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Semi-annual Report on Participating Agency Agreement
between
The Agency for International Development
and
The Economic Research Service
for Analysis of
Demand Prospects for Agricultural Exports of
Less Developed Countries

July 1 - Dec 31, 1968

By

Foreign Development and Trade Division
Foreign Regional Analysis Division
Economic Research Service
March 1969

A.I.D.
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I. Introduction

This report describes the work that has been done during the period -- July 1, to December 31, 1968 of the Project Agreement between the Agency for International Development and the Economic Research Service for the analysis of demand prospects for exports of less developed countries.

The Project Agreement divides the total research effort into three phases:

1. Phase A -- A historical analysis of agricultural exports of less developed countries from 1951-65.

2. Phase B -- A detailed analysis of demand in importing countries for selected agricultural commodities exported by the less developed countries.

3. Phase C -- An analysis of the policy implications of the estimates of world demand prospects for national agricultural development plans and programs in the less developed countries.

Research under Phase A has been completed and reported in the last Progress Report. During the current reporting period, work has been concentrated on Phase B and is reported on in detail in Section II of this report.

Organization and Staff

An ERS Technical Advisory Committee is responsible for project formulation, execution, and overall direction of research. This Committee includes Dr. Arthur B. Mackie, Foreign Development and Trade Division; Anthony S. Rojko, Foreign Regional Analysis Division; and, as Chairman, Dr. Louis F. Herrmann, Staff Assistant to the Administrator, ERS.

The two Division members of this Committee are responsible for developing methodological aspects and direction of research on the project.

The Foreign Regional Analysis Division and the Foreign Development and Trade Division have primary responsibilities for research under the Project Agreement.

The Foreign Development and Trade Division has primary responsibility for the historical analysis of trade flows of selected agricultural commodities and the demand analyses for coffee, cocoa, tea, feed grains, and fruits and vegetables. The Foreign Regional Analysis Division has primary responsibility for data on production of all selected commodities, data and projections to 1980 on population and indication of income, and the demand analysis for wheat, rice and cotton. The analyses of demand for oilseeds and products will be done jointly by both Divisions. The historical analyses of production and consumption are being incorporated with the demand analyses of each commodity. The analysis of the policy implications of Demand prospects on trade and export earnings will be done jointly by both Divisions.

II. Research Progress During the Period -- July 1 to December 31, 1968

Research Plans: The plan of work as submitted in support of the Research Agreement describes the major topics of area of work to be covered under Phase B and Phase C of the project. The Agreement and Work Plan indicate that primary emphasis would be given to completion of Phase A -- historical analysis of consumption, production and world trade patterns of selected agricultural commodities for the period 1951-65 -- and to Phase B -- demand analyses during the first 2 years.

Trade Analysis: The research under Phase A of this project, analyses of changes in trade flows of selected agricultural commodities and development of population and overall economic factors for the period 1951-65, has been completed. World trade in selected agricultural commodities 1951-65 have been published in five separate volumes as reported in the second annual Progress Report, September 1968.

These data have already been used by the State Department in preparing a United States position paper for the recent UNCTAD Conference. Requests for copies of these trade data have been made by a special UNCTAD committee set up to study the trade and development problems of the LDC's by the Food and Agricultural Organization of the United Nations, and by the Foreign Agricultural Service for each of its embassy representatives.

Initially, it was planned to develop the world trade data as working materials for this project and limited distribution and use by ERS and AID. However, the response to the need for and use of these data indicated that they should be published for wider distribution. This route required more time than was originally allocated to Phase A of the project, thus delaying the initiation of Phase B as originally scheduled. In view of the many requests that have been received from universities, private research corporations, national and international government agencies as well as various AID missions, the decision to publish these data has been fully justified.

