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Economics and Statistics Service  
United States Department of Agriculture

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**Macroeconomic Linkages to Agricultural Trade**  
Roningen, V. and J. Hillman, eds.

Proceedings of a Meeting of the  
International Agricultural Trade Research Consortium  
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## FOREWORD

The seventies brought about major changes in the pattern and structure of world agricultural trade and U.S. interest in that trade. These changes pose new challenges for U.S. agriculture. ESS has a major role to play, notably in research and country analysis, in meeting these challenges. In doing so, it must work closely with other agencies in USDA and with university researchers.

Recognition of the increasing international importance of food and agriculture led to the creation of a new International Economics Division (IED) in ESS in 1979. Staffing of this new division was largely completed in 1980. Significant additional resources have been committed to the programs of that division in order to permit expansion in the scope and depth of trade research. Despite this expansion in ESS resources, and given the continuing concern with the Federal budget, total resources devoted to the critical area of agricultural trade research are still quite limited. Consequently, it is highly important that ESS researchers increase their interaction with other researchers in an effort to work cooperatively on the complex trade issues requiring research.

The goal of increased interaction between ESS and university researchers was formalized in June 1980 by establishing the Consortium on Trade Research. The objectives of the consortium are to:

Foster sustained efforts in international trade research with emphasis on the domestic impacts of policy developments in international commodity markets.

Encourage and facilitate interaction between IED and university trade policy researchers.

Provide a forum for the exchange of research results and the identification of problems and policy issues requiring research.

The consortium is a cooperative undertaking between ESS, USDA's Foreign Agricultural Service, and various universities. Membership in the consortium is mutually agreed upon by ESS and initial university participants but is generally open to those who have an interest and are prepared to make a contribution.

Kenneth R. Farrell, Administrator  
Economics and Statistics Service

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## HIGHLIGHTS

U.S. agriculture has been drawn dramatically closer to world markets over the last decade. The dollar now floats against major world currencies, agricultural exports have increased dramatically, and U.S. agriculture has become more vulnerable to economic shocks and policy changes occurring abroad. The second Consortium on Trade Research focused on the macroeconomic and monetary linkages which now connect U.S. agriculture to the domestic and world economies.

This and other world issues were addressed by the second Consortium on Trade Research, established by the Agriculture Department's International Economics Division and several universities.

The consortium papers emphasized that not only do exchange-rate movements affect commodity prices, but the rates themselves shift because of macroeconomic and monetary policy changes and/or real economic shocks. Agricultural economists dealing with trade issues now must analyze them in a more general equilibrium framework than was previously necessary.

Evidence was offered that the extra uncertainty induced by exchange-rate movements might directly affect trade volumes. The argument was presented that different markets vary in structure so that particular commodity market prices may be affected directly by monetary factors in addition to the conventional determinants of supply and demand. On the demand side, the consortium examined the hypothesis that food prices were more important than other prices in the formulation of consumer expectations about inflation.

A summary of a wide ranging research effort on trade and macroeconomic policies of developing countries finds strong evidence that those countries with export promotion policies and strategies fared better in growth terms than those who focused on import substitution. It remains to be seen how the developing countries will organize their trade and macroeconomic and monetary policies to operate with the flexible exchange-rate regimes and accompanying trade policies now being implemented in developed countries.

Evidence of increased developed country cooperation in policy formulation is found in the Organization for Economic Cooperation and Development (OECD) effort to promote member country policies which would not negate economic adjustments that are needed to cope with the new world energy and exchange-rate regime that has evolved in the last decade. In this increasingly complex world, the extent to which food surplus countries can use their position to political advantage is not clear. Population growth may make for tighter world food markets,

but the responses of food deficit countries to real food price increases is uncertain.

Most important, the consortium meeting highlights the need for increased dialogue and exchange of ideas between agricultural economists and general economists working in this important area of research.

#### NOTES

The views expressed in this report are not necessarily those of the U.S. Department of Agriculture.

The Economics, Statistics, and Cooperatives Service was reorganized on October 1, 1980, and became the Economics and Statistics Service. ESS will be used for subsequent references to the agency.

# Consortium on Trade Research

## Macroeconomic Linkages to Agricultural Trade

### MACROECONOMIC AND MONETARY LINKAGES TO AGRICULTURAL TRADE

Macroeconomic and  
Monetary Linkages  
to International  
Agricultural Trade

by G. Edward Schuh,  
Chris Hodges, and  
David Orden

Discussant:  
Robert Stern

The fixed exchange-rate regime adopted as part of the 1944 Bretton Woods Convention governed the international trade and monetary system for almost 30 years. Throughout this period trade grew faster than national product, and the world's economies became increasingly interdependent through trade and international capital markets. During the seventies, this regime dissolved into the current system which can be characterized by partially floating or flexible exchange rates. This paper presents an overview of exchange rate economics, a review of the exchange rate as a policy instrument, and a partial survey of empirical and analytical work relating exchange-rate policy to agriculture.

Surveying the theory, the paper reviews six approaches to exchange-rate and balance of payments determination. These include the monetary approach of Johnson and Mundell, the elasticity approach of Robinson, the Keynesian multiplier approach of Harberger, the income absorption approach of Alexander, the Keynesian policy approach associated with Meade and Mundell, and the longstanding purchasing power parity approach of Cassel. In discussing the exchange rate as a policy instrument, several objectives of exchange-rate policy were cited.

These include the extraction of resources from the agricultural sector for development, the subsidization of wage goods, the prevention of capital flows, the stabilization of the domestic economy, and the balancing of trade accounts. It is noted that all of these objectives may be pursued with exchange rates and supporting regimes which are considerably different from a laissez-faire situation.



For agriculture, the paper emphasizes two effects resulting from an exchange rate regime. First, there could be a price distortion directly affecting agricultural trade. An undervalued currency serves as an export subsidy and an import tax, while an overvalued one serves as an import subsidy and a tax on exports. A second effect concerns the openness of the economy to capital flows and other international economic events which is implied by the exchange-rate regime in effect. It is argued that the movement away from the fixed exchange-rate scheme has made U.S. agriculture much more vulnerable to international economic events and policies while at the same time freeing U.S. agriculture from the implicit export tax burden of the overvalued dollar in the latter days of the Bretton Woods system.

The paper summarizes much of the research and discussion that evolved from G. Edward Schuh's work in the first half of the seventies concerning the relationship of agriculture and agricultural policy to the changed world exchange-rate system. Essentially, Schuh argued that traditional commodity policy was inadequate for dealing with the new instability affecting U.S. agriculture. In contrast, the European Community has recognized the problem and has neutralized some of the internal effects of disparate monetary and macroeconomic policies on agriculture by their green rate system. Schuh's work brought forth a vigorous debate among agricultural economists concerning the overall impact of dollar devaluation on U.S. agriculture; this debate is summarized in considerable detail in the paper.

Finally, the paper discusses recent research on the effects of exchange-rate policies on agriculture in several developing countries. The paper notes that a more general equilibrium framework is needed to evaluate the true impact of macroeconomic and monetary, and especially exchange-rate, policies on agriculture and agricultural trade.

Comments by Robert Stern: The paper by Schuh and others surveys the theory of exchange-rate determination, the use of the exchange rate as an instrument of policy, and the impact of exchange-rate changes on the agricultural sector.

