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*International Trade Models and Product Studies as a Base for Worldwide Decision-Making in Agriculture**

I

Decision-making in agriculture is of a nature so complex that for lack of knowledge of the impact of alternative policies, one is inclined to adhere to the rule that only measures which have consequences one can control with certainty should be applied. This attitude leads toward rather narrow concepts and limited horizons. Most agricultural policies consequently remain in the framework of a national state. This attitude is also reflected in agricultural economics and particularly in analysing and forecasting international trade.

The objectives of decision-making in agriculture on a worldwide scale are intricate and must be comprehensive because they affect very diverse facets of social and economic policies designed to improve the state of nutrition in all nations. As one country or region differs from others in endowments, resources for agricultural development, and production technology (which is expressed in a concept of comparative advantage), commodity trade should assume a predominant role in decision-making in worldwide agriculture. However, in the past, trade and commercial policies have suffered from the absence of economic tools to guide decision-makers. What intelligence was available rested on rather short run observation of markets and prices. International trade models and product studies were designed to remedy precarious situations and to provide a better foundation for policies, commercial as well as agricultural, for all countries.

The praxis of nineteenth century international commodity markets took it for granted that the instruments developed to facilitate trade functioned perfectly in the short run as well as in the foreseeable future. Whenever and wherever a commodity exchange was allowed to function and interference in the automatic system of adjustment was absent, trading provided for conditions best described as a dynamic equilibrium.

The three main components of the trade instruments on commodity exchanges were:

(a) the gold standard as the basis for international adjustment of the value of national currencies,

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(b) the interaction of spot and futures trading activities, and

(c) the perfection of a worldwide communication system and wire service and newspaper reporting of prices and quantities traded.

Closer scrutiny of commodity exchanges in the past and in the present may lead us to question whether commodity exhanges have ever functioned without "product studies" and without concepts implied in "international trade models", albeit economists and traders in the past did not use the nomenclature nor the methodologies of research and analysis dealt with in this paper. However, there are other notions which merit special mention here. In the past, trading was regarded as an affair of the private sector of the economy. Governments did not or should not have interfered in the autonomous adjustments and mechanisms of international trade. It is, nevertheless, surprising that just about the time that the belief in the perfect market concept prevailed (in the second part of the last century and after the repeal of the Corn Laws in England), the need for economic research in support of commodity trading was felt much more than during the period of restrictive trade practices in the mercantilist era.

In the 1880's, the United States established an office in London to report on commodities, production, prices and trade. Today's United States Department of Agriculture commodity and country reports have their forerunners in these reports. Together with crop reports for the country itself (acreage and expected yields), USDA reports constitute a most important source of intelligence which affects price quotations on commodity markets in Chicago, New York, and other places in the United States. Most of the other countries participating in international trade feel compelled to observe, record, and forecast production and prices for commodities of special interest to them. Communication between commodity exchanges (Chicago, Minneapolis, Kansas City, London, Amsterdam, and Singapore are only a few examples) provides a network of international contacts which remains indispensable for the present and foreseeable future.

One cannot claim that the marketing system described lacks an economic and scientific foundation. Prices of commodities are the main feature in the information package. They allocate production as well as income and thus affect decision-making in agriculture all over the world. This applies to all countries regardless of their internal organisation of production processes (free market economies or centrally planned countries).

What is to be discussed in this paper is why the apparently perfect system of commodity exchanges did not and does not work satisfactorily and why it does not fully reflect the reality of the economic life and behaviour of participants. Even greater attention will be given later to the discussion of models and studies which could support worldwide decision-making in agriculture in the long run. This is particularly necessary because although the system of commodity exchanges (spot and futures trading) provides satisfactory information for short run conditions, it does not provide a data base for long run investment criteria nor for future structural adjustments in either production of agricultural commodities or the infrastructure for marketing food and fibres.