A compendium on population, income, and expenditure data has been prepared and distributed for limited use. In addition to the historical data series, this compendium includes projections of these data to 1980 and a description of methodology. Besides being vital to the individual

commodity analysis under Phase B of this study, this compendium is useful to AID missions, research workers and policy makers concerned with program development and evaluation.

Demand Analysis: A world trade and demand model for making projections to 1980 for the demand for exports of selected agricultural commodities of the LDC's has been developed and is currently being tested on the computer. The initial model is concerned with grains, and will be modified for use where feasible in other commodity analyses. The first model covers three commodities: wheat, coarse grains, and rice. It is designed to accomplish several objectives: (1) Determine the equilibrium quantities and prices in some future period by regions for some level of exogenous (given) factors such as population, income, etc.; (2) Determine the trade flows between regions consistent with some objective function such as to minimize transfer costs; (3) Determine export earnings under alternative supply and demand situations in 1980; and (4) Have sufficient flexibility to incorporate constraints to reflect institutional limitations.

Of the commodities covered, work on demand analysis has progressed furthest on wheat, rice, coarse grains, and cotton. Estimates of price and income elasticities and other factors are being developed for use in the grain computer model. Work on institutional barriers affecting price and trade of these commodities is well underway.

Demand analyses on coffee, cocoa, and tea is underway. Work on fruit and oilseeds was initiated during this reporting period.

In support of the commodity demand analysis, two studies of an important major market -- Japan -- for the exports of LDC's were made. One was a detailed econometric study of the food grain--feedgrain--livestock economy and the other dealt with the impact of Japanese national development policies on food imports. The results of these studies were reported in the previous progress report. Considerable time was spent in finalizing these reports for final review. The growth of Japan's import demand for grains and other agricultural products is of special interest to less-developed countries that have export potentials.

III. Research Plans for Remainder of Project

Research Objectives: The major effort will be towards completion of the commodity demand analysis under Phase B and analysis of policy implications of commodity demand projections on export earnings as described under Phase C in the Agreement.

Under Phase B, the world trade and demand computer model developed for grains will be used for making projections to 1980 of import demand in the major markets and of export potential of the grain producing countries. These grain projections will also show the trade flows of wheat, rice, and coarse grains between the major exporting and importing regions of the world. Export potentials of the LDC's will be determined under several alternatives with regard to economic growth conditions, and production and trade policies of the LDC's. Probable prices and export earnings under assumed 1980 supply, demand and trade policy conditions will be projected. The extent to which excessive supplies in relation to demand may depress prices and reduce export earnings will be evaluated.

This program and analytical procedure will be adopted or modified to project to 1980 the export earnings of cotton, coffee, cocoa, tea, selected fruits and vegetables, and oilseeds.

It is anticipated that separate reports will be published for the various commodities indicating the demand prospects and export earnings in 1980 under different assumed conditions.

Work on Phase C of the project, policy implications of the estimated world demand prospects, will be started during the calendar year 1969. This analysis will include a summary of major findings from individual commodity studies and the implications of these findings upon import policies and demand of importing countries as well as programs and policies of the LDC's to expand agricultural exports. In addition, the effects of different policies and programs of exporting and importing countries upon export earnings of the LDC's will be evaluated. A copy of the working outline for a report under Phase C of the project is attached. This outline does not include the final section on policy implications.

MAJOR CONTRIBUTIONS OF THE RESEARCH PROJECT

"ANALYSIS OF DEMAND PROSPECTS FOR AGRICULTURAL EXPORTS OF LESS DEVELOPED COUNTRIES" (Through September 1968)

This report briefly describes important contributions and lists reports based on this research project, "Analysis of Demand Prospects for Agricultural Exports of Less Developed Countries," PASA RA (AJ) 2-66, conducted by the Economic Research Service, USDA, in cooperation with the Agency for International Development.

Important Contributions

- (1) Information on world agricultural trade flows among the 19 major importing and exporting regions of the world was used by the State Department in preparing a position paper for the UNCTAD meetings held in India during February and March 1968.
- (2) A historical series on population, income and agricultural production data for major producing and importing regions of the world has been prepared. These data are currently being used as basic source materials for ERS research in foreign agricultural economics.

