



# Research and Agricultural Trade

A paper prepared for  
the Experiment Station  
Committee on  
Organization and Policy  
1984



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# Preface

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During the decade of the 1970s U.S. agriculture became an integral part of an international food and agricultural system. Its dependence on international trade increased significantly, with the result that the welfare of both U.S. farmers and U.S. consumers became increasingly tied to the ability of U.S. agriculture to compete in international markets. At the same time, the United States became an important source of food for the rest of the world.

This increased dependence on trade produced a new agenda for U.S. research institutions. Knowledge is now needed on trade issues, on the interactions between macro-economic policies and domestic commodity policies, and on the agriculture and policies of other countries. Pursuit of this new knowledge will require additional resources, possible redirection of currently available resources, and possibly new institutional arrangements to facilitate research on these complex issues.

In view of these developments the Experiment Station Committee on Organization and Policy (ESCOP) sought an in-depth view of the following issues:

- the international context of U.S. agricultural trade;
- agricultural trade policy issues facing the United States;
- scope, participants, and nature of current agricultural trade research activities; and
- options for development and expansion of the trade research base.

A committee was formed to study and report on these issues to research administrators and to the research community at large. The following individuals, selected for their breadth of knowledge relating to trade issues and for their deep concern for the future health of U.S. agriculture, comprised the committee:

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The committee prepared the following report, which ESCOP has found to be highly useful in addressing the concerns above. ESCOP is publishing the report in the belief that it will be equally useful to the many others who have an interest in international trade research.

We wish to express thanks to Cooperative Research, Science and Education Administration, U.S. Department of Agriculture for counsel and support.

Lowell Lewis  
*Chairman of ESCOP*

Mark Buchanan  
*ESCOP Subcommittee*



# Executive Summary

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During the 1970s U.S. agriculture became an integral part of an international food and agricultural system. This increased dependence on trade produced a new agenda for U.S. research institutions. In view of these developments the Experiment Station Committee on Organization and Policy (ESCOP) sought an in-depth view of the following issues:

- the international context of U.S. agricultural trade;
- agricultural trade policy issues facing the United States;
- scope, participants, and nature of current agricultural trade research activities; and
- options for development and expansion of the trade research base.

This report contains the findings of the committee asked to investigate these issues.

## *Introduction*

The growth in agricultural exports during the 1970s made a number of important contributions to the U.S. economy. The surplus on the agricultural trade accounts provided the foreign exchange to help pay for growing imports of petroleum, other raw materials, and consumer goods. It helped the United States maintain a worldwide political and economic position. It helped sustain farm incomes and generated employment both in agriculture and in related sectors. It also reduced the need for government support of agriculture.

In the first three years of the 1980s agricultural exports have declined over 20 percent. This decline in foreign markets has contributed to a serious income problem in agriculture, with the result that government expenditures for farm programs have grown rapidly. At the same time, trade conflicts have emerged and protectionism has become an increasingly important policy issue.

Unfortunately, there has been a serious lack of research in the United States on agricultural trade issues, problems, and opportunities. The implicit goal of this paper is to encourage additional research on agricultural trade issues. The intended audience for the report includes both Agricultural Experiment Station directors and researchers who might want to redirect their efforts to this important field.

## *U.S. Agriculture in an International Context*

Changes that have occurred primarily since the end of World War II have made possible a world food system. The emergence of this system has added immeasurably to food security

for the poorest people of the world. The creation of this system, in which American agriculture has played a critically important role, is one of the great achievements of modern times.

***Changing Trade Patterns.*** The last four decades have witnessed striking changes in the patterns of world trade. A review of some of the most important changes will help to highlight the major research problems and issues that have emerged or will emerge in the years ahead.

***1. Increased Interdependence.*** The United States was not the only country whose agriculture became more dependent on trade. The centrally planned economies and Japan, for example, became more dependent on imports. In general, worldwide agricultural trade increased 45 percent during the 1970s while production increased by 24 percent. An important feature of the U.S. situation was that we were earning a significant surplus on the agricultural trade accounts while trade in all nonagricultural products was incurring a large deficit.