The version of the paper presented at the conference offered a somewhat dated view of exchange-rate theory, reflecting developments mainly up to the early seventies. This was manifest, for example, in discussing the equilibrium exchange rate in relation to the official settlements balance of payments. This balance was the focus of attention in the Bretton Woods system of pegged exchange rates, but is no longer relevant in the current regime of floating rates and has not been published officially since mid-1976. Further, six different approaches to exchange-rate determination were identified. However, no mention was made of

the asset-portfolio-balance approach which has become dominant in recent years and views exchange rates as being determined by stock-equilibrium adjustments in international securities markets. Exchange-rate theory has been in a state of flux for the past decade, although it is interesting that the current account is beginning to reemerge as a primary determinant of exchange rates.

In discussing the use of the exchange rate as an instrument of policy, many of the examples were drawn from Bretton Woods experiences when multiple exchange rates were prevalent in developing countries and capital controls were common in developed countries. There also seemed to be an implicit view that countries could treat the exchange rate as exogenous for policy purposes rather than being determined endogenously, especially in the context of changes in domestic monetary and fiscal policies.

Several issues were discussed concerning the impact of exchange rates on agriculture. First, it was argued that U.S. agriculture has become more vulnerable to domestic stabilization policies and exchange-rate changes since 1973 as compared to the Bretton Woods period. However, government policies towards agriculture have been changed greatly and no longer act as a buffer. Second, it was urged that the modeling of agricultural trade elasticities be done in terms of general equilibrium. This is a highly commendable view, although the estimation problems may be severe. Finally, regional impacts of exchange-rate changes in developing countries were discussed in light of the theory of the optimum currency area. While the presentation was in terms of factor mobility between regions, it might be preferable to focus more on the price ratio of tradable to nontradable goods. It would be interesting in this connection to study the effects of exchange-rate unification and floating on agriculture, especially in some of the rapidly industrializing developing countries.

In the open discussion Stern advocated research on the effect of exchange-rate movements on agricultural prices and inflation in general. He also suggested that studies be done on the use of futures markets and commodity stockpiling schemes by traders and governments to hedge against exchange-rate uncertainty. He also noted that many of the disturbances in world commodity markets in the early seventies could be explained by the synchronization of world business cycles at that time. Sarris questioned why exchange-rate movements should be destabilizing and argued that they might instead, serve as built-in stabilizers linking national and international markets. Schuh reiterated his view that the old commodity price stabilization schemes simply could not survive under the system of flexible

exchange rates. Sorenson commented that many things had happened simultaneously during the early seventies and that it would be hard to sort out the effect of any particular event such as the dollar devaluation. Kreuger reminded the group that in economic terms, the United States is less influential in the world now than it used to be simply because the economy of the rest of the world has seen tremendous growth. This means the United States can no longer serve as a stabilizer of world commodity markets. Lawrence supported Schuh's view of the uniqueness of agricultural markets with respect to their vulnerability to monetary shocks. Lawrence stated that monetary policy has direct price effects on primary commodity markets because the price transmission effect is different for these markets than for industrial goods markets.

Exchange-Rate  
Volatility and  
Bilateral Trade  
Flows

by Richard K. Abrams

Discussant:  
Alexander Sarris

Many researchers have shown that if transactors are risk averse, a rise in exchange-rate uncertainty should result in a reduction of bilateral trade flows. However, attempts to support this hypothesis empirically have failed. It is contended in this paper that exchange-rate uncertainty does result in trade reductions, and that previous research was unable to isolate this effect because it generally relied on observation periods which were too short.

The first section of the paper uses an updated version of the Tinbergen-Linnemann model to estimate a model of annual bilateral trade flows between 19 developed countries over the period 1973-76. The model is estimated in log linear form using exports as the dependent variable. As in the original model, the independent variables include the incomes of both the importing and the exporting countries, the distance between countries, and a binary variable which is set equal to one if both the countries are members of the same trade preference organization. Exports are deflated by the Consumer Price Index (CPI).

The model includes a variable that tests the Burenstam-Linder hypothesis that demand is a key determinant of international trade. If  $RPC_{it}$  and  $RPC_{jt}$  are the real per capita incomes of the exporting and the importing countries, respectively, the variable ( $PCD_{ijt}$ ) testing this hypothesis is:

$$PCD_{ijt} = \max(RPC_{it}/RPC_{jt}, RPC_{jt}/RPC_{it}).$$

Two proxies for exchange-rate uncertainty are used in this study. The first (VEX) assumes the exchange-rate uncertainty regarding country i's exports to j is proportional to the previous year's quarterly percentage variance in the two countries' bilateral exchange rate. The second proxy (VTREX) implies that exchange-rate uncertainty is a function of the

percentage monthly variance of each bilateral exchange rate from its trend movements over the previous year.

All variables in the model were significant at the 1-percent confidence level, except VEX in the model where VEX and VTREX were tested together. Thus, it is possible that even with a gliding peg, the variance of exchange rates about their trends would still result in trade losses. The stability of the whole model as well as the uncertainty variables were also tested. In no case was it possible to refute the null hypothesis that both the models and the uncertainty variables were stable.

Finally, the model with VTREX was simulated using both 1970 and 1971 uncertainty levels to estimate the trade losses which may have resulted from the additional exchange-rate volatility present under the floating rate system. With 1970 as the base, the model estimates that 0.9 percent more trade could have taken place during 1973-76, while if the conditions prevalent in 1971 continued, 4.2 percent more trade would have taken place. However, these results are not strong, since the estimated trade losses vary markedly depending upon the way exchange-rate uncertainty during the fixed rate period is specified.

Comments by Alexander Sarris: The basic interest in this paper is that for the first time, a negative impact of increased exchange-rate volatilities on bilateral trade volumes is empirically detected. This is done using a longrun model of the determinants of bilateral trade flows, while previous research has focused on shortrun theoretical and empirical models. However, while earlier empirical work was quite firmly grounded on theoretical models, the tests of this paper rest on a rather flimsy foundation. The Tinbergen-Linnemann, as well as the Burenstam-Linder models, are admittedly longrun, but they do not include relative prices as a determinant of trade flows, while the inclusion of exchange-rate volatility variables presumes the existence of some price influence. In fact, one can think of situations where, theoretically, one would expect increased bilateral trade flows under increased exchange-rate instability (for instance, when the exporting firm invoices in domestic currency).

The theory of the firm under price uncertainty would predict that total trade volume might be reduced as a result of increased uncertainty, and not bilateral trade volume. Furthermore, bilateral trade might be influenced by relative changes in foreign exchange fluctuations with several trade partners, with an uncertain outcome on trade volume. In other words, before the results of the paper can be considered credible, substitution effects must be included in the regressions.

An empirical criticism of the paper is that the pooled cross-section, time-series regressions use ordinary least squares (OLS), while variations in large trade flows will usually have larger variances than variations of flows between small trading partners. Hence, the estimation method could bias the results.

Finally, the fact that the estimation period is 1973-76 means that increased exchange-rate volatilities during this period were correlated with increased oil prices and subsequent declines in all bilateral flows induced by reactions to the energy crisis. Hence, the negative sign on the exchange-rate fluctuation terms might just be a consequence of omitting some other variables negatively correlated with the ones representing volatility, and which are more important in determining bilateral trade volumes during the period.

Despite these shortcomings, however, the paper is a valuable addition to our empirical knowledge on the impact of recent increased instability in international markets on world trade flow.

Technical aspects of the paper were the focus of the open discussion. Stern felt that a bilateral trade flow model which netted out prices might not be the most appropriate model for a study of the lagged effects of exchange-rate fluctuations on trade. He also noted that the forward rate, rather than the spot rate, might be used for creating a measure of exchange-rate volatility. Krueger and Lawrence wondered whether the trade pattern changes due to the oil crisis and other economic shocks occurring in the early seventies might not be responsible for some of the results of the paper rather than exchange-rate fluctuations.

