemes.

This paper analyzes the implications of such a scheme for various types of exporters and importers in the world market. First, for purposes of comparison, an equilibrium pricing model is presented for the one-commodity, two-country model. Second, the characteristics of the Pisani-Baumgartner type of plan are outlined. The plan is then subjected to simple graphic analysis which demonstrates the nature of gains and losses resulting from its operations. Finally, some general conclusions are drawn about the implications of fixed-price schemes.

The Equilibrium Trade Model

The central characteristic of the traditional trade model is that price is flexible with the result that the international market is always cleared.

Assume as a beginning point that the world consists of two countries and one commodity.²

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² The analysis portrayed in figure 1 is derived in part from P. T. Ellsworth, *The International Economy* (New York: The Macmillan Co., 1958), pp. 110-111.

In figure 1, panel A shows country A's supply and demand functions in a regular fashion and panel B shows country B's as a mirror image of panel A. With no trade, country A's supply is S_a-S_a , A's demand is D_a-D_a , and price is P_a . In country B, supply is S_b-S_b , demand is D_b-D_b , and price is P_b . Now permit trade and assume no transport or entry costs. World supply, S_w , and world demand, D_w , are derived by the horizontal addition of country A's and country B's demand and supply functions. Equilibrium world price is therefore P_w . In country A at P_w , Q_2 is produced, Q_1 is consumed, and $Q_2 - Q_1$ is exported. In country B, Q_4 is consumed, Q_3 is produced, and $Q_4 - Q_3$ is imported and by construction is equal to $Q_2 - Q_1$. Thus, D_a+e becomes the effective demand in country A. It is derived by netting supply and demand in B and adding it to D_a-D_a . Effective supply, S_b+i , is determined in country B in an analogous fashion. Now if transport or other costs are introduced, effective demand in country A is shifted downwards to $D'a+e$, price P_a' prevails, and effective supply in country B is shifted upwards to $S'b+i$ with price P_b' prevailing. The difference between P_a' and P_b' is the cost of transport or cost of trade as labeled in figure 1.³ Of course, if the difference between the initial no-trade prices P_a and P_b were less than the cost of trade, i.e., the difference between P_a' and P_b' , then no trade would occur.⁴ Portrayed here as a shift in the effective demand and supply functions, the effect of a transport cost is identically the same as that of the application of a fixed

³ The allocation of the "cost of trade" equally to country A and country B is arbitrary. It is the magnitude of the "cost of trade" which is important to the analysis.

⁴ See P. A. Samuelson, "Spatial Price Equilibrium and Linear Programming," *Amer. Econ. Rev.*, Vol. XLII, No. 3, June 1952, pp. 283-303.

Mansholt II⁸ following criticism by the United States. The European proposals for organizing world markets proceeded from the following reasoning. Most developed nations are committed to domestic farm income support. In the pursuance of income support goals, these nations utilize nontariff restrictions as means of implementing income support policies. Thus, negotiations on tariff reductions are not meaningful for agriculture. Further, developed nations have a responsibility to assist lesser developed nations. In particular, food surpluses represent a maldistribution of products rather than of resources. In general, then, the major participants in Temperate Zone trade, i.e., the United States, Canada, etc., and the EEC, should be reasonable and agree on an international arrangement consistent with these conditions.

Given the above reasoning, the various fixed-price schemes have had, with variations, the following main elements:

(1) A world price somewhere between EEC and U.S. support levels should be agreed upon by the major participants. The precise level of agreed price, however, declined with each succeeding plan, but even Mansholt II envisioned an agreed-on world price somewhat above present world prices.

(2) Exporters would be guaranteed the same total revenue as under previous trading arrangements, i.e., a smaller quantity sold at a higher price. This in turn would require market quotas for major exporters.

Footnote 7 continued:

Also see discussion of Pisani plan in J. H. Richter, *Agricultural Protection and Trade: Proposals for an International Policy* (New York: Frederick A. Praeger, 1964), pp. 73-83; T. K. Warley, "Agricultural Policy in Europe," *Grain Rev.* (published quarterly by the Winnipeg Grain Exchange), Vol. 3, No. 2, Apr. 1965, p. 3; and Warley, "Organizing World Trade in Temperate Agricultural Products," *Farm Mangt. Notes, Univ. of Nottingham*, No. 33, Spring 1965, pp. 34-36.