***2. Changes in Composition of Trade.*** During the 1960s and 1970s the products with the highest rates of growth were either feed materials (soybeans, corn, oilseed cake and sorghum) or vegetable oils (soybean, palm and coconut). One reason the United States did well in expanding its agricultural exports in this period is that it exported products experiencing a rapid growth in world trade. Our output of these products increased significantly while our domestic use increased relatively little.

***3. Changes in Market Shares.*** U.S. market shares changed significantly during the 1960s and 1970s. Our share of world soybean exports declined from 85 percent in 1960-64 to 80.5 percent in 1975-78. (Brazil displaced Chinese exports during this period, not U.S. exports.) Our share of coarse grain exports increased from about 45 percent in the early 1960s to 65 percent in the late 1970s. The U.S. share of world wheat exports was about 40 percent in the early 1960s, declined to less than 30 percent, and then increased to 40 percent again at the end of the 1970s. Our share of cotton exports has varied a great deal, but it was about 30 percent both at the beginning and end of the period. Shares of major U.S. competitors are also documented in the report.

***4. Effects of Population and Income on Trade.*** Contrary to popular belief, U.S. trade grew with those countries that were experiencing rapid increases in per capita income, not with those experiencing rapid population growth. Moreover, among the less-developed countries, our exports grew to those countries that were also experiencing a rapid growth in their agricultural exports.

***5. Availability of Foreign Exchange to Pay for Food Imports.*** During the early and mid-1970s there was concern that the sharp increase in international prices of grains and



other food products would force the developing countries to sharply curtail their imports of food products. This concern proved to be unfounded, since many low-income countries are also exporters of agricultural products. The sharp increase in oil prices also had little impact on these countries since they import relatively little oil.

**Institutional Changes.** The volume and direction of agricultural trade is importantly influenced by economic policies and institutional arrangements. This section reviews significant institutional changes that have affected agricultural trade over the past two decades.

1. *Trade Negotiations.* A series of multilateral trade negotiations (MTN's) have taken place within the framework of the General Agreement on Tariffs and Trade (GATT). These negotiations have reduced tariffs on manufactured products by a significant margin. They have had less influence on barriers to agricultural trade, since negotiations on agricultural trade issues tend to involve negotiation over domestic agricultural policies. The MTN's also have had little influence on the use of non-tariff barriers to trade or on export subsidies.

2. *The North-South Dialogue—UNCTAD.* The United Nations Conference on Trade and Development (UNCTAD) has presented its claim for a New International Economic Order as the means by which the inequalities in income between the North and the South could be reduced. Central to the New International Economic Order is the Integrated Programme for Commodities, which has as a goal the transfer of income from the developed countries to the less-developed countries by means of higher commodity programs. Little agreement has been reached on this program to date.

3. *Changes in U.S. Policies.* U.S. commodity programs and an over-valued dollar made it difficult for U.S. agricultural products to compete in foreign markets during the 1950s and 1960s. Over time, the United States gradually flexed support levels downward, while at the same time using export subsidies and PL-480 (food aid) shipments to retain foreign markets. The devaluation of the dollar in the 1970s made U.S. products more competitive and thus reduced the need, at least temporarily, for export subsidies of any kind.

4. *The European Economic Community.* The creation of the European Economic Community (EEC) was one of the major political events of the Post-World War II period. The cornerstone of the EEC has been the Common Agricultural Policy (CAP), which is operated in large part by means of a variable levy which keeps domestic prices of agricultural products above international opportunity cost levels. The CAP constitutes a significant distortion to international trade in agricultural products. It also contributes to instability in international commodity markets.

**Emergence of International Capital Markets.** The

emergence of a well-integrated international capital market in the 1960s and 1970s is one of the major institutional developments of the post-World War II period. The Euro-dollar and Euro-currency markets are only part of this international capital market. The significance of this new market is that it ties together the economies of the world in ways that are every bit as important as the growth in trade. Perhaps more importantly, it changes the way that monetary policy affects the economy, forcing a great deal more of the adjustment to changes in monetary policy onto agriculture.

**Factors Conditioning Future Trade Patterns.** Major factors affecting future trade patterns include income growth, population growth, realignments in foreign exchange rates, changes in technology, domestic agricultural policies, and institutional changes affecting trade. Important factors causing the decline in U.S. exports in the early 1980s have been the large rise in the value of the U.S. dollar and domestic commodity programs that have put a floor under commodity markets. Decisions in the centrally planned economies will also have an important influence to trade in agricultural products.