Primary Commodities  
and Asset Markets  
in a Dualistic  
Economy

by Robert Z.  
Lawrence

Discussant:  
Andrew Schmitz

The magnitude of primary commodity price fluctuations in the seventies has had a profound impact on the general interpretation of the causes of, and cures for, inflation in modern industrial economies. Some economists still hold the traditional view that a rise in primary commodity prices represents just a change in relative prices--a shift which can be accomplished without a general change in the price level provided that the monetary authorities maintain a constant money supply. But others argue that since a substantial proportion of wages and prices follow fairly rigid nominal paths in the short run, changes in relative commodity prices will affect either the price level (if they are accommodated by the monetary authorities) or the level of economic activity.

As macroeconomists have debated the effects of commodity market disturbances, microeconomists have been similarly divided about

their causes. Few of the serious microeconomic studies have been able to track adequately relative price behavior in the seventies. The pervasiveness of the price changes across numerous markets is strongly suggestive of a related cause. Some have suggested the rapid accumulation of international monetary reserves as a source of the disturbances, but the transmission mechanism between reserves and commodity prices has not been adequately modeled.

This study is based on the recognition that modern industrial economies have a wide range of market structures. Some approximate the traditional Walrasian behavior in which flexible prices speedily bring supply and demand into balance--Okun has called these auction markets. Other markets, however, have more sluggish price responses, and temporary imbalances in demand are met by variations in production, inventory levels, and backlogs of orders--Okun refers to these as customer markets. Our central thesis is that the causes and consequences of commodity market behavior can be fully appreciated only when these markets are embedded in a general equilibrium model of a dualistic economy which has both auction and customer markets, and when commodities are treated as assets as well as inputs into consumption. Both auction markets (identified as commodity markets) and customer market prices will behave differently when these markets coexist.

The first section of the paper discusses some explanations for the dualistic structure of modern economies. Such behavior can be explained within a framework of economic optimization. In some product and labor markets, the ongoing relationships between buyers and sellers--implicit and explicit contracts in the case of the labor market--shift practices away from maximization of shortrun advantage. Prices do not adjust continuously to transitory market changes. In other markets, such as those for homogeneous primary commodities, prices adjust more promptly in response to new information.

In the second section of the paper, a formal model of the dualistic economy is developed. There are three markets: a money market, a primary commodity market that clears in the short run by price adjustment, and a manufactured goods market that clears in the short run by quantity adjustments. Expectations are assumed to be rational. In the long run, nominal changes are neutral, but in the short run, unanticipated monetary disturbances affect relative primary commodity prices. Commodity booms may stem from monetary factors in addition to changes in the conventional determinants of supply and demand. Monetary changes may operate through channels other than that of interest rates and the level of aggregate demand. Commod-

ities might provide an effective hedge against inflationary increases in the money supply since, temporarily, they may overshoot their longrun nominal values. In the third section, monetary variables introduced in a manner suggested by this theory improve regressions explaining global food prices.

The following section delves more deeply into the role of commodities as assets in a dualistic economy. Hypothetically, commodities could either increase or decrease overall portfolio risk. Since commodity prices are so sensitive to inflation changes, held in isolation, commodity investments will become more risky when inflation uncertainty increases. On the other hand, since unanticipated inflation may adversely affect the returns from other assets, commodities may actually reduce overall portfolio risk. It is found that holding commodities increased nondiversifiable risk in the seventies. This may explain the failure to rebuild global commodity stocks in the seventies, as well as the dramatic growth of futures markets.

The paper's final section discusses the policy problem in the dualistic economy. Even if upward and downward fluctuations in primary commodity markets have symmetric effects on the price level, the macroeconomic externalities associated with commodity price fluctuations provide a rationale for direct government intervention.

Comments by Andrew Schmitz: One way of viewing the impact of agricultural shocks on inflation and their related macroeconomic variables is to assume there is an increase in the foreign demand for food due to, say, a crop shortfall in one of the major importing countries. The price of food increases, which leads to a rise in farmland prices. This increase has a positive impact on farmers' wealth where land is privately owned since the value on land titles increases and the nominal mortgage payments decrease relative to the real values. The rational farmer desires to invest since his increasing wealth provides him with opportunities to obtain investment funds. However, the farmer will not always be inclined to buy more farmland since its increased price has reduced its expected net present value. Hence, following the asset demand theory, he will direct at least some of his demand for investment to sectors which are relatively unaffected by the food boom, such as urban real estate, small industries, and the stock market. Hence, the increasing foreign demand for food will not only extend to the gross national product (GNP) through the usual foreign trade multiplier, but will also increase investment in sectors that are not directly related to food production. This is formally shown as follows:

Let

$C(Y, w)$  = the consumption function where  $Y$  is national income and  $w$  is the total wealth,

$I(Y, i, w)$  = the investment function where  $i$  is the rate of interest,

and

$X - M$  = the net foreign trade balance where  $M$  and  $X$  are imports and exports, respectively.

The wealth accumulated from food production is reflected in the value of farmland. Thus,  $w_{\text{food}} = L \cdot p^L$  where  $L$  is the farmland acreage and  $p^L$  is the price of land. But the price of land is, in this case, a function of the volume of food exports and the rate of interest. Hence, one rewrites wealth as:

$$w_{\text{food}} = L \cdot p^L(X, i); w = w(X, i). \quad (1)$$

Assume that imports are only consumer goods and that exports are income-creating and not sales on account of capital. Then in equilibrium the value of the national product is:

$$Y = C(y, w) + I(Y, i, w) + X - M, \quad (2)$$

where  $w = w(X, i)$ .

The change in GNP as a result of the changes in exogenous factors is as follows:

$$dY = C_y dY + C_w w_X dX + C_w w_i di + I_y dy + I_i di + I_w w_X dX + I_w w_i di + dX - dM, \quad (3)$$

where

$$C_w = \frac{\partial C}{\partial w}; w_i = \frac{\partial w}{\partial i}; C_y = \frac{\partial C}{\partial Y}, \text{ etc.} \quad (4)$$

The change in national income as a result of a change in exports is given by the export multiplier:

$$\frac{dY}{dX} = \frac{1 + (C_w + I_w) w_X}{1 - C_y - I_y}.$$

The wealth effects on consumption,  $C_w$ , and investment,  $I_w$ , are nonnegative, and this export multiplier will be



larger than the multiplier in a conventional foreign trade model that does not account for wealth. This argument was based on two important assumptions: the first considered an economy of private ownership of land, and the second assumed the existence of idle savings balances in the economy.

If money were in relatively short supply, the increasing wealth from farmland would shift investment funds from other sectors to agriculture. Moreover, if money supply is exogenous and bankers could create money by providing reserves such as collateral of farmland values, increasing wealth in agriculture could cause a rise in the level of investment in the economy despite the fact that savings deposits are fully employed. This conclusion could explain the recent surge of major U.S. and Canadian banks into lending for farmland and agricultural purchases in general. On the other hand, wealth from farmland can be used for investment only if the land is privately owned. Public lands are not used as collateral in obtaining loans. Thus, in an economy of publicly owned farmlands, an increase in food exports will increase the revenues to farmers but no wealth increases in farmland would take place; and since investment funds will not be allocated on the basis of wealth, the foreign trade multiplier will be much smaller. Hence, one expects that in an economy of privately owned farmland, exogenous forces affecting agriculture will have a greater amplified impact on the economy.