Reports Based on the Project

- (1) A. Nicholas Filippello, "An Econometric Model Designed to Forecast Japanese Feed Grain Imports", a paper presented to the Frederick V. Waugh Seminar, U.S. Department of Agriculture, June 1, 1967.
- (2) Arthur B. Mackie, "World Food Production Potentials", a paper presented at a conference on the North America Common Market, which was sponsored by the Center for Agricultural and Economic Development, Iowa State University, Ames, Iowa, October 2-4, 1967.
- (3) Arthur B. Mackie, World Trade in Selected Agricultural Commodities 1951-65, Volume I--Beverage Crops: Coffee, Cocoa, and Tea, FAER No. 42, ERS, USDA, June 1968.
- (4) Arthur B. Mackie, A. Nicholas Filippello, John E. Hutchison, and James F. Keefer, World Trade in Selected Agricultural Commodities 1951-65, Volume II.--Food and Feed Grains: Wheat, Rice, Maize, Barley, and Other Cereals, FAER No. 45, ERS, USDA, June 1968.
- (5) Arthur B. Mackie, World Trade in Selected Agricultural Commodities 1951-65, Volume III--Textile Fibers: Cotton, Jute and Other Vegetable Fibers, FAER No. 43, ERS, USDA, June 1968.

- (6) Arthur B. Mackie and J. Lawrence Blum, World Trade in Selected Agricultural Commodities, 1951-65, Volume IV--Sugar, Fruits, and Vegetables, FAER No. 44, ERS, USDA, June 1968.
- (7) Arthur B. Mackie, Jon Falck, and Thomas E. Full, World Trade in Selected Agricultural Commodities, 1951-65, Volume V--Oilseeds, Oil Nuts, and Animal and Vegetable Oils, FAER No. 47, August 1968.
- (8) Arthur B. Mackie, "The Network of Trade", The Farm Index, July 1968.
- (9) Arthur B. Mackie, "The Import of Exports", The Farm Index, August 1968.
- (10) Anthony S. Rojko, A. Nicholas Filippello, and Francis S. Urban, "A World Grain Trade and Equilibrium Model", unpublished manuscript, June 1968.
- (11) A. Nicholas Filippello, A Dynamic Econometric Investigation of the Japanese Livestock Economy, unpublished manuscript, June 1968.
- (12) A. Nicholas Filippello, The Japanese Grain-Livestock Economy - An Econometric Projection to 1980 with Emphasis on Grain Imports, unpublished manuscript, March 1969.
- (13) Joseph R. Barse, Japan's Food Demand and Grain Import Prospects, 1980's, unpublished manuscript, February 1969.
- (14) Lyle E. Moe, "World Population and Income by Countries, 1950-65 and Projections to 1980", unpublished manuscript, September 1968.
- (15) Quentin M. West, "Major Forces Affecting the World Food Situation", a paper presented at the National Agricultural Policy Conference, Tahlequah, Oklahoma, September 11, 1968.
- (16) Quentin M. West, "The Future for U.S. Grain Exports", a paper presented at the Transportation-Distribution Symposium of the Grain and Feed Dealers National Association, New Orleans, Louisiana, January 8, 1969.
- (17) Quentin M. West, "The World Food Situation in Perspective", a paper presented at the National Outlook Conference, Washington, D.C., February 17, 1969.

Demand Prospects for Export Earnings of Selected Agricultural
Products of Less Developed Countries

I. Introduction.

- A. The problem.
- B. Purpose of study.
- C. Scope of study.