**World Food Problems.** The less-developed countries did a remarkable job of feeding their populations during the 1970s. Per capita production of food increased modestly in all parts of the world except Africa. The key to dealing with the world food problem is to have economic development which raises per capita income in the less-developed countries.

## *Agricultural Trade Policy Issues Facing the United States*

In developing an informational base to assist in formulating domestic and trade policies, a wide range of policy issues and problems needs to be taken into account. Some of the more important of these are discussed in this section:

1. Retaining a comparative advantage in agricultural products—the importance of productivity growth
2. Sustaining an efficient transportation and marketing sector
3. Price instability in international commodity markets
4. Monetary instability as a source of instability in commodity markets
5. Resource management in the context of rapidly changing foreign demand
6. Energy from agriculture
7. The relationship between grain prices and food prices
8. Agriculture as a source of foreign exchange
9. The United States as an importer of agricultural products
10. Maintaining U.S. commodity policies that are consistent with an open-economy exporting stance



## Scope, Participants, and Current Trade Research Activities

### **Scope, Nature, and Apparent Participants in Trade Research.**

A classification scheme is used to characterize the nature and practitioners of trade research:

- IA. Economic Research—Explicitly International
  - 1. World Market Analysis
  - 2. Country-Oriented
  - 3. State-Commodity Approaches
- IB. Economic Research with Implicit International Impact
- IIA. Physical and Biological Research—Explicitly International
  - 1. Production Research on Export Crops
  - 2. Product Development, Packaging, Grades and Standards, Etc.
  - 3. Technology for Trade or Transfer
- IIB. Physical and Biological Research with Implicit International Impact
- III. Market Intelligence

Data are then assembled which quantify trade research.

Despite the inadequacy of the data on which this overview of research in the trade area is based, the overriding conclusion from this analysis is that efforts devoted to trade research are extremely limited, despite the importance of international trade to U.S. agriculture. Beyond being limited in overall effort, much of the research is limited in scope. State Agricultural Experiment Station projects, particularly Ph.D. dissertations, tend to be individualistic (in terms of commodity, region, country or methodology), one-shot, and non-additive. Only the USDA maintains ongoing programs, but even these are heavily skewed towards short-term policy analysis and long-term projections.

## Building the Base for Expanded Trade Research

This section is divided into two parts. The first part addresses the constraints to effective trade research in an attempt to identify why the United States appears to significantly underinvest in this area. The second part reviews some of the externalities in trade research and recommends new institutional arrangements that might be more conducive to effective trade research.

### **Constraints to Effective Trade Research**

#### *1. Deficiencies in the Conceptual Framework*

- The lack of a straightforward way to account for technological differences among countries or to account for changes in technology over time.

- The unsettled state of monetary theory, especially in an international context.
- The need to better conceptualize the gains from trade.
- The failure to incorporate concepts of imperfect competition and institutional interactions into trade theory.
- The lack of a well-developed theory to explain the behavior of governments and the response of policy-makers to economic forces.

#### *2. Deficiencies in the Data*

- Domestic prices in other countries.
- Factor prices.
- Transportation rates.
- Policy variables and policy interventions.
- Exchange rates.
- Input-output tables.

#### *3. Deficiencies in U.S. Institutional Arrangements*

#### *4. The Dearth of Human Resources Trained to Work in the Agricultural Trade Area*

### **The Externalities of Trade Research**

## Research Priorities

Priorities will change, often quickly, in response to changing conditions. The purpose of this section is to outline a set of general objectives that should underlie an expanded research program in food and agricultural trade.

1. Assessing the impact of changes in economic and technical factors and resource endowments on import demand, availability of export supplies, and comparative advantage in agricultural production.
2. Analyzing the impact of economic policies on trade patterns.
3. Identifying and analyzing monetary linkages among countries and assessing the implications of monetary phenomena on trade flows, and the functioning of financial, commodity, and international capital markets.
4. Tradeoffs and linkages between domestic agricultural and trade policies.
5. Devising an optimal international commodity trade policy for the United States.
6. Assessing and evaluating the gains from trade and the implications of restrictive trade policies and practices in terms of who gains, who loses, what benefits and costs will arise from policy changes, and what positive adjustment policies are warranted.