Schmitz, in the open discussion, agreed with Lawrence's view of differing rigidities in different commodity markets and suggested that agricultural commodity price shocks could expand the money supply. Lawrence countered that this would depend on government response to the demand for money. Government validation of commodity price inflation was possible but not a necessary response. Further discussion verified a basic consistency between Lawrence's approach and other work in this area. Lawrence also emphasized that his approach did allow for the transmission of real shocks to commodity supplies as well as those from macroeconomic and monetary policies. Kreuger raised the concern of the policymaker in determining the tradeoffs in externalities that could occur if rigidities were removed. If governmental or institutional factors prevent adjustment to shocks in some markets, other markets adjust more. The choices are to create alternative policy instruments to dampen undesirable side effects in nonrestricted markets or to work to remove rigidities in less flexible markets.

Food Prices,  
Expectations,  
and Inflation

by Carl Van Duyne

Discussant:

Robert Thompson

The hypothesis that the recent behavior of food prices plays a special role in the formation of consumers' expectations of inflation appears to be widely held by economic policymakers and policy-oriented economists in the United States. The 1976 Economic Report of the President, for example, states this hypothesis clearly:

Food prices are the most visible and best publicized of all the components of the CPI. For this reason they may be especially important in determining the wage demands of labor and the inflationary expectations of all consumers.

This hypothesis, which here is termed the biased expectations hypothesis (BEH), was prevalent at the Cost of Living Council, the Government agency responsible for administering wage and price controls in the early seventies, and it appears to have figured prominently in the decisions to impose meat price ceilings in March 1973 and agricultural export controls in the summer of 1973.

This paper summarizes the implications of the BEH for the overall rate of inflation; explores whether the BEH might reflect rational economic behavior, in the sense of Muth (1961), without invoking questionable arguments about differential information costs; and tests the hypothesis empirically. The model developed in the paper is a simple stochastic, fixprice-flexprice model of the inflation process that is akin to the mainline model recently used by Gramlich (1979) to analyze the macroeconomic effects of price shocks. In the long run, output in the model is supply determined, and the inflation rate depends solely on the rate of growth of the nominal money stock. In the short run though, shocks to food prices can induce substantial and persistent bursts of inflation even if the rate of growth of the money supply is fixed. These shocks temporarily increase the current rate of inflation and expectations of future inflation. Higher inflationary expectations induce a rise in the rate of growth of wages, and hence bring about higher rates of inflation in the future. If expectations are biased in the sense that consumers place more weight on the recent behavior of food prices when forming their expectations than expenditure shares would indicate, then shocks to food prices may have magnified effects on subsequent rates of inflation.

If expectations are assumed to be Muth-rational, the analysis suggests that consumers should form their expectations using a weighted average of sectoral inflation rates, with weights that differ from expenditure shares. When food price shocks in the current period provide little information about the shock next

period, such as when food price shocks show little serial correlation, and when wage inflation and hence the rate of change in manufactured goods prices show substantial inertia, then the rational way to form expectations about inflation next period is to place relatively little weight on the recent behavior of manufactured goods prices. If price shocks during one period provide substantial information about shocks the next period and wages and manufactured goods prices exhibit little inertia, then it is rational to place more weight on the recent behavior of food prices than expenditure shares would indicate.

A measure of the expected rate of inflation was used to estimate the weight consumers actually place on food inflation when forming their expectations. This was derived from responses to a quarterly survey conducted by the University of Michigan's Survey Research Center and was regressed on: the lagged rate of growth in the food component of the CPI, the lagged rate of growth in all items except the food component of the CPI, the lagged rate of growth in the nominal money stock, a measure of aggregate demand, and a dummy variable for the wage and price controls period.

Empirical results indicated that, contrary to the conventional wisdom, consumers do not appear to place undue weight on the recent behavior of food prices when forming expectations of future inflation. The implication is that sectoral anti-inflation policies such as agricultural export controls and meat price ceilings are less effective, and hence less justifiable, than is generally presumed.

Comments by Robert Thompson: This was a very relevant paper since there had been few attempts by agricultural or other economists to analyze rigorously the links between commodity market shocks and inflation. Much of the work on inflation has tended to be on an aggregate inflation rate rather than disaggregating as both the Lawrence and Van Duyne papers had done. Thompson wondered if the closed economy model, which was abstracted from foreign supply and exchange-rate shocks, was an oversimplification and suggested opening the model to make it more realistic for agriculture. He also cited some work by agricultural economists which supported the hypothesis that increases in the money supply increased agricultural commodity prices relative to noncommodity prices. Thompson suggested that more operational complexity should be added to Van Duyne's model so that agricultural economists could incorporate these linkages into their models for agricultural commodities. He stated that this paper does provide evidence of the inflationary expectations bias carried by food prices that he and many other observers believed existed, and he was surprised that the empirical evidence in the paper wasn't stronger. This paper

and other work strongly suggest that models to forecast inflation need sector detail. Van Duyne replied that his closed model assumption and simple modeling approach made the empirical work more manageable, and he doubted the results would change significantly if the model was opened. Also, he said that the shocks he was dealing with were real, such as bad harvests. He was not concerned here with the issue of the relative importance of real-versus-monetary shocks in inducing inflation. Ensuing discussion concerned technical questions about the estimation techniques and results and the data sources used for the paper.

## MODELERS' VIEWS OF MACROECONOMIC AND MONETARY LINKAGES TO AGRICULTURAL TRADE

The Role of Agriculture in Macroeconomic Models:  
A Review

by William E. Kost

Discussant:  
Gary Storey  
(see discussant  
comments on  
Subotnik paper)

The agricultural sector, of course, is important to the national economy. Since the general trend in macroeconomic modeling tends toward increased sector detail, a logical next area of interest is agriculture.

The paper presents the results of a survey of the treatment of agriculture in several operational macroeconomic models: the the Wharton Project LINK models, the Chase Econometric Associates international models, the Economic Models Limited international models, the Evans Economics, Inc. international models, the Data Resources, Inc. (DRI) international models, and the Chase, DRI, and Wharton (WEFA) U.S. macroeconomic models. The equation specifications were carefully reviewed to determine both which agricultural sector variables were included and how the agricultural sectors were specified. Only recently could one easily conduct such a survey. The survey's success hinged on widespread acceptance of the models and adequate documentation. In recent years, macroeconomic models have moved from academic exercises to being accepted as relevant forecasting and policy tools and, therefore, used on a regular basis. Only then does it become crucial to look at the role of agriculture in these models. Just recently, some of these models have been expanded to the point where they can be said to contain endogenous sectoral detail rather than being only aggregate national account level models.

The survey results show that the agricultural sector generally is ignored or treated exogenously. When the sector has been endogenized, the specification would be far from satisfactory for most agricultural economists. Agricultural economists would criticize most endogenous agricultural sectors as being structurally misspecified and/or too small to provide any relevant information about agriculture to agriculture. Because of this, simulation results from agriculture/nonagriculture policy shocks will have little credibility, particularly among agricultural economists.

Agriculture has built up its own group of professional agricultural economists to look at agricultural issues. Perhaps this caused general economists to overlook the agricultural block when incorporating sectoral detail into their models. Economists may have assumed that since agricultural economists were modeling the agricultural sector in detail, they could treat agriculture as exogenous without biasing their results. However, as Subotnik indicates, agricultural economists aren't working in this area of agriculture/nonagriculture linkages either. Everyone seems to be ignoring this interface.