II. Major markets for agricultural products of less developed countries.

A. Major importers and exporters of total agricultural products.

- 1. Relative importance of agricultural trade to total trade.
 - a. Countries with high dependency on trade-imports or exports.
- 2. Major flows of total agricultural trade (value) for a recent period. (1964 and 1965)
 - a. Within developed regions; between developed and less-developed regions; and within LDC's
 - b. Between LDC's and Communist Bloc countries.
- 3. Relative importance of supplementary and complementary commodities, by importing countries or groups of countries in similar stage of economic growth.
- 4. Relative importance of selected agricultural commodities studied in international trade.
 - a. By major exporters and importers.
 - b. Contribution to export earnings of major countries or regions in less developed world.

B. Major importers for selected agricultural products.

- 1. Relative importance of major importers in world trade of each commodity.
 - a. Importance of developed countries.
- 2. Source of supplies for each major importer.
 - a. Quantity trade flows for each commodity for a recent period.

- C. Major exporters of selected agricultural products.
 - 1. Contributions to world exports of major regions.
 - a. Importance of less developed countries.
 - 2. Share in market in major importing countries by commodities.
 - a. Competition between developed and less developed regions for markets.
- D. Changes in historical trade patterns (quantity flows),
 - 1. As affected by changes in production patterns.
 - a. Where have been the big increases and decreases by regions and by commodities?
 - b. What were the factors affecting production?
 - (1) Highlight factors that led to major changes in world production patterns.
 - (a) As a result of technology,
 - (b) As a result of policy and institutional changes, for example, goal of self-sufficiency.
 - 2. As affected by changes in consumption patterns.
 - a. Identify major shifts in consumption patterns.
 - b. Highlight factors that led to major changes in consumption patterns.
 - (1) Population explosion in developing world.
 - (2) Cite important technological breakthroughs that altered patterns of consumption.
 - (a) Role of synthetics.
 - (b) Instant coffee.
 - (3) Changes associated with stages in economic development.
 - (a) Upgrading of diets subject to traditional tastes.

3. As affected by terms of trade .

a. Long-term trends in prices.

(1) Exports of L.D.C.'s relative to imports of L.D.C.'s.

b. Institutional and policy factors.

(1) Commodity agreements, trade preferences, trading blocks, and import restrictions.

E. Effect of changes in trade patterns on export earnings of less-developed countries.

1. Description of major changes in export earnings using time series of export earnings by selected commodities of LDC's.

2. Changes in market shares.

3. Using information in D above, summarize the total effect of long-term changes in production, consumption and terms of trade on export earnings of LDC's.

III. The economic framework--a formal view.

A. Objectives.

1. Determine quantities and prices for selected commodities in some future period by regions for some level of exogenous (given) factors such as population, income, etc.

2. Determine trade flows between regions consistent with some objective functions such as to minimize some level of transfer costs.

3. Have sufficient flexibility to incorporate constraints to reflect institutional limitations.

4. Determine export earnings of LDC's.

B. The ingredients of the model.

1. Variables to be determined jointly.

a. Production and consumption by regions.

b. Prices by regions and sectors where possible.

c. Trade flows.

d. Export earnings of LDC's.

2. Variables determined independently.
 - a. Demand shifters such as population, income, etc.
 - b. Supply shifters such as fertilizer costs, etc.
 - c. Matrix of transfer costs.
 - d. Policy variables and considerations.

C. Major relationships,

1. Set of demand relations.
2. Set of supply relations.
3. Sets of price relationships for connecting different sectors within each region.
4. Set of price relations to connect regions.
5. Matrix of transfer costs linking regions.

D. Commodity aspects of the models.

IV. Demand Analysis.

- A. Measurement of major components of domestic and import demands for commodity in selected importing countries or regions.
 1. Measuring consumer response to income and estimating income elasticities from cross-section and time series data.
 2. Measuring consumer response to price-demand price elasticities.
 3. Measuring substitution and competition.
 - a. Traditional patterns
 - b. Changing patterns of consumption related to stages of economic development and cultural patterns.
 4. Differentiation of demand, where possible, between domestically produced and imported products.
 5. Determining ways for estimating demand coefficients and particularly demand interrelationships among products where data and statistical analyses prove infeasible.