7. Understanding why governments make the kinds of policy decisions they do.
8. Assessing institutional relationships in the form of state trading, monopolistic business practices, and government involvement in international agreements and their impact on performance of international markets, information, and transaction linkages.
9. Improving the conceptual framework for international agricultural trade research.
10. Developing and using improved empirical models for policy analysis.

## *A Strategy for the Future*

Sizeable investments will be needed if the United States is to develop a capability in agricultural trade research commensurate with the importance of trade to U.S. agriculture. Institutional creativity is needed, as well as investments in developing appropriate skills and information systems. In this section a comprehensive strategy is sketched out which over a period of years would give the United States a significantly strengthened capability for research into problems of agricultural trade. The strategy involves a great deal of collaboration among research institutions and the willingness to develop new ways of doing things.



# Introduction

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During the 1970s U.S. agriculture became increasingly dependent on international trade. As much as 30 percent of cash marketings were attributed to exports in some years, and as many as two out of five acres of land were producing for foreign markets. These exports are of considerable value to the economy as a whole. For example, in some years agriculture was earning a surplus on its balance of trade of as much as \$28 billion a year. This surplus provided the foreign exchange to help pay for growing imports of petroleum, other raw materials, and consumer goods. It also helped the United States maintain a worldwide political and economic position.

A strong export performance is helpful in other ways as well. It helps sustain farm incomes and generates employment both in agriculture and in related sectors. In addition, it reduces the need for government support of agriculture, thereby helping to control government expenditures and enabling farmers to exercise more freedom in their choice of production activities and in the way they use their resources.

After the export boom of the late 1970s, the value of agricultural exports tapered off from its peak of \$43.8 billion in 1981 to \$34.8 billion in 1983—a decline of slightly more than 20 percent. This decline in foreign markets has contributed to a serious income problem in agriculture, with the result that government expenditures for farm programs have grown rapidly. At the same time trade conflicts have emerged, particularly with the European Community, and protectionism and threats of protectionism have become increasingly important policy issues.

Unfortunately, there has been a serious lack of research in the United States on agricultural trade issues, problems, and opportunities. This lack of research undoubtedly traces in part to the relative unimportance of agricultural trade until

this last decade. However, it also traces to the particular difficulties of doing research on trade when many, if not most, of our agricultural research institutions have strong mission orientations to local clientele and when institutional arrangements to conduct international trade research are weak or inadequate.

The purposes of this paper are to:

- gain perspective on the international context of U.S. agriculture;
- examine the trade issues and problems the United States faces as it attempts to develop sensible trade policies;
- review the scope, participants, and current activities of trade research;
- discuss how the base for expanded trade research might be built;
- suggest priorities for an expanded research program; and
- recommend a strategy for developing this expanded program.

The implicit goal of this paper is to encourage additional research on agricultural trade issues. We have taken as our audience both Agricultural Experiment Station Directors and researchers who might want to redirect their efforts to this important field.

The authors wish to express their appreciation to Mark T. Buchanan, James E. Halpin, Robert F. Hutton, John Malone, Richard Sauer, and Wayne Schutzer for helpful comments on an earlier version. The chair would also like to thank Director Buchanan for his patience with the many delays in bringing the manuscript to publication.



# U.S. Agriculture in an International Context

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Changes that have occurred primarily since the end of World War II have made possible a world food system. This system means that people throughout the world can draw upon available supplies of staple foods, regardless of where those supplies have been produced or are located. With rather minor exceptions, if governments do not interfere, grain produced in America, Australia or France is available to almost any person in the world if that person has the means to purchase it.

The emergence of a world food system has added immeasurably to food security for the poorest people of the world. Famines due to crop failures have now been almost eliminated, a major achievement in light of the tens of millions who lost their lives due to crop production shortfalls during the last half of the nineteenth century. The existence of the system depends not only upon an available supply of food that can move across national boundaries, but also upon striking improvements in transportation and communication that have occurred during the twentieth century. The creation of this system, in which American agriculture has played a critically important role, is one of the great achievements of modern times. It is not possible to exaggerate its importance; the existence of the system has meant the difference between life and death for millions.