A second, often more important reason for rethinking the problem is the fact that an increasing percentage of international movements of agricultural products and food can be observed outside the traditional marketing system, bypassing commodity markets and exchanges as we know them and thus following criteria we might have neglected in the system of intelligence in support of trade and investment. Criteria which determine P.L. 480-based operations, considerations governing U.N. Food Aid, and a host of bilateral agreements are valid examples of "non-market", not price determined, movements of commodities in international trade.

A third feature in commodity trade not accounted for in the past are events which have fundamentally changed the scene, such as political decisions which have influenced regionalisation (EEC and COMECON; the OECD; the block of petroleum producing countries; or developing nations). In addition, economists have not considered such fundamental changes as the commodity crises of 1973/74 and the impact of considerations related to the protection of the environment. All these are events after which one hears more and more views that the agricultural economist's tool of economic analysis "throws but a partial light on the issues which are the most critical in the planning of world food supplies". At the same time there is convincing evidence that tools or techniques based on neoclassical theory are valid if only one can examine and project in an economic framework which includes factors which have been neglected in the past.[1]

II

International commodity trade studies fundamentally tend toward spatial equilibrium models either of the nature of a comprehensive analysis or partial analyses by commodity or by specific region. The underlying idea of this approach is that the interaction of demand and supply in the long run will be subject to forces which will neither produce surpluses nor leave people starving. This allows for interpretations which are somewhat Malthusian but at the same time express expectations that the food needs of the world population will be satisfactorily met.

Demand (as a rule, a simplified version of population and income growth projection) is mostly an extrapolation of time series. Therefore, two fundamental difficulties arise. The economist has to rely on statistical data gathered in a period of extraordinarily high growth rates. As already indicated, the first comprehensive projections of population growth prepared by the U.N. after World War II should be revised. The probability is great that projections should be scaled down considerably, especially for the more developed countries, the EEC and the COMECON. A second rather doubtful assumption that has crept into the demand analyses is that higher per caput income will be associated with somewhat uniform consumption patterns all over the world.

Even stronger are the reservations expressed in regard to the general pattern of supply and its impact on international trade. Countries and regions are so diverse so different when we assess the relationship between population

and endowment in terms of land, water and other resources that generalized extrapolations of past trends in production probably have proven more misleading than helpful in explaining future production and trade patterns for agricultural commodities. For example, the USSR apparently decided to improve its nutritional standards and to participate in international trade as a buyer of wheat when the vagaries of its climate (something forecasters of agricultural production also failed to observe) caused production to fall 25 percent below trend. Other cases of such unforeseen but vital elements are the global shortage of fertilizer and the price increase of oil and gas. It is certainly possible to increase the number of observations and to account for greater amplitudes of year-to-year changes in factors such as climate, as well as socio-economic and political factors, which affect demand and supply at the international level. Modern computers can easily accommodate the additional data input.

One may claim that such an expansion of the data input may render the results of the analysis less reliable because of the widening of the range of probable solutions. Minima and maxima could easily be outside reasonable probabilities. But one is reminded that the accuracy of a forecast should not be the ultimate analytical problem. The closer to the present, the more accurate forecasts will be. The farther into the future, the more forecasting assumes a special nature. It is becoming a more dynamic indicator of possibilities and choices the decision-maker will welcome in support of his own socio-economic or political preferences. Simulation becomes in this case a more reasonable approach to economic analysis.

In the field of agriculture, it is of greatest importance for a country to account for cycles in production and to incorporate its cyclical production patterns to meet international market requirements. This is so because movements of agricultural commodities across the border of a country deal primarily with food products which represent residual quantities (often called surplus, or excess over domestic needs, or deficinecies, or residual quantities of food a country was not able to produce at all or was not able to produce at reasonable prices).

Macro-economic considerations (for example, a cyclical decline in economic activities and the subsequent relative decline of per caput real income) affect imports and exports more than the other sectors of the national income and expenditure accounts of an economy. Not even custom unions, free trade areas or zero-tariff conditions will prevent a decline in trade due to cyclical movements because of the protection built into the institutionalized arrangements of national economic infrastructure, prevailing consumption habits and political pressures exercized by predominant social groups.