Any work in this area will soon run into methodological problems. Macroeconomic models have been built using macroeconomic methods, while agricultural commodity models have been built using microeconomic methods. These two modeling approaches are not necessarily compatible. Incorporating agriculture into macroeconomic models may require focusing less on supply/ demand type commodity models and more on aggregate farm account production process type models that can more easily be integrated into the existing macroeconomic models.

Any detailed microeconomic commodity model may be more easily linked to this type of macroagricultural model than to a macroeconomic model. Conceivably, the proper approach to developing feedback loops between agriculture and the rest of an economy will best be achieved indirectly. Rather than having macroeconomic/commodity links, having macroeconomic/ macroagriculture and macroagriculture/commodity links may prove to be the most fruitful approach to modeling this agriculture/ nonagriculture interface.

No matter how this interface question is finally resolved, the first prerequisite is having people work on the problem; the profession (both general and agricultural economists) really doesn't even have that yet. Given the increased interest in, and importance of, agriculture, the knowledge gained from work in this area would be quite significant.

The Role of Nonagricultural Sectors in Agricultural Models

by Abraham Subotnik

Discussant:  
Gary Storey

This paper surveys some operational agricultural models for their linkages to other sectors of the domestic and foreign economies, pinpoints their deficiencies, and suggests some ideas for dealing with these deficiencies. The surveyed models are detailed agricultural models that analyze the many activities related to the agricultural sector and their interactions within the sector as well as with the nonagricultural, domestic, and foreign sectors.

The models surveyed in this analysis are the Wharton agricultural model, the USDA's cross-commodity model, and the Canadian FARM model.

Some of the nonagricultural linkages are related to specific nonagricultural production industries as fertilizers, agricultural machinery, seeds, and insecticides and pesticides. These industries' products are used mostly as inputs in the agricultural sector. Other nonagricultural linkages are related to macroeconomic variables such as the wage rate, the interest rate, the general price level, per capita income and expenditure, and the exchange rate. These macroeconomic linkages are demand related and are sufficient for the simultaneous determination of prices and output allocation in the agricultural

sector in the short run (for given levels of output) as in quarterly models. On the other hand, models that extend beyond the gestation period of agricultural production such as annual models should also have supply related nonagricultural linkages. This implies that in annual models, linkages with the nonagricultural inputs are to be included as an integral part of these models.

All of the surveyed models have the required demand related linkages with the nonagricultural macroeconomic variables of the domestic and foreign economies. But despite the fact that production is an explicit component of these models, none of them deals with the specific input markets to agriculture stemming from the nonagriculture sectors. This would imply that the supplies of the inputs specific to agriculture are infinitely elastic and that there are no financial constraints in the agricultural sector to use the optimal quantities of these inputs. An additional shortcoming of these models is that the farm account components, which are estimated, do not have feedbacks to the other parts of the models, nor do they link with the financial sectors of the macroeconomy.

Theoretically, it can be shown that if the supply of any input is less than infinitely elastic, the omission of the market for this input will result in underestimating (in absolute value) the effects of relative changes in the exogenous variables on the relative change in consumer prices and in overestimating (in absolute value) the effects of exogenous changes on consumption. While no econometric research has been performed to study the supply structure of these inputs, there is some evidence that their supply is less than infinitely elastic. On the other hand, there are a few econometric studies dealing with the demand for fertilizers and farm machinery. All of these studies report strong evidence on the own-price effects of the respective inputs, the prices of other related inputs, and on the prices of final products. There is also some reported evidence that the demand for fertilizers and farm machinery is also affected by the farm cash receipts from crops and by government payments. This is a reflection of a credit constraint to the demand for short-term credit to finance current operations. It follows that if the nonagricultural inputs are to be explicitly dealt with in agricultural models, their demands should be linked to the farm accounts thereby providing a feedback for these accounts. The interface of the farm accounts and the demand for inputs would then be the basis for a loanable fund demand function, which while interacting with the supply of loanable funds to agriculture, would solve for the equilibrium credit to the sector.

Regarding the introduction of input demand functions in agricultural models, there are some points to consider: the extent and quality of the available data, and the fact that these inputs are not commodity specific. A possible solution with respect to the second point is to assume a separable production possibility frontier and to estimate simultaneously the derived demands for inputs and the supply functions of the final consumer products.

Finally, some issues concerning the foreign trade component of agricultural models are considered. Taking a monetarist approach to the determination of the exchange rate and since the agricultural balance of trade is such a significant proportion of the total balance of trade, foreign trade's effect on the exchange rate cannot be ignored. On the other hand, some new theories concerning exchange-rate determination such as the hypothesis that foreign exchange markets are efficient, have not yet been analyzed in the context of agricultural models.

Comments on the Kost and Subotnik papers by Gary Storey: Previously the American Agricultural Economics Association (AAEA) had two sessions that dealt with problems of incorporating the agricultural sector in macroeconomic models and modeling needs (American Journal of Agricultural Economics, May 1975, Feb. 1977). The points raised by Kost and Subotnik reflect the issues presented in earlier papers which generally called for tightening up the linkages between agriculture and other sectors of the economy, in particular modeling to incorporate the interactions of: general price and income levels with agricultural prices and demand, agricultural input markets and the financial sector, and agricultural trade in determining balance of payments and exchange rates.

In looking at the role of agriculture in macroeconomic models, Kost first presents data showing the importance of agriculture in the economy of several developed countries in terms of consumption, production, and trade as arguments for the inclusion of agriculture as a separate sector in macroeconomic models. Although he provides some data on standard deviations, he does not explicitly argue that it has been the relatively increased instability of food and other agricultural prices or the impact of the growing U.S. agricultural trade surplus for the balance of payments which provides the rationale for increased linkages between agriculture and the general economy.

In attempting to endogenize agriculture in existing macroeconomic models, Kost is concerned that the micro-oriented (commodity) agricultural models may not be compatible. He calls for establishing macroagricultural models developed from microagricultural models and linking these to macroeconomic



models. However, one should have some reservations about this suggestion since the aggregation of various agricultural commodity sectors is likely to mask the specific agricultural sector impacts.

Subotnik's analysis of the deficiencies of current agricultural models with respect to their linkages to other economic and foreign sectors fairly well matches the points raised by others in the AJAE sessions (Popkin, King, Just, Roop, Zeitner, and Johnson). In addition to his point on deciding on the purpose of the model before establishing linkages, one feels that too often our agricultural models have failed to meet their potential use because we have tried to develop them as multiuse (policy and forecasting) models. The failure comes from the commitment to further develop and provide the infrastructure to utilize the models beyond initial model development. Subotnik stresses the need to develop agricultural input as well as financial market linkages. There is a need in modeling these linkages to take account of farm allocation to factor input categories under conditions of capital rationing. Marginal analysis is not likely to provide good estimates or predictions of input use.

In the open discussion there was some additional debate on the importance of treating agriculture as an important specific sector in macroeconomic modeling given the relative importance of sectors such as textiles, pulp and paper, and others.

The discussion started with an elaboration of Storey's contention that the purpose and objective of the modeling effort is important but often forgotten. It was pointed out that modeling is an expensive proposition. Because of this, models tend to have multiple objectives and be asked to support many functions. Thus, there is a natural tendency for models to grow in size, in detail, and in complexity. Since the modeling effort is an expensive one, model builders also tend to promote modeling as being able to answer many questions. In the process of selling their endeavors they often are forced to oversell a model's worthiness and raise clients' expectations. Because they cannot live up to these artificially high expectations, model builders find it even more difficult to maintain and update a modeling effort over a long period.