## *Changing Trade Patterns*

The last four decades have witnessed some striking changes in the patterns of world trade. A brief review of some of the most important changes will help to highlight the major research problems and issues that have emerged or will emerge in the years ahead.

**Increased Interdependence.** The output of two out of every five acres harvested in the United States is exported; three-fifths of our wheat, more than half of our soybeans, and almost a third of our corn are consumed outside the United States. We export far more agricultural products than we import, yet we are also the world's second largest importer of agricultural products, surpassed only by Germany.

During the most recent five-year period the value of U.S. agricultural exports exceeded imports by approximately \$18 billion, with the net surplus peaking at \$28 billion. For most years from 1920 through the early 1960s, except for World War II and the immediate postwar period, we imported more agricultural products than we exported.

The United States, of course, is not the only country or region for whom interdependence has increased substantially. The centrally planned economies—the Soviet Union, Eastern Europe and the People's Republic of China—have greatly increased their dependence upon imports of agricul-

tural products. During the 1950s Japan relied rather little upon international trade in agricultural products. However, starting in 1960 it increased imports of numerous agricultural products rapidly, and soon emerged as the world's second largest importer of grain. Japan is now third in the world in the value of its agricultural imports.

One indication of the general increase in interdependence is that during the 1970s the volume of world trade in agricultural products increased faster than world agricultural production. Trade increased 45 percent while production increased by 24 percent.<sup>1</sup> Thus, a larger share of world agricultural production entered trade at the end of the 1970s than at the beginning.

U.S. agricultural exports have exceeded agricultural imports by a wide margin in recent years, as noted earlier. During the same years U.S. merchandise trade (including agricultural products) exhibited large deficits, averaging approximately \$28 billion for the fiscal years 1977-80.<sup>2</sup> During the same four years the surplus in agricultural trade was almost \$16 billion, while the deficit in all nonagricultural trade averaged \$44 billion. These figures, added to the great importance of agricultural exports to the income and employment of farm resources, underscore the significance of improving our understanding of the factors influencing international trade, of adopting policies that will increase the comparative advantage of U.S. agriculture, and of inducing modifications in the domestic and international policies of other countries that restrict access to their markets. The United States, of course, has a similar responsibility to consider the effects of its domestic and trade policies upon our import of products that are produced more economically abroad.

**Changes in Composition of Trade.** Table 1 summarizes some of the changes in world and U.S. trade from 1951-81. The data reveal that while the U.S. share of total world trade has declined significantly over the past three decades—from 18 percent in 1951-55 to 11 percent in the late 1970s—our share of world agricultural trade has increased over the same period, from 13 percent in the earlier years to more than 18 percent in the later years. The last column indicates a quite remarkable phenomenon, namely that the share of U.S. agricultural trade in total U.S. trade has remained approximately constant over the three decades. During the same period there was a decline of more than half in agriculture's share of total world trade.

Table 2 gives the annual compound rates of change in the volume of world agricultural trade for major agricultural

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1. Food and Agriculture Organization, *FAO Production Yearbook 1979* and *FAO Trade Yearbook 1979*.
  2. *FATUS*, various issues.