III

The objectives of exporters and importers are to improve trading practices and to stabilize trade among nations and thus assure viability of investment in agriculture and the infrastructure related to the industry (particularly storage, transportation and food manufacturing facilities). Longer term forecasting

serves these purposes and is being carried out by individual firms, by government and international organisations. The scope of economic analyses and forecasting varies so much that it is difficult to clearly designate the work as studies of trade. Classification is as difficult. In general terms, one can distinguish three types which denote the emphasis:[2]

(1) Country reports;
(2) Commodity studies; and
(3) Trade models.

(1) Country reports deal with trade problems and forecasts only in the case where exports (seldom imports) of agricultural commodities are of vital importance to the development of the industry. Some of the most elaborate country reports can be found in publications dealing with geographic or economic regions or an economic association.[3] Most country reports apply methodologies which yield either predictive or normative models for all sectors of the country's economy, not only the agricultural. Thus the farming sector is usually integrated into the network of a country's economic system. In more developed countries, where most of the economic analyses are done, the agricultural sector comprises but a small part of the economy and agricultural trade is less important. All newer studies are based on time series recursive models and/or cross-sectional analyses and apply computer programs.

From a rather simple notion that production in excess of domestic demand will find a market somewhere, country reports tend to underestimate the importance of foreign trade of agricultural products. This does not apply to country reports within the framework of a specific region where trade balances play a great role and where price trends are known or manipulated (as in the case of EEC agricultural trade). In such cases, elasticity coefficients have become a very reliable tool in the methodology for analysing trade.

(2) Commodity studies distinguish themselves because of the greater degree of accuracy, the well defined objectives and the rather longer time series upon which findings rest. What contributes most to the success of commodity studies applied to forecasting is the homogeneity of the statistics used. In many ways these studies serve also as outstanding sources for economic development planning as they contain an already standardized set of basic data and relationships (coefficients and elasticities) connected to demand and production functions.

Techniques of calculations are now often set in what is called "scenario" fashion or in variants. State assumptions and variables and their interactions are set out in considerable detail (in the case of a comprehensive feed grain study by the USDA, eight "cases" are specified). In reviewing commodity studies, one notices that many lack the essential element of economic analysis – the impact of prices on demand and supply. Why has this aspect been omitted in most of the studies? It appears that for agricultural commodities, market forces as measured by the impact of prices on commodity movements could not be quantified with a high degree of reliability for long periods after World War II because a major part of the food moving from country to

country was not being traded through commercial transaction, thus putting it outside the effective price-making process. Other contributors to this difficulty were market distortions due to quantitative restrictions, quota systems and other government induced trade constraints and policies. In spite of these handicaps, computer models for trade of specific commodities were worked out to simultaneously determine levels of trade flows. There is sufficient indication that models with prices included and elasticities calculated could reflect real life conditions better than models without price variables. The techniques allow also for regionalisation according to specific criteria set by the researcher. Thus, one stage may include market economies; a second, centrally planned countries; a third, the less developed world; or the criteria can be geographic.

In commodity studies in general, the overriding advantages are the relatively high degree of homogeneity of the product and the relatively low substitutability which contribute to the transparency of relationships and high accuracy in forecasting.

(3) Comprehensive trade models appear to be the ultimate form of scientific work in support of worldwide decision-making in agriculture in spite of the rather hesitant acceptance of the first large-scale attempts at providing countries participating in commodity trade with such models.

IV

(1) Of all trade models, the ones which appear to be best known are the FAO Indicative World Plan trade component, the OECD longer term forecasting method and models prepared by the U.S. Department of Agriculture.[4]

The objective of FAO's Indicative World Plan for Agricultural Development was "to define the scale and nature and to assess long term prospects for world trade in major agricultural commodities".[5] Major variables affecting demand and supply were defined and parameters of prospective changes were sufficiently well quantified to provide for projections upon which individual member countries of the organisation could plan their own agricultural development strategy. In the "Outlook for Trade", nevertheless, the work proved hardly more than a general indication of major trends to 1975 and 1985. This was the result of the limited scope of the methodology employed.

