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Agricultural Trade Modeling – The State of Practice and Research Issues

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COMMENTS ON SUGGESTIONS FOR A RESEARCH AGENDA IN MODELING TRADE POLICY

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The paper by Karp provides a useful summary of some of the research by our colleagues in trade theory. I disagree with little of what is said in the paper, except to note that the dimensionality issue of the standard trade model is more complex than suggested. In the case of full dimensionality--the number of goods equal to the number of factors--Either (3), and Dixit and Norman (2) show that weak generalizations corresponding to the standard propositions hold. 1/ This is particularly true when global univalence (A(W) is a P-matrix) which generalizes montonicity holds (like a dominant diagonal matrix). In the case of more factors than outputs, some of the propositions break down--notably factor price equalization and the Stolper-Samuelson theorem (Jones magnification effects). Some propositions can be rescued under restrictive assumptions, as can be demonstrated by the Ricardo-Viner model. When there are more outputs than factors, serious problems begin to rise, such as indeterminacies.

Some additional areas of development in trade theory that should be added to Karp's discussion include theories of trade in middle products; economies of scale, scope, and cost sharing; joint products; and nontraded goods. Sanyal and Jones present a model of a small country to explain trade in middle products--intermediates--as well as final product trade (7). This is a critical aspect of U.S. agricultural trade policy because most U.S. exports are in fact middle products. Further, most trade issues confronting the United States, such as the effects of content legislation, can be analyzed in this framework.

Chang, Either, and Kemp consider the issue of joint products (1). Again many products in the agricultural sector fit this type of model. For example, soybeans separate into meal and oil, while wheat is transformed into flour and bran. While final good and factor prices remain linked as in the standard model, the effect is dampened. The end result is that the signs of the effects remain the same; however, the magnification effects may be lost. Indeed it can be shown that the standard Heckscher-Ohlin model is a subset of the joint product model.

Krugman considers the issues of returns to scale and cost sharing (6). He links the number of varieties of a product to sharing of fixed costs. Even if countries are identical, a country can benefit by having twice the number of varieties available but pay for fixed costs on only its production. While many agricultural products are homogeneous, this model can provide a framework for analyzing the formation of a customs union between similar economies or on issues where a country simultaneously imports and exports similar goods--such as wheat and livestock products. One possible detraction of these type of models for agriculture is their use of monopolistic competition as a conduct rule.

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1/ Underscored numbers in parentheses refer to sources cited in the References following this article.

Another area of research by trade theorists that has important implications for agriculture is nontraded goods (5). Nontraded goods interact with traded goods via substitution and income effects because the price ratios are not independent. Thus, price changes in traded goods affect nontraded goods and vice versa.

Finally, there is considerable research on the effects of physical capital mobility and technology transfer (4). Capital mobility and transferability affect policy decisions. While a country can tax location specific production, such as soybeans, it cannot effectively tax a commodity with transferable technology--poultry.

In concluding, I would like to offer some brief comments on my philosophy of our role in trade modeling. I do not believe agricultural economists have a comparative advantage in developing new theories along the lines discussed above. We need to be aware of new theory, but our main role should be in applying developments to agricultural commodities. That task frequently entails substantial modification of the assumptions in the original model. It requires using the general equilibrium models to guide development of a partial equilibrium analogue. And most important, it requires empirical application of these theories. Unlike economists, we cannot escape problems by convenient assumptions and cannot be content to avoid empirically testing the theory.

References

(1) Chang, W. W., W. J. Either, and M. C. Kemp. "The Theorems of International Trade with Joint Production," Journal of International Economics, Vol. 10, No. 3 (Aug. 1980), 377-94.

(2) Dixit, A. K., and V. Norman. Theory of International Trade. Welwyn: James Nisbet & Co. LTD, Cambridge University Press, 1980.

(3) Either, W. "Some of the Theorems of International Trade with Many Goods and Factors," Journal of International Economics, Vol. 4, No. 2 (May 1974), 199-206.

(4) Jones, R. W. "International Capital Movements and the Theory of Tariffs and Trade," The Quarterly Journal of Economics, Vol. 81, No. 1 (Feb. 1967), 1-38.

(5) _____. "Trade with Non-Traded Goods: The Anatomy of Interconnected Markets," Economics, Vol. 41, No. 162 (May 1974), 121-38.

(6) Krugman, P. R. "Increasing Returns, Monopolistic Competition, and International Trade," Journal of International Economics, Vol. 9, No. 4 (Nov. 1979), 469-79.

(7) Sanyal, K. K., and R. W. Jones. "The Theory of Trade in Middle Products," The American Economic Review, Vol. 72, No. 1 (Mar. 1982), 16-31.