⁸ See address by Dr. S. L. Mansholt, Vice-President of the EEC Commission, to the European Parliament, Strasbourg, 7 January 1964, EEC Doc. No. 414/pp/64-E; also see Warley, "Organizing World Trade in Temperate Agricultural Products," *Farm Mangt. Notes, Univ. Nottingham*, No. 33, Spring 1965, pp. 36-38; and European Communities--Joint Information Service, "From an EEC to a World of Agricultural Policy," *Newsletter on the Common Agricultural Policy*, No. 30, March 1965, for details.

(3) Excess supplies over and above commercial sales should be sold to underdeveloped countries at concessional prices, presumably at the expense of the exporters. Details of how this was to be administered were never spelled out, though reference to international commodity agreements was made by both Pisani and Baumgartner.

(4) Some form of international organization, or at least formal procedures of negotiation, should be established to organize the world market for food.

These plans lend themselves to graphic analysis as shown in figure 2. For expositional purposes, the plan will be called the Pisani plan, but the central features--fixed prices and surplus disposal--are common to all. In the upper half of the figure, supply and demand functions for the EEC and the United Kingdom are shown in (a) and (b), and a world demand function is derived in (c). In the lower half of figure 2, similar constructions are presented for Canada and the United States. While this does not represent the total market for wheat, for example, it does illustrate the implications of the Pisani plan for the major types of exporters and importers; those importing at world price (United Kingdom); those importers applying tariffs (EEC); those exporters passing export prices back to producers (Canada); and those exporters maintaining domestic prices above world price (the United States).

Assume that some world price, Wp^0 , prevailing because of existing arrangements, exists in time t_0 . Now assume that in time t_1 the Pisani plan is implemented with agreed-on price Pp and that other things remain equal. Now it is possible to consider the effects on each country. In the EEC, target price is $P1$, which fixes production and consumption and determines a quantity imported, $Q1$. At Wp^0 , the EEC gains tariff revenue of the quantity $A + B$. At Pp , tariff revenue declines to A with revenue B going to the exporters. Thus, the EEC loses tariff revenue, while expenditures, consumer prices, and imports remain unchanged. If, however, certain countries such as France exported the commodity, the loss in levy revenue could be offset by reduced export subsidies.

In the United Kingdom domestic support is Po , and $q4$ is produced. At Wp^0 , $q2$ is consumed,