The commodity coverage included all basic farm products. Major food items appeared in aggregated form (e.g., meat) as well as disaggregated, and main components were listed separately (e.g., beef and veal, mutton and lamb, pork, poultry and "other"). Cereals were subdivided into wheat, rice and "coarse grain". Sometimes the functional relationship between commodities were recognized and accounted for (as was the case with butter which was aggregated with "fats and oils" instead listing it as an animal product).

The country coverage was comprehensive (99 countries which accounted for 98 percent of world population), though difficulties arose from the procedure of grouping them in 24 sub-regions and only 3 zones (developed countries, centrally planned countries, and developing countries). The last

grouping proved the least satisfactory because it did little for the better understanding of trade relations and often blurred the picture one could get from the analyses of sub-regions or individual countries.

Basic assumptions underlying the demand projections (population growth and change in GDP) follow the traditional line of U.N. studies. In addition, the FAO prepared "standardized food balance sheets" from which data were used to prepare (or correct) the rather simple income elasticities which measured the effect of per caput change of GDP on consumption of individual food items. In retrospect, one can observe that this procedure proved to be too theoretical, although it carried the seed for further work and improvement.

Production projections were based on past trends. This was probably the least satisfactory part of the study because it neglected the complexity of interrelationships of such factors as climate and to a great extent it also omitted the human factor, structural adjustment and government functions which affect the rate of adjustment of production technologies in agriculture.

Demand functions applied[6] provided for coefficients of income elasticities which were adequate where autonomous market and price-oriented economic conditions prevailed. Wherever this was not the case, the results were less satisfactory (in the case of government induced consumption, prices fixed by governments or non-price distribution of food). No adequate data were available for the calculation of price elasticities. For this reason, the inclusion of price elasticities in the model was postponed to a later date. The IWP projections were made uniformly at 1961–1963 prices.

If projected demand and production are brought together – calculated for every commodity in each country and projected to 1975 and 1985 – the only important information one gets is the extent to which a country (or a region) is or will be self-sufficient or the extent to which production will be in excess of domestic requirement. Thus the model provides "commodity balances" for respective years in the future. The balancing quantities (negative denotes import requirements, positive indicates export availabilities) "are not a projection of net imports or exports; they are only intended to provide an element for assessing trade prospects in 1975 and for analyzing possible changes in prices and in commodity policies".[7]

FAO's model clearly reveals that the magnitudes of residuals vary very much from year to year and from country to country. This accounts for the instability of agricultural commodity trade. planning and programming trade flows thus pose great difficulties. One recognizes also that there are limitations in the accumulation of "surpluses" as well as for "shortages".

In retrospect, and in conclusion of our observations in regard to the important work of the FAO, one should mention that the IWP projections were proven invalid in the early seventies, even before the revolutionary price changes which coincided with the cartelization of oil supply. The methodology of the study must have missed some most relevant correlations and disregarded some of the truly important factors of global production functions (for example, the consideration of cyclical changes of factors related to the climate of certain regions in the USSR which affect production functions for cereals).

Simplification of economic models through the use of parameters too complex in nature proved to be of little value. In the time series analysis, the change in per caput consumption calculated on the basis of a sole index proved less than satisfactory. Is the change due to per caput increase in disposable income, or is the greater contributor the change in price, the availability or change in the price of substitute goods, or a result of other factors?

Another problem in trade projections of this kind is the notion that consumption patterns depend on the level of per caput disposable income, and that this pattern is universally applicable. From what we know one cannot challenge the general rule, but the standard deviation might be very pronounced. Differences in consumption patterns between countries with market-oriented economies were very great. They were even more pronounced in centrally planned economies. Therefore, viable models which can usefully serve government and the public as a tool in decision-making include parameters not accounted for in the early studies (such as the FAO's IWP). More realistic regionalisation is also a mandatory requirement.