- B. Identification and measurement of dynamic aspects of demand
1. Classification of selected countries or regions by relating demand structure to stage of economic growth.
 - a. What is the population growth rate?
 - b. What is the rate of growth of Income and GDP?
 2. What determines stage of economic growth and what are the implications as to demand structure?
 - a. What are the economic factors?
 - b. What are the political factors?
- C. What are the long term trends in demand?
1. Can a trend in per capita demand be identified apart from income effect?
 - a. Growth in demand for rice in the United States vs. decline in demand in Japan.
 - b. Are there any special factors that make the growth or decline in demand in this country or region different from other countries or regions.
- D. Are there any special constraints to demand growth in developing countries .
1. Export earnings and balance of payments constraint.
 - a. What effect does this have on level of consumption and how is the impact generated?
 2. Any other constraints? Government programs?
 3. Do we differentiate between commercial demand and total demand?
 4. Do P.L. 480 shipments have any effect on demand in aid-reipient countries?

- V. Documentation of economic factors affecting supply.
 - A. Effect of price on production and quantities supplied in the market.
 - 1. Developed world.
 - a. Importing countries.
 - b. Exporting countries.
 - 2. Developing world.
 - a. Importing countries.
 - b. Exporting countries.
 - B. Effect of changes in technology on production (Green Revolution).
 - 1. Developed world.
 - a. Importing countries.
 - b. Exporting countries.
 - 2. Developing world.
 - a. Importing countries.
 - b. Exporting countries.
 - C. Competitions between products and its effect on major shifts in resource use.
 - 1. Crops for domestic use vs. crops for export.
- VI. Identifications and measurement of national agricultural policies (food strategies) in developed countries as they affect exports of selected agricultural products of LDC's.
 - A. Policies designed to affect imports.
 - 1. Nature and methods used.
 - a. Use of import quotas, tariffs and levies.
 - b. Use of discriminatory exchange rates.
 - c. Use of subsidies.
 - d. Other.

2. Japan's food strategy.
 - a. Strategic objectives.
 - b. Operating methods and government agencies.
 - c. Structure of domestic supply.
 1. Government's general policy toward domestic food production.
 2. Trends in production economics and technology.
 3. Interaction of policy and trends.
 - d. Trade policy.
 1. Toward food raw material imports.
 2. State trading and other trade barriers.
 - e. Policies toward imports and exports of capital and its control.
 - f. Specific commodity policies.
3. Common Agricultural Policy of the European Economic Community.
 - a. Agricultural harmonization and Community economic power.
 - b. The Commission and national governments in policy formation.
 - c. Methods of financing and administration.
 - d. Structure of domestic supply.
 1. General policy toward domestic food production.
 2. Trends in production economics and technology.
 3. Interaction of policy and trends.
 - e. Trade policies and devices.
 1. Imported foods and food raw materials (including fibers).
 2. Exported commodities.
 - f. Investment and managerial control in the EEC by foreigners.
 - g. Specific commodity policies.
4. The United Kingdom's import substitution policy.
 - a. The balance of payments problem and agricultural imports.
 - b. Operating methods and government agencies.
 - c. Structure of domestic supply.