Krueger saw no reason why agriculture should be incorporated in macroeconomic models. Many other industries would prove more important. Furthermore, she questioned the need for large macroeconomic models. She felt that the sort of questions that could be answered by macroeconomic models could be answered by small models. Schuh, Kost, and Lawrence responded that shocks originating in agriculture did have an impact on the

macroeconomy. Cited as one example was the impact of agricultural instability on food prices translating itself into significant movements of the CPI. Van Duyne pointed out that the argument was more fundamental. It was an argument about the real usefulness of econometric models in general. He felt that Kost's paper implicitly assumed that econometric models were good while the Krueger comment implicitly assumed that they were not. Schmitz commented that while national account variables provided some answers, all the really important policy issues involved distributional effects. Kost added that sectoral detail was the only way to incorporate distributional questions into the list of questions answerable by a macroeconomic model.

ASPECTS OF MACROECONOMIC AND MONETARY POLICYMAKING CONCERNING AGRICULTURE AND AGRICULTURAL TRADE

Trade Policy as an Input to Development: Monetary and Agricultural Implications

by Anne O. Krueger

Discussant:  
Vernon Sorenson

This paper examines the reasons why developing countries which have adopted export promotion as a trade and industrialization strategy have performed so much better than countries which have relied upon import-substitution policies. It then proceeds to examine the monetary and agricultural implications of the success of the newly industrializing countries.

Theory indicates a number of ways in which equalizing the rates of transformation between the domestic and the international market provides a superior static resource allocation. However, the theory does not indicate how many activities will be undertaken, the relative importance of exporting or import-competing activities at the optimum, or how optimal resource allocation changes over time with economic growth. In practice, however, the relationship between export promotion and growth is sufficiently strong so that it bears up under many different specifications of the relationship.

There are three reasons why growth performance is better; the relative importance varies between countries. First, factors such as a minimally efficient size of plant, increasing returns to scale, indivisibilities in the production process, and the necessity for competition, are all better served under export promotion simply because the size of the market is adequate. A second hypothesis is that differences in growth rates are the result of inappropriate policies and excesses of import substitution strategies, which have not happened under successful export promotion. The third hypothesis is that pursuit of an export promotion strategy is simply closer to an optimum, because deviations between domestic and foreign prices are less than under import substitution. The first and second hypotheses are consistent with some infant industry notions; the third is not.

The monetary implications of an export promotion strategy are straightforward: pursuit is not feasible for a long period of time unless exchange rates are set at realistic levels; in addition, it is difficult to sustain an export promotion policy unless domestic markets are increasingly linked to international markets. This, in turn, implies the need for, and desirability of, realistic interest rates and domestic financial policies.

In addition, some countries have been able to realign their exchange-rate and interest-rate policies so as to be able to avail themselves of the international capital market as a source of equity or loan funds in order to raise the rate of investment above that sustainable by domestic saving.

For agriculture, it seems evident that export promotion countries have achieved more rapid rates of growth of agricultural, as well as industrial, output and exports. In some countries new agricultural export crops have emerged in response to an increased real exchange rate.

The implications do not, however, necessarily mean that international trade in agricultural commodities will grow more rapidly as more and more developing countries adopt externally-oriented trade strategies. In some countries more rapid growth has inevitably implied increased demand for imports of agricultural goods, while in others, there has been a greater acceleration of domestic output than of demand.

Probably, a more rapid rate of growth of developing countries implies a more rational allocation of resources within world agriculture in both exporting and importing countries.

Comments by Vernon Sorenson: Krueger presented a comprehensive and insightful assessment of a number of basic propositions concerning the relationship between trade and development. However, this reviewer would prefer to take the prerogative of presenting some related comments and trying to place his own perspective behind some of the questions that are raised by the paper.

It could be argued that we should not concentrate on trade with development as the dependent variable but rather should ask the question, "What relevant guidelines can be established for development planning, and how is trade sector planning incorporated into overall country planning?" Each country faces unique choices concerning which industries to promote for domestic consumption, which industries and activities to promote for exports, and how much import substitution and export promotion should be sought and at what cost. While various concepts in economics are highly relevant to policy guidance, a great deal of empiricism is required to develop workable approaches that fit individual countries' circumstances.

Strategies and appropriate policies must be arrived at in the light of a number of economic and institutional variables including trends in domestic and international demand for relevant commodities, the resource base available to the country, the nature of the production function and the technological

base for increasing production and reducing cost, the externalities and linkages backward, forward, and horizontal that influence the developmental effect achieved from program development. While all of this is very complex, it is also true that these relationships must be dealt with by international lending institutions such as the World Bank. Export development is crucial where hard currency repayment is required. On the other hand, import substitution is also considered a legitimate component of development planning. The issue is not the good or bad of one approach but the appropriate mix in any given situation.

The discussion ranged over a wide area of topics related to the paper. There was some speculation about future commercial and macroeconomic policies which developing countries would be likely to pursue.

One question was whether developing countries would continue the trend towards liberalization of their trade regimes given the evidence that export promotion strategies are associated with more rapid growth. The resurgence of protectionism in various forms in developed country markets could force developing countries to move again toward policies of import substitution. Questions also were raised about the likely response of developing countries to the codes and other agreements reached in the recently completed multilateral trade negotiations. Although the developing countries have not joined in most of these agreements, Kreuger felt that some diplomatic effort in this direction might be fruitful. There is also uncertainty as to what stabilization policies the developing countries will follow in response to flexible exchange rates among major developed country currencies. Concerning the techniques and tactics of developing countries following successful export promotion strategies, the question was raised as to whether such countries had picked basically unprotected markets. In agricultural exports, Brazil was cited as an example where its major agricultural exports (coffee and soybeans) were not protected in developed country markets. An answer was hard to generalize since protection sometimes changed in response to import penetration, and there were plenty of examples where export values had increased even if markets had been restricted in quantity terms. It was also mentioned that entrepreneurial capacity is an important factor in picking the right developing country exports for the right developed country markets.

Positive Adjustment  
Policies: A View  
from the OECD

by Marshall Casse

Discussant:  
Timothy Josling

On June 15, 1978, the Ministerial Council of the Organization for Economic Cooperation and Development (OECD) approved an expression of desirable policy orientation or "guidelines" for member countries. The OECD statement urged member countries, to the extent possible, to use policies to adjust positively in accordance with, rather than opposed to, structural economic adjustment called for by the slower growth scenarios that developed in the seventies.

The OECD felt that since the oil crisis and the inflationary recession of 1974-75, there was evidence of a shift in member countries' policies from long-term to short-term objectives, from broadly based to more selective interventions and, more fundamentally, from the pursuit of adjustment to a defensive posture based on maintaining the existing conditions. It was only to be expected that this shift would first manifest itself in the area of trade policies, which is particularly tempting for defensive and selective short-term action.

Despite rather successful efforts to avoid new trade restrictions in their more traditional forms, there has been a significant move to various forms of export restraint, to the more strict and rapid application of safeguards, antidumping procedures, countervailing duties, and to increased administrative surveillance. Even countries with a tradition of fairly liberal state procurement policies switched to a heavy reliance on procurement as a way of assisting ailing industries. Finally, there has been a substantial rise in the size and range of incentives and direct financial assistance to exports or exporting activities, frequently on a highly selective basis.

In the last few years, there also appears to have been a significant, though not always measurable, rise in the size of member governments' intervention at the submacrolevel, combining trade, manpower, and industrial and regional policy instruments, mainly geared to maintain the existing industrial and agricultural structures and thus limit the rise in unemployment. In a sense, the distinction between the policy instruments applied appears to be more apparent than real. Thus, the dividing line between trade and other policies has become increasingly artificial and there is not much difference in effect between trade measures and subsidies to labor cost as an incentive to labor-hoarding by enterprises or other forms of financial assistance enabling enterprises to maintain activity and hence employment.