A most damaging attitude was shown in the early work on trade models. Economists were thinking in terms of the classical school where all conditions were perfect and the criteria of comparative advantage applied universally. The world is certainly not homogeneous as far as agricultural trade is concerned. Instead, there is a multiplicity of structures, of conduct and behaviour. Among countries there are associations of varying degrees and forms. Membership in associations change and depend on commodities, on regional arrangements based on geographic criteria and on internal as well as external policies. Such considerations are often more important than the grouping applied by FAO, particularly the one which segregated developed from developing countries.

A methodology which can be universally applied is an ideal the economist cherishes very much. Nevertheless, a valid question is: To what extent could modifications account for factors less easily quantified, as, for example, attitudes toward nutrition or toward trade deficits? In other words: Could the economist introduce parameters of a socio-economic nature or features attributed to the realm of "political economy"? How does one account for trade restrictions due to a variety of factors such as the level of unemployment, the rate of adjustment from predominantly rural employment to manufacturing and service industries, the balance of payment problem, the minimum rate of self-sufficiency due to political or defense considerations, etc? The inclusion of such factors in a model would contribute to a more meaningful IWP and to better forecasts of trade. In such a model the concept that trade deals only with residual quantities could be dropped and foreign trade could become an integral part of real balances on a worldwide scale. Also, a new "Perspective Study of World Agricultural Development" could depart from the central idea of determining degrees of self-sufficiency and would benefit from a realistic appraisal of what international trade could do for the world's population.

(2) Work on the IWP was a first attempt at a comprehensive projection of

agricultural trade possibilities. Other international organisations interested in trade (GATT/UNCTAD, OECD, International Wheat Council and other similar commodity-oriented institutions) also contributed to the development of the methodology of long term forecasting.

The OECD Agricultural Projections "are a complement to FAO's Indicative World Plan, which is primarily concerned with less developed countries".[8] Because member countries of the OECD have more detailed and longer run statistical data, this study was much more precise. Nevertheless, it did not pretend to forecast production, consumption and trade of agricultural products and chose to call itself a "projection exercise".

What distinguished this study was that specific assumptions underlying the projections were stated in considerable detail and the data system was used for reasonable extrapolations. In spite of this caution built into the methodology, a clear statement was made that "in several aspects the results are clearly unrealistic".[9]

It was recognized that where supply and demand were projected independently, residual items were large. Based on studies of individual countries, residuals were either net export or net import requirements. They were not projected trade!

Of particular value to researchers is a comparison with the FAO IWP findings. A review shows the weaknesses of the models:

(a) Demographic studies were out of date.

(b) The concept of "normal production" is a construct too far removed from reality in agricultural production because cyclical movements are dominant.

(c) The "composite elasticity" and the elasticities and correlation coefficients derived[10] proved to be applicable over narrow ranges only and do not accommodate conditions observed on commodity markets.

(d) The "net trade" concept tends to mask the acutal commodity movement (as each country is likely an exporter as well as an importer of the same commodity).

(e) The estimates of "unit value" where imports were recorded c.i.f. and exports f.o.b. poses questions of reconciliation for which there is apparently no ready answer available.

Compared with the IWP, the OECD study shows considerable improvement but a comparison is not fair because the OECD had a much more complete data system on its side. In the field of studies of methodologies, the OECD may likely proceed toward more dynamic recursive trade models.[11]

(3) In support of its agricultural and commodity trade policies, in the early sixties the EEC conducted rather extensive economic analyses and projections of demand and production of agricultural commodities, first for 1966 and then for the target year 1977. The methodology applied did not differ in principle from the one explained previously. Growth of population and per caput consumption were the basis for projecting domestic demand. Production increases were expected because of improved agricultural technologies

and were calculated by extrapolating past trends. Greater domestic supply affected the general increase in the degree of self-sufficiency which narrowed the gap between requirement and availability from domestic sources, a gap to be filled by imports from "third" countries.