1. General policy: The Development of Agriculture White Paper.
 2. Trends in production economics and technology.
 3. Interaction of policy and trends.
- d. Trade policy toward imports.
1. Food raw materials and fibers.
 2. Processed products.
- e. Foreign management and capital in U.K. agri-business.
- f. Specific commodity policies.
- B. Estimates of extent and magnitude of trade policy mechanisms in terms of quantities and prices.
1. By commodities covered in this study.
- C. Policies of major exporters to stimulate exports.
1. Use of export subsidies.
 2. Use of long-term credits.
 3. Economic aid policies.
- D. Trade policies designed to control trade for benefit of countries with common interests.
1. Market agreements.
 2. Regional trade associations .
- VII. Identification and measurement of food, fiber policies of less developed countries.
- A. Policies designed to stimulate exports and earn dollars.
1. Use of export subsidies.
 2. Use of discriminatory exchange rates.
 3. Other means.
- B. Policies to restrict imports.
1. Import substitution to improve balance of payments.
 2. Use of discriminatory exchange rates.
 3. Other levies and means.
- C. Policies limiting exports.
1. Export tax.
 2. Commodity agreements.
 3. Other means.

VIII. Projections to 1980.

A. Assumptions basic to all alternatives.

1. Production, consumption, trade and price levels will be determined jointly for each alternative projection unless otherwise stated.
 - a. For example, a constant price level assumption might be used in one alternative.
2. Population.
 - a. A single projection for all countries will be used. (As shown in working paper on World Population and Income, October 1968.)
3. Income Growth.
 - a. Developed and communist bloc.
 - (1) Single projection as shown in Working Paper on World Population and Income, October 1968.
 - b. Developing countries.
 - (1) Three levels of economic growth which will be specified under the alternative projections described below.
4. Discussion of basic supply and demand elasticities and trend factors used in deriving the basic supply and demand functions by regions.
 - a. A single set of demand functions will be used to generate consumption under all alternatives.
 - b. A single set of supply functions will be used in developed world but three different supply functions for each commodity will be used in the developing world to reflect 3 levels of agricultural development. The latter will be specified under each alternative.

B. Alternative I

1. Alternative I will be considered the basic set of projections and will incorporate the most likely set of assumptions.
2. Continuation of present food and fiber policies with some modification.

a. Developed importers

(1) Although self-sufficiency goal will be emphasized, there will be a trend toward liberalization of import restrictions.

(a) For example, cost of maintaining present high price Common Agricultural Policy in EEC, will lead to restructuring of agricultural policy in EEC that might result in larger imports.

(b) Specific statements about Japan, U.K., and other importers will be made.

b. Major established exporters.

(1) These countries will follow a basic food production and export strategy of at least maintaining their historical share of the world market.

(a) This might include export subsidies.

c. Specific statements about Communistic Bloc countries would be appropriate here.

(1) For example, some liberalization of East-West trade.

d. Developing countries.

(1) Importing countries will continue to put emphasis on agricultural development.

(a) United States, other developed countries and foundations will continue to provide aid for self-help programs, etc.

(2) Exporting countries will put moderate emphasis on using agricultural exports as a means of improving their export earnings through agricultural exports.

(a) Some assumptions about export taxes or subsidies may be needed.

(3) Some countries, presently importers, but with possibilities of becoming exporters may need additional assumptions.

3. Special assumptions for developing world.

- a. Medium level of economic growth as indicated by growth in GNP in Working Paper on World Population and Income, October 1968.
- b. Medium level of agricultural production.
 - (1) Basically historical trends adjusted for moderate improvement in production reflecting progress in technology.
- c. Exports and imports will be determined by the world market subject to conditions imposed in item VIII, B, 2, d above.

4. Special assumptions pertaining to commodities.

- a. United States will follow a policy (through P.L. 480 and export subsidies if necessary) that will result in the United States maintaining at least its historical share of the world market in cotton, wheat, rice, feed grains, soybeans and oils.
- b.
- c.

C. Alternative II.

- 1. Same as Alternative I, except for developing world.
 - a. High level of economic growth.
 - b. High level of agricultural production.
 - c. Assumptions (a) and (b) may turn out to be inconsistent for some commodities because of reduced export earnings.

D. Alternative III.

- 1. Same as Alternative I, except for developing world.
 - a. Low level of economic growth.
 - b. Low level of agricultural production.

E. Alternative IV.

- 1. Same as Alternative I, except United States as residual supplier.