The above concerns led the OECD to consider and release its "guidelines" statement advocating policies which would support "positive" adjustments to economic change.

It is significant that a multicountry group such as the OECD perceived and responded to the threat of delayed structural adjustment resulting from policies of member countries. The OECD statement focused attention on the potentially adverse collective effects of such policies and, it is hoped had some influence in helping member governments adjust positively to changed world economic conditions. Paragraph 18 of the OECD statement summarizes the desire for international cooperation to adjust positively in all sectors of the economy including agriculture:

"18. Continuation of defensive measures and lack of longer-run restructuring programs in some countries will make it politically difficult for others to pursue their own adjustment policies. Collective agreement on the need to shift from defensive to more positive adjustment policies in the areas of industrial employment and manpower, agricultural, regional, and regulatory policies, as part of a concerted programme for a more sustained and better balanced growth, will make it easier for each Member country to follow appropriate domestic policies, and to honor its commitments under the OECD Trade Pledge. It is also an affirmation of Member countries' willingness to adjust to changes in their trade in manufactures and other products with developing countries. Continued efforts for cooperation whereby current and perspective developments are reviewed, analyzed, and discussed, should help governments to formulate policies which take into account possible impacts on other countries and involve a fair sharing of the costs of adjustment."

Comments by Timothy Josling: Few economists could disagree with the premises of the OECD Positive Adjustment Policy guidelines. Defensive policies have short-term benefits often turning into long-run costs, provoke retaliation, and create vested interests. By stimulating rather than avoiding adjustment, positive policies aim to encourage mobility of labor and capital to their most productive uses. Such policies would include enhancing competition, improving market information, and encouraging innovation. They would supplement market forces and promote sustainable noninflationary growth.

The farm problem used to be thought of as a release of labor too fast for rural and urban institutions but too slow for income parity. Agricultural adjustment implied the need for resource shifts in the face of technical change and a slowly

growing demand. Government policies often appeared defensive--the artificial stimulation of demand through price supports, rather than positive, such as the encouragement of migration. These policies spawned their own set of problems, including increased transfers to a declining segment of the population and perpetual trade problems arising from the subsidized exporter struggling to gain access to the protected market.

The balance changed over time. During the last 20 years most developed countries have introduced structural policies, including such provisions as pension and retraining schemes, and capital grants linked to farm amalgamation plans. But the older pricing and marketing policies did not go away. Instead they changed functions to become important aspects of economic management in their own right. They became policies for export expansion, import replacement, and food price stability. Though maintaining a nostalgic link with farm incomes, they were often unrelated to agricultural adjustment. The defensive and the positive policies in agriculture now coexist--the latter struggling to offset the effect (on resource adjustment) of the former.

The cautious treatment of agriculture in the OECD guidelines is a good illustration of the difficulty of exposing these matters to international discourse. Certainly one should try to minimize the cost of meeting legitimate national policy objectives, as suggested in the section on agriculture. But that merely raises the question of how to negotiate on the undesirable external aspects of national policies. The real test of the guidelines is whether they can influence countries to avoid the type of protective action which snowballs throughout an integrated trading system. In other words the key section in the OECD paper may be paragraph 8 which suggests that assistance to "individual sectors or companies in financial difficulty" should be "temporary and should, wherever possible, be reduced progressively according to a pre-arranged timetable." To phase out the defensive policies holds out the prospect of a positive payoff. To introduce positive policies without tackling the resource misallocation generated by intervention policies is inadequate.

The open discussion continued with a summarization of the problem, namely that the speed and degree to which external economic shocks can be absorbed are subject to political pressures. Furthermore, once intervention mechanisms are set up, they continue to operate even if they are no longer needed. Intervention to retard or moderate economic adjustment tends to occur in times of slow growth when efficient allocation of resources becomes most important. Schuh pointed out that many intervention policies occur because producer groups are well organized



and consumers are not. This allows the intervention question to be phrased in terms of domestic versus foreign producers rather than domestic producers versus domestic consumers. Casse suggested another difficult issue concerning policies relating to adjustment, namely that, from an economic viewpoint, all policies which affect a sector or the national economy should be examined for their impact on the adjustment process. However, from a political viewpoint, many policies are considered to be exclusively in the domestic, as opposed to the international, domain.

Food as an Instrument of Diplomacy

by Cheryl Christensen

Discussant:  
Colin Carter

Discussions of food and foreign policy often suffer from an instrumentalist bias, or a tendency to think of food as an instrument which can be used to achieve foreign policy objectives which are exogenous. The paper analyzes the instrumentalist bias, including the reasons for its current appeal, the complexities of both domestic and international realities which it ignores, and the implications of pursuing policies based upon such a perspective. It makes several basic points. First, one cannot assume food to be simply an instrument of foreign policy. Changing food conditions may create crises to which foreign policy must respond, or generate issues which must be addressed by policymakers. Second, much of the current interest in food as an instrument of foreign policy reflects a mixture of factors relevant to the success of food diplomacy, such as global supply-demand trends and vulnerability of other countries, and factors that predispose policymakers to consider using food instrumentally but do not increase the chances of doing so successfully, exemplified by declining American control over other policy instruments. Third, the likelihood of successful food diplomacy depends heavily on the policy arenas of national security, trade, agriculture, and development; the objectives sought, such as support, influence, and punishment; and the policy preference ordering of states as well as more conventionally defined power relationships. Fourth, attempts to use food as an instrument of foreign policy which do not recognize these complexities run not only the risk of short-term failure but also the risk of catalyzing longer term changes in the international political economy of food.

Comments by Colin Carter: The bulk of the paper describes the nature of the grain trade. The most interesting and novel part of the paper is the last section which puts forth various propositions about American food power.

This reviewer is more optimistic than the author on the potential use of food as an instrument of economic warfare. The current Russian grain embargo has not been as much of a failure as the author suggests. Russia imported 5 to 7 million metric tons of grain less than they wanted this past year and

suffered as a result. U.S. dominance of the grain export market is just as pronounced as the Arab dominance of the oil market.

The author suggests that a major reorganization of international grain markets would be necessary before the United States could gain from using grain as an economic weapon. She suggests that the multinational grain companies may get most of the benefit. Given the fact that the volume of grain traded is most important to these companies and given that they have been strongly opposing the grain cartel idea, it is difficult to agree with the author on this point.

It is suggested in the paper that the United States should concentrate on earning economic rents from grain exported to oil producing and exporting countries. The author has overemphasized the importance of this this very small market for imported grain.

Two major points neglected in the paper by Christensen are the questions of importer response and of cooperation among major grain exporters. A major result of grain warfare would be to stimulate production in importing countries. The Soviet Union, for example, has severe agricultural productivity problems, which it may be able to overcome in a grain war. Also, cooperation among major exporting countries is crucial for successful food warfare. This is an unresolved issue and is left unaddressed by Christensen. In summary, the paper understates the importance of food as an instrument of economic warfare.