It should be mentioned that the EEC presented for discussion two fundamental methodological studies before projections of demand and production were made.[12] Instead of looking for new avenues in projection, these studies emphasized the applicability of models to the conditions in the Community and its member countries. In these studies one notices emphasis on equilibrium models, on spatial equilibrium in particular. Guided by the basic philosophy of a market-oriented economic system, the role of prices and price function was emphasized. The work reflects also the dual foundation – market orientation as well as policies toward restructuring of the agricultural sectors of the member countries – of the CAP. International trade did not receive special consideration as greater attention was directed to the discussion of intra-Community trade.

In the EEC preference has been given to the application of spatial models to international trade with the objective of finding equilibrium solutions. Following Takayama and Judge,[13] a model based on linear demand and supply functions and including prices and other factors could logically lead to solutions as long as price competition in international trade is permitted. If conditions as set out are not met, this method could at least serve as a starting point and provide a model against which the impact of factors not easily quantified can be assessed. A next step would be to include such criteria as quantitative restrictions applied in trade, minimum level of self-sufficiency, "voluntary quota" agreements and other trade restricting practices.[14]

An inventory of research conducted in the member countries of the EEC in 1970 shows how little was done by agricultural economists to project international commodity trade. Reservations expressed by leading scholars as to the applicability of known methodologies probably led to a reluctance on the part of the administrators of research activities to proceed with further work. As a consequence, apparently no research input beyond the short term analyses and year-to-year projections indicated in the annual reports and budgets of the CAP and the Guarantee Fund (FEOGA) went into decision-making regarding agricultural trade.

The rather pessimistic attitude toward what the methodology could accomplish is reflected in a set of studies commissioned by the EEC's Directorate General for Agriculture. The studies were published over a number of years under the title "Projektionen ueber Erzeugung und Verbrauch landwirtschaftlicher Erzeugnisse – 1977" (individually for each member country and a summary volume for the six original EEC members).[15] Notes on the methodology used indicate that agricultural trade was treated solely as an actual or potential contributor to the balance of foreign trade. Thus trade was treated only as a residual and no indication of the direction of trade with "third" countries was included.

In general, the studies for 1977 indicate a much higher degree of self-sufficiency in all major commodities (for all cereals excluding rice, 99·3 percent for the six original EEC members and 91·4 percent for The EEC-nine;

corn, 80·7 percent for EEC-six and 63·9 percent for the EEC-nine; all meat, 93·9 percent for the EEC-six and 97·7 percent for the EEC-nine). This means that traditional suppliers to this market may have to find new outlets for their "surplus" production. Some of the expected increases in total availability appear disturbing to trade. For example, in the case of wheat in the target year 1977, the EEC-six might produce 14·1 percent more than their domestic requirement. However, at the same time, this "success" might ease the situation in the world supply and enable wheat deficient countries among the less developed nations to obtain this basic food with greater facility.

These studies were more comprehensive in coverage and interpretation when the degree of self-sufficiency was already high or when projections indicated that the EEC would approach a high level of self-sufficiency. Whenever supply depended to a great degree on imports (as in the case of citrus fruit or vegetable oil), the coverage was limited.

The EEC and individual member countries (particularly France, the Netherlands and the United Kingdom) were more successful in researching and projecting international trade in a series of so-called "commodity studies".[16]

An attempt by Dr. Rainer Schmidt to prognosticate international trade of milk products, a study commissioned by the EEC, is an example of a product study and will be reviewed here briefly.[17] The study listed twenty-eight exogenous variables for the model applied to determine import requirements for milk products to the United Kingdom. Among major items one recognizes some familiar features of expected change – a slight increase in population, an increase in per caput disposable income, a relative decline in the price of milk products against a relative increase in the price of beef, and an increase in the price of cheese and other milk products. Also included were features of adjustment to accommodate the trend in observed technological improvements (for example, higher yields of hay per acre). Unfortunately, no attempt was made to go beyond the calculation of import requirements. The study proved useful in assessing the impact of the United Kingdom's accession to the Common Market.