The Pisani-Baumgartner Plan

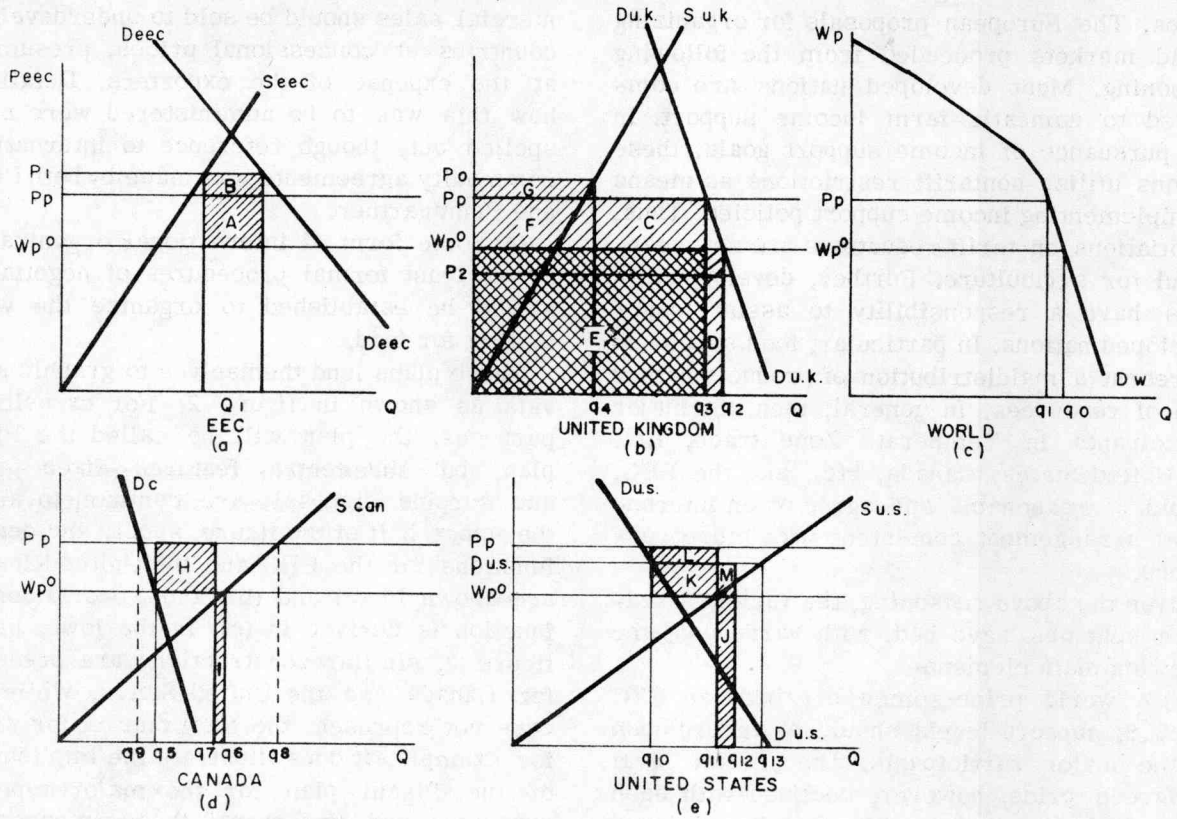


Figure 2

consumers spend $E + D$, and under prevailing deficiency payment programs, the government pays $F + G$ in direct payments to farmers. Now with the Pisani plan, P_p prevails in the world market. Production remains the same but consumption contracts to q_3 , consumer expenditure now is $E + F + C$, increased by $F + C - D$, and government payments are reduced by F . The net loss to the country is $C - D$ which is transferred to exporters. But food prices have risen and part of the burden of price support has been shifted from the treasury to the market place. In summation, Britain loses because of the Pisani plan; producers are unaffected but consumers will pay higher prices for less food.

In figure 2(d) Canada has passed world price W_p^0 back to producers with the result that q_6 is produced, q_5 is consumed, and $q_6 - q_5$ is exported. With the implementation of the Pisani plan two critical elements are demonstrated in Canada's case. First, the contraction in the quantity of imports demanded, as a result of

higher prices in Britain and other importers, must somehow be allocated between exporters. Just how this is to be done was never spelled out and represents an administrative problem of some magnitude. However, assume that Canada's share of the loss is $q_6 - q_7$. The second problem arises with respect to which price, P_p or W_p^0 , should prevail in the Canadian market. If Canada lets her domestic price rise to P_p , then production expands to q_8 , consumption contracts to q_9 , and given her export allocation of $q_7 - q_5$, Canada has quantities $(q_8 - q_7) + (q_5 - q_9)$ which she must dispose of elsewhere. On the other hand, if Canada maintains her market price at W_p^0 by an export tax, then she gains $H - I$ in revenue under the plan and can use this revenue to dispose of $q_6 - q_7$ in the concessional market. The implications of this discussion of Canada's position are the same for exporters whose domestic price is world price. The fixed price can be prevented from affecting domestic price by an export tax, or if the world price is allowed to

prevail internally, its effects can be offset either by domestic supply control or by foreign surplus disposal.

The position of the United States is depicted in figure 2(e). Domestic price is P_{us} , q_{10} is consumed, q_{13} is produced, $q_{12} - q_{10}$ is exported commercially at a subsidy cost of $K + M$, and $q_{13} - q_{12}$ is either stored or disposed of by concessional sales. Under the Pisani plan commercial exports are reduced to $q_{12} - q_{11}$ (under some assumed quota allocation), revenue increases by $K + L - J$, and government subsidy expenditure ceases. The additional quantity, $q_{12} - q_{11}$, must now be disposed of in other fashions. If the Pisani price assumed here were to be above the prevailing U.S. support price, then the United States would face problems similar to those of Canada.