**Table 1. U.S. Share of World Agricultural Exports, Five-year Averages 1951-70 and Annual 1971-81**

	Total Exports			Agriculture <sup>a</sup>			Agricultural Trade as a Percent of Total Trade	
	World	United States	U.S. Share	World	United States	U.S. Share	World	United States
	(billion U.S. dollars)		(percent)	(billion U.S. dollars)		(percent)	(percent)	
1951-55	84.82	15.20	17.9	26.80	3.41	12.7	31.6	22.4
1956-60	113.32	19.06	16.8	31.62	4.59	14.5	27.9	24.1
1961-65	157.52	23.76	15.1	38.65	6.04	15.6	24.5	25.4
1966-70	248.00	35.05	14.1	47.23	6.90	14.6	19.0	19.7
1971	346.27	43.49	12.5	58.43	8.24	14.1	16.9	18.9
1972	413.48	48.98	11.8	70.55	9.97	14.1	17.1	20.3
1973	573.79	70.25	12.2	103.08	18.84	17.9	18.0	26.3
1974	838.27	97.14	11.6	126.77	23.10	18.2	15.1	23.8
1975	872.98	106.16	12.2	129.65	22.83	17.6	14.9	21.5
1976	989.43	113.32	11.5	141.11	24.17	17.1	14.3	21.3
1977	1,122.90	117.93	10.5	161.16	24.97	15.5	14.4	21.2
1978	1,297.27	140.00	10.8	183.93	31.24	17.0	14.2	22.3
1979	1,636.40	173.65	10.6	218.31	37.21	17.0	13.3	21.4
1980	1,994.31	212.89	10.7	251.34	44.08	17.5	12.6	20.7
1981	1,960.09	225.77	11.5	248.21	46.11	18.6	12.7	20.4

<sup>a</sup>Agricultural exports include SITC Sections 0, 1, 2, and 4 but exclude Divisions 03, 24, 25, 27, and 28.

Sources: United Nations, *Monthly Bulletin of Statistics*, selected issues, 1969-80.

—————, *Statistical Yearbook*, 1960-63.

—————, *UNCTAD's Handbook of International Trade and Development Statistics*, 1972-79.

From: FATUS, November-December 1980, p. 69, and personal communication, Art Mackie, ERS-USDA.

products during the 1960s and 1970s. The commodities are ranked from the highest to the lowest growth rates. With only one exception, the products with the highest rates of growth (in excess of 7 percent annually) were either feed materials (soybeans, corn, oilseed cake and sorghum) or vegetable oils (soybean, palm and coconut). The exception, dry skim milk, is in this select company because it is so highly subsidized by governments. Meat fell into an intermediate position with a growth rate of 5.7 percent. The fibers—cotton, jute, and wool—suffered both relatively and absolutely. Tropical products, except the vegetable oils, did rather poorly; note the low growth rates for sugar, tea and coffee.

It is rather obvious from this table why the United States did very well in expanding its agricultural exports. Feed grains, soybeans, oilmeals and vegetable oils—the products with the most rapid growth in the world trade during the previous two decades—comprised nearly half of U.S. agricultural exports in 1980-81, up from about 30 percent during 1961-65. Our output of these products increased significantly while our domestic use increased relatively little, resulting in sharply higher amounts available for export.

**Changes in Market Shares.** As indicated in Table 1, the United States has held a constant or increasing share of the world's agricultural exports for the past three decades. There have, however, been some shifts in our market shares for our

**Table 2. Average Annual Growth Rates in Volume of World International Trade for Selected Agricultural Products, 1961-65 to 1978<sup>a</sup>**

Product	Annual Growth Rate (percent)
Soybeans	10.3
Soybean Oil	10.0
Dry Milk	9.3
Palm Oil	8.6
Corn	8.4
Oilseed Cake	7.9
Sorghum	7.8
Coconut Oil	7.4
Meat	5.7
Wheat	3.4
Tobacco	2.9
Rubber	2.5
Sugar	2.3
Tea	1.9
Rice	1.6
Coffee	1.1
Cotton	1.0
Wool	-2.2
Jute	-5.0

<sup>a</sup>Based on volume of exports. Generally, export data are more accurate than import data for agricultural products.

Source: FAO, *The State of Food and Agriculture 1979*, Rome, 1979, p. A-13.



major exports during the past two decades.<sup>3</sup> We supplied about 85 percent of the world soybean exports during 1960-64; for 1975-78, our share was 80.5 percent. Our share of coarse grains exports increased from about 45 percent in the early 1960s to 65 percent in the late 1970s. For corn alone we increased our share from 53 percent to 73 percent. Our share of world wheat exports was approximately 40 percent both at the beginning and end of the two decades, though this figure declined to less than 30 percent during the late 1960s and then increased to as much as 45 percent in 1973. Our share of world cotton exports was 30 percent for both the beginning and ending five-year periods, but there were substantial variations in between, with a low of 16 percent in the late 1960s. In 1979 we accounted for 36 percent of world cotton exports.