Income and price elasticities for milk and milk products, as well as the very important cross-elasticities, show extreme variations. Aggregations and regionalisation of demand are therefore nearly impossible. To eliminate errors from calculations of supply due to the fact that the milk cow is in most countries simultaneously the major source of beef is another facet of the complex problem. The animal is only a converter of domestically produced or imported feed. This accounts for further difficulty in providing information regarding the extent to which the milk industry contributes to foreign trade. Simple supply functions proved an insufficient base for forecasting trade in Schmidt's study.

On the positive side and in favour of his study, one should mention that it was demonstrated that different data systems from different countries required adjustments of the methodologies as was shown in the case of the report on the milk industry in the German Democratic Republic, the Philippines and Venezuela.

(4) In support of the work of the Club of Rome, discussion of the "Multi-level Computer Model of World Development System" is of interest to the study of agricultural trade.[18] This is a highly aggregative model which used the data base from the FAO studies, had regionalisation on similar principles and included FAO's Food Balance Sheet concept. A substantial addition to the FAO models was the inclusion of prices (per unit cost of land, livestock and other productive factors related to crops, as well as monetary values related to various categories of agricultural products). With such additions a comprehensive concept, the "agro-ecosystem", was established. Based on "sub-models" (land use and food production) and population, regional "surpluses" and "deficiencies" in food were predicted. Unfortunately, no true balances of trade were calculated.

Among "Scenarios" elaborated by the Club of Rome, as exemplified by a special note on South East Asia, completely unrealistic outcomes result. No reasonable trade could accommodate the discrepancies and food aid was considered at a level the magnitude of which is incomprehensible. In spite of such inconsistencies, the methodology is fascinating and promises to open doors for more detailed and more realistic studies. The basic concept – "agro-ecosystem" (to which economics and ecology contribute) – provides for parameters and insight into functional relationships often neglected in earlier studies.

V

FAO, OECD, and GATT/UNCTAD are international organisations and emphasize global economic and social aspects and problems. For various reasons these organisations have not appeared to place sufficient emphasis on balancing supply and demand of agricultural commodities on a worldwide scale. This is probably so because in the FAO priority was accorded to improving nutrition in less developed countries, increasing the degree of self-sufficiency and, consequently, improving agricultural techniques.

UNCTAD emphasized development to which agriculture can contribute, but this was only one of many avenues toward its goals. In GATT, the problem of agriculture did not play a major role as the agricultural sector was specifically designated as being outside its competence. In the work of the OECD one detects probably the most advanced data system and analyses in support of decision-making in agriculture, although its mandate is "regional" and thus not wide enough to affect decision-making on a worldwide scale.

The EEC was preoccupied with internal problems of coordination of agricultural development toward which intra-Community trade stabilization provided one, if not the most important, path. Intra-Community trade stabilization became one of the cornerstones of the Community. Imports from third countries were deliberately reduced to supplying residual quantities of agricultural products required solely in case domestic production was not sufficient to satisfy the demand. EEC exports to "third" countries often required subsidies and government supported marketing activities. Variable levies (in the case of imports) and export subsidization resulted in a situation where the participation of the EEC in commodity trade could not have been

accommodated in methodologies of economic research which had as their major component prices of products and were generally thought of as complying with the classical principles of comparative advantage.[19]

The COMECON, the major economic association of centrally planned economies, with the USSR as its primary contributor to the trade of agricultural commodities, is the most difficult "region" to accommodate and to account for in a model of international trade or product study. The reason for this is not only because all prices in these countries are administered. Statistics upon which to calculate demand as well as production functions are not available. In spite of the difficulties arising from the inclusion of data from these economies, trade models and product studies which do not account for the components related to the COMECON and China will be highly deficient.

VI

The discussion related to economic regions as exemplified by the EEC and COMECON requires further elaboration because the observed trend toward more regionalized agricultural trade was in no way interrupted by the events of 1973/74. Established regional trade patterns proved viable trade arrangements (as was the EEC and its associates or the COMECON). Therefore trade patterns determined by geographic proximity and political affiliation must be recognized in trade models and product studies because a better knowledge of such patterns could significantly improve the forecasting of trade.