In figure 2(c), as price is raised from W_p^0 to P_p , the quantity of imports demanded contracts from q_0 to q_1 , reflecting the contraction of imports in the United Kingdom and wherever else the price was previously below P_p . The elasticity of this function is critical to the group of fixed-price plans under discussion. The crucial assumption of these plans was that, if world prices were raised, revenue would be increased sufficiently to guarantee exporters the same revenue for smaller exports with excess funds available to subsidize concessional sales. If this is to come to pass, the import demand function must be inelastic over the relevant price range. Import demand functions derived by the subtraction of domestic supply from domestic demand will have at least the elasticity of the domestic demand function if the domestic supply relation is perfectly inelastic. Given a domestic supply function with some slope, it follows that the import demand function will have a greater elasticity at each price than the domestic demand function.⁹ Though a definite answer as to the elasticity of the import demand function would require actual estimates of domestic elasticities, it can be stated that it will not necessarily be inelastic even if the relevant

domestic functions are inelastic over the appropriate price ranges. The equation:

$$(1) \quad E_i = \frac{E_s \cdot Q - E_d \cdot q}{Q - q}$$

expresses the relationship between the elasticity of domestic supply, E_s , the elasticity of domestic demand, E_d , and the elasticity of import demand or export supply, E_i , where Q is the quantity supplied domestically, and q is the quantity demanded domestically.¹⁰

If we define a self-sufficiency ratio, S , as the ratio of quantity supplied domestically to the quantity demanded domestically, $\frac{Q}{q}$, then (1) can be rewritten as:

$$(2) \quad E_i = \frac{S \cdot E_s - E_d}{S - 1}$$

If it is assumed that $E_d < 0$ (i.e., the demand curve slopes downward), $Q > 0$, and $E_s > 0$, then it is clear from (2) that for $0 < S < 1$, $|E_i|$ increases as E_s , $|E_d|$, and S grow larger. Thus, even if both domestic supply and demand were inelastic, a sufficiently large S would yield an elastic net demand function, e.g., if $E_s = .1$, $E_d = -.1$, and $S = .9$, $E_i = -1.9$.¹¹

If the import demand function is elastic, then the raising of world price under the Pisani plan would reduce total revenue, and everyone would lose.

Finally, the concessional market is assumed to be a completely elastic safety valve for production in excess of commercial demand.

¹⁰ See T. O. Yntema, *A Mathematical Reformulation of the General Theory of International Trade* (Chicago: Univ. Chicago Press, 1932, p. 44).

¹¹ For alternative formulations of (2), see C. E. Ferguson and M. Polasek, "The Elasticity of Import Demand for Raw Apparel Wool in the United States," *Econometrica*, Vol. 30, No. 4, October 1962, p. 673; and A. C. Harberger, "A Structural Approach to the Problem of Import Demand," *Amer. Econ. Rev.*, Vol. 43, No. 2, May 1953, ff. 3, p. 156. The difference in sign is explained by their defining

$$E_d = - \frac{dq}{dp} \cdot \frac{p}{q}$$

⁹ See Abel, *op. cit.*, p. 197.

While this article cannot delve into the questions of the desirability of food as a form of economic aid, the physical capacity of underdeveloped nations to absorb increases in food supplies, and the means by which such a program would be administered, it is clear that they are critical to the operation of these plans.¹²

Conclusions

The above analysis clearly shows that a world characterized by fixed internal and international prices is a nonequilibrium world where surpluses (and, possibly, shortages) are normal rather than abnormal. In appraising the strengths and weaknesses of proposals for such a world order, it should be recognized that the present situation, even after the Kennedy Round, is characterized by fixed internal prices and managed international prices in many instances. This situation is also one of nonequilibrium in the economic and, perhaps even more, in the political sense.

¹² For a brief discussion of these questions, see W. W. Cochrane, *The City Man's Guide to the Farm Problem* (Minneapolis: Univ. Minn. Press, 1965, pp. 100-106).

The simple graphic analysis presented here suggests that, from a typical cost-benefit viewpoint, the fixed-price schemes do not necessarily yield positive gains, even for their principal proponent, the EEC. Participants in the international agricultural policy debate should be aware of this fact, but they would be unwise to accord it more weight than it deserves.

To date, no attempt has been made to assess the absolute level of costs. Perhaps of greater importance, no one has attempted to assess the benefits to be derived in a longer run economic and political sense. If a policy reflects recognition that surplus agricultural resources in developed nations are an international as well as a domestic problem; if the mechanics of such a policy can reduce conflicts between domestic and international objectives among developed nations; and, finally, if the policy can be used to aid, or at least not to thwart, the ambitions of the developing world, an increased cost should not arbitrarily deter its adoption. Some version of a fixed-price scheme that resolves the difficult administrative problems (e.g., market shares and international financing of surplus stocks) may be such a policy.