In the open discussion Hanrahan pointed out that Christensen's paper was talking about the unilateral use of food as a diplomatic lever rather than a multilateral scheme operated by major world producers. Also, there were political limits to international cooperation on food questions. Hanrahan emphasized that many developing countries were becoming more significant food importers thereby enhancing the diplomatic use of food in the future. Bain suggested that some sensitivity analysis ought to be done on likely world scenarios for food in the eighties. He felt that, although the possibility for commodity price instability had increased, projected scenarios of chronic food shortages might have been overemphasized. He and others felt that too little was known about foreign supply response and that this was a key factor when considering the use of food as a diplomatic tool. McCalla and other discussants felt that the supply response in many importing countries was as much a political as an economic question and furthermore, the gamut of economic policies in the developing countries had to be considered in assessing a likely supply response. If, for example, the import demand for food was a result of urbanization that evolved from industrial policy, then changes in industrial

policy which would stem rural-to-urban migration would be important in determining both the levels of import demand and domestic agricultural supply in developing countries.

## SUGGESTIONS FOR FURTHER RESEARCH

The consortium meeting highlighted the fact that most of the work in the macroeconomic and monetary area has been done by general economists and that agricultural economists interested in this topic have a large body of theory, literature, and applied research from which to draw. Significant work has been done on topics of direct interest to agricultural economists notably in the area of linkages between commodity markets and macroeconomic and monetary policies. It is important that agricultural and general economists expand their dialogue and undertake joint research efforts in this area.

A general suggestion was to model the effects of exchange-rate changes on agriculture and agricultural trade in general equilibrium terms. However, it was recognized that this would be a difficult empirical task. It was also suggested that work be done on the transmission of exchange-rate changes through agricultural commodity prices. In light of the move to flexible exchange rates, it was also important to understand how traders and governments made use of futures markets and stockpiling of commodities to hedge against exchange-rate uncertainty.

The papers by Lawrence and Van Duyne suggested further theoretical and empirical work was needed to understand why price behavior was different in commodity, as opposed to manufactured goods, markets. Specifically, commodities can be treated as assets and have a special role in the formation of price expectations. Also, there are important questions concerning structural and institutional constraints on price behavior in different types of markets.

From a modeling viewpoint, it was recognized that much more work was needed to incorporate macroeconomic and monetary linkages into agricultural trade models. While the theoretical and empirical basis for doing this was not always clear, agricultural modelers might take a careful look at some of the work done by general economists on commodity market behavior in order to develop theoretical and empirical approaches. Financial market effects, as well as factors affecting the supply and demand of agricultural inputs, need to be incorporated into agricultural models. It is also important that exchange rates become an integral part of agricultural trade models so that

the magnitudes of trade effects caused by the exchange-rate movements can be gauged.

In the applied research area, there are many practical problems that must be dealt with in formulating U.S. agricultural trade policy. Since the developing countries are likely growth markets for agricultural exports, as well as possible competitive suppliers in some cases, more should be known about how the trade and monetary regimes of these countries might evolve over the next decade. It will be important to understand how the mix of policies will affect demand for, and supply of, agricultural commodities as developing countries react to the macroeconomic and monetary shocks affecting world markets. Developing countries traditionally have more state intervention in their trade and in their domestic economies. Therefore, special attention will have to be paid to the effect of these intervention mechanisms on world agricultural trade. While Kreuger and others have done extensive studies of trade policies and general economic development, more work of this type needs to focus on agriculture in developing countries.

Several consortium members discussed ways of organizing research on agricultural trade to obtain extramural support. It was recognized that international trade research was only a small part of the budget of agricultural experiment stations. Furthermore, since there are few agricultural economists working in this area, U.S. researchers have to form cooperative efforts to do research projects if State, Federal, and private funding is to be forthcoming.

Bain gave a brief description of the trade research program at the Australian Bureau of Agricultural Economics (BAE). Their program was heavily commodity-oriented and absorbed about a quarter of their research budget. However, the BAE program did represent a substantial part of the agricultural trade research being conducted in Australia. White discussed the ESS trade research program and noted that the traditional method of direct funding for university researchers was being replaced by cooperative research agreements where ESS and university researchers worked together on research projects. Rossmiller emphasized that the Foreign Agricultural Service has a great need for applied research and, therefore, cooperates closely with ESS in its research program.

APPENDIX--TRADE CONSORTIUM CONTRIBUTORS OR PARTICIPANTS

Bain, Robert Associate Director, Australian Bureau of Agricultural Economics--currently an IED Exchange Program participant	International Economics Division Economics and Statistics Service, USDA GHI Building, 500 12th St., S.W. Washington, D.C. 20250
Christensen, Cheryl Chief, Africa-Middle East Branch	IED/ESS/USDA Room 390-GHI Building
Hanrahan, Charles E. Assistant Director for Research	IED/ESS/USDA Room 348-GHI Building
Kost, William E. Trade Policy Branch	IED/ESS/USDA Room 360-GHI Building
Roningen, Vernon O. Chief, Trade Policy Branch	IED/ESS/USDA Room 360-GHI Building
Subotnik, Abraham Professor, University of Haifa, Israel--on sabbatical with IED	IED/ESS/USDA Room 360-GHI Building
White, T. Kelley Director	IED/ESS/USDA Room 348-GHI Building
Rossmiller, George E. Assistant Administrator for International Trade Policy	Foreign Agricultural Service, USDA Room 5057 South Building Washington, D.C. 20250
Harrison, Kelly General Sales Manager	Office of the General Sales Manager, USDA Room 4071 South Building Washington, D.C. 20250
Abrams, Richard	Federal Reserve Bank of Kansas City Federal Reserve Station Kansas City, Missouri 64198
Bartel, Richard Editor	Challenge Magazine 901 North Broadway White Plains, New York 10603
Carter, Colin Professor	Department of Agricultural Economics University of Manitoba Winnipeg, Manitoba R3T 2N2 Canada

Casse, Marshall	U.S. Department of State 2201 C Street, N.W.
Eddleman, B. R. Professor	Department of Agricultural Economics Mississippi State University P. O. Box 5187 Mississippi State, Mississippi 39762
Hillman, Jimmye Professor	College of Agriculture Department of Agricultural Economics Agriculture Building #36 University of Arizona Tuscon, Arizona 85721
Josling, Timothy Professor	Food Research Institute Stanford University Stanford, California 94305
Krueger, Anne Professor	Department of Economics University of Minnesota St. Paul, Minnesota 55108
Lawrence, Robert Research Associate	The Brookings Institution 1775 Massachusetts Ave., N.W. Washington, D.C. 20036
McCalla, Alex Professor	Department of Agricultural Economics University of California, Davis Davis, California 95616
Pearson, Scott Professor	Food Research Institute Stanford University Stanford, California 94305
Sarris, Alexander Professor	Department of Agricultural and Resource Economics 207 Giannini Hall University of California Berkeley, California 94720
Stern, Robert Professor	Department of Economics University of Michigan Ann Arbor, Michigan 48104
Schmitz, Andrew Professor	Department of Agricultural and Resource Economics 207 Giannini Hall University of California Berkeley, California 94720

Storey, Gary  
Professor

Department of Agricultural Economics  
University of Saskatchewan  
Saskatoon, Saskatchewan S7N 0W0 Canada

Schuh, G. Edward  
Professor

Department of Agricultural and  
Applied Economics  
231 Classroom Office Building  
University of Minnesota  
St. Paul, Minnesota 55108

Soe, Lin

International Trade Policy Division  
Agricultural Canada  
Sir John Carling Building, Room 361  
Ottawa, Ontario, KIA 0C5 Canada

Sorenson, Vernon  
Professor

Department of Agricultural Economics  
Agricultural Hall  
Michigan State University  
East Lansing, Michigan 48824

Thompson, Robert L.  
Professor

Department of Agricultural Economics  
Purdue University  
West Lafayette, Indiana 47907

Van Duyne, Carl L.  
Professor

Department of Economics  
Williams College  
Williamstown, Massachusetts 01267