Some doubt must be expressed as to the applicability of the standard nomenclature which reflects the division of countries into "market economies" and "centrally planned economies". Also, identification according to institutional arrangements is not applicable. Not all market economies are members of the EEC or OECD, not even market economies in close geographical proximity. On the other hand, many countries distant from the EEC (geographic, political) benefit from association with EEC as it renders trade more of the kind denoted as "intraregional" or "intrazonal". Associates of the EEC enjoy privileged or free access to markets, long term trade arrangements and an increased flow of investment funds for the expansion of agricultural production. Links between participating countries are thus strengthened and trade flow is more stabilized in associations of this kind. Similarly, the COMECON is such a region or zone. Not all centrally planned economies are members. Its expansion (as in the case of Cuba) results first in a reorientation but afterwards in a stabilization of trade patterns. The United States has formed the core of such a region as well.

These observations should direct the attention of agricultural economists towards distinguishing between forecasting in the frame of a region or zone where the probability is high that predictions will be valid and forecasting agricultural trade on a worldwide basis. What is required is differentiation in methodologies and adjustments in accommodating the differences in data systems and in economic and market behaviour. This departure from looking at agricultural trade solely from the "global" aspect could provide for more realistic forecasting. Multilevel decision-making in agriculture is prevailing

today. Free trade does not apply. A methodology of economic analysis, trade models and product studies will have to cope with the reality of the complex twentieth century.

There is justifiable hope for a change to better and easier forecasting because one can observe a trend toward greater homogeneity of economic conditions in individual regions, particularly where the regional set-up at the international level is institutionalized (EEC or COMECON). The gradual abolition of trade restrictive practices allows comparative advantage to affect allocation of production according to economic criteria. Simultaneously, some of the more damaging features on international commodity trade, particularly the high degree of uncertainty, tend to diminish. This is so because in the sixties and the beginning of the seventies, intraregional agricultural trade grew at an annual rate which was twice that of interregional or world trade. The sudden increase in interregional trade in 1973/74 may not fundamentally alter the relationship between intraregional and interregional or world trade. The purchase of huge quantities of cereals by the USSR and the general upheaval in trade in the recent past has probably strengthened the trend toward greater reliance on orderly and foreseeable relationships in commodity markets. This should also give direction to research and forecasting and to the methodologies to be applied.

Established research institutions and academic economists have already achieved a high degree of sophistication in forecasting trade, but the applicability and usefulness of models and commodity studies to government and industry require substantial resources and a degree of continuity only few countries can afford. For this reason international organisations will have to play an even more important role than in the past.

NOTES

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[4]The work of the staff of UNCTAD will not be considered in this context because agricultural commodities constitute only a small part of a much more comprehensive work dealing with primary products.

[5]Food and Agriculture Organisation, *Agricultural Commodities – Projections for 1975 and 1985*, Vol. I (Rome, 1967), p. iii.

[6]Functions were: (a) logarathmic, $\log_e y = a + b \log_e x$; (b) semi-logarithmic,

$y = a + b \log_e x$; (c) log-inverse, $\log_e y = a - (b/x)$; (d) log–log-inverse, $\log_e y = a - (b/x) - c \log_e x$.

[7]Food and Agriculture Organisation, *Agricultural Commodities – Projections for 1975 and 1985*, Vol. II (Rome, 1967), p. xxxi.

[8]OECD, *Agricultural Projections for 1975 and 1985: Europe, North America, Japan, Oceania. Production and Consumption of Major Foodstuffs* (Paris, 1968).

[9]OECD, *op. cit.*, p. 9.

[10]OECD, *op. cit.*, p. 73. Rules: (a) positive elasticity coefficient from double log functions; (b) coefficient higher than 1·0 from log-inverse functions; (c) negative coefficient less than − 1·0 from semi-log functions.

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