Some note may be taken of the shifts in the shares of some of our major export competitors. Brazil had no exports of soybeans during the early 1960s but accounted for nearly one-seventh of world trade during 1975-78. Most of the Brazilian increase, however, replaced Chinese, not U.S., exports. China, which had supplied about one-tenth of world soybean exports, was no longer a factor in such exports by the late 1970s. China's withdrawal from the soybean export market was due to domestic policies that emphasized the production of grains at the expense of soybeans. After 1976 Argentina also became a significant soybean exporter.

The increase in our share of corn exports came primarily at the expense of Argentina and South Africa. On the import side, there was a dramatic decline in the share of the EC-9<sup>4</sup> in world corn imports, from 57 percent in 1960-64 to 38 percent in 1975-79. Taking up the share foregone by the EC-9 were the Soviet Union, Eastern Europe, and Asia excluding Japan. In world wheat exports Canada lost a modest part of its share over the two decades while France approximately doubled its share from about 5 percent to 10 percent.

The shifts in the share of world wheat imports were quite dramatic between 1960 and 1979. The EC-9 reduced its share by about four percentage points, while the Soviet Union went from no imports during the first three years of the 1960s to 10 percent of world imports during the last five years of the 1970s. China, which had just entered the world grain market as the 1960s opened, had approximately the same share of trade at the end as at the beginning of this period. India, on the other hand, sharply reduced its share of world wheat

imports from nearly 9 percent to no imports for 1977-79.

There were significant shifts in the shares of world cotton imports. Japan's share declined slightly while the share of the EC-9 fell by nearly half. Together Japan and the EC-9 reduced their share of world imports by almost 20 percentage points. This was largely absorbed by Asiatic countries —The People's Republic of China, South Korea, Taiwan, and Hong Kong. In 1979 China tied with Japan as the leading cotton importer and actually imported more than the EC-9.

**Effects of Population and Income on Trade.** Trade patterns are influenced by both population and income changes. Other factors, such as domestic and international policies, also have a major influence upon the amounts and direction of trade. The expansion of trade in agricultural products appears to be at least as responsive to per capita income growth as to population growth. This is contrary to what is often expected, since there is a general assumption that the income elasticity of demand for agricultural products is low, generally much less than one, while each additional one percent of population requires at least one percent more food.

Table 3 provides data on changes in the value (in current dollars) of exports and imports of agricultural products and in some other important characteristics for four groups of countries during the 1970s. The smallest increase was for the low-income developing market economies. These economies had quite rapid population growth (2.2 percent) but slow per-capita income growth (1.6 percent). The largest increase in imports was for the middle-income developing market economies, which had rapid population growth (2.4 percent) and high per capita income growth (3.7 percent). These economies also had the greatest growth of agricultural exports. The developed market economies had slow population growth, relatively rapid per-capita income growth, and a high growth rate for imports.

It is commonplace to point with alarm to the large volume of cereal imports by the developing economies; pointing with alarm, for example, is at least an annual event for the United Nations Food and Agricultural Organization (FAO). In the *State of Food and Agriculture 1979*, the FAO reports:

The cereal imports of the developing countries which represent slightly less than half of the gross value of their food imports, increased from an average of 40 million tons in 1969-71 to about 79 million tons in 1978-79 and are expected to rise to 85 million tons in 1979-80. Imports of other food commodities, particularly vegetable oils, dairy products and meat, continue to grow rapidly and increasing dependence on external food supplies is a critical issue for many developing countries.<sup>5</sup>

3. Webb, Alan J., *World Trade in Major U.S. Crops: A Market-Share Analysis*, ESS, USDA, ESS-7, April 1981.

4. The EC-9 refers to Belgium, Denmark, France, Ireland, Italy, Luxembourg, Netherlands, West Germany, and United Kingdom. These countries constitute the European Community. The EC-9 is used to distinguish this expanded grouping that resulted when the original membership of six was expanded to nine.

5. FAO, *State of Food and Agriculture 1979*, pp. 1-54.



**Table 3. Trade in Agricultural Products and Some Characteristics of Major Regions in the 1970s**

	VALUE OF TRADE <sup>b</sup>					
	1969-71			1977-79		
	Exports	Imports	Net <sup>a</sup>	Exports	Imports	Net <sup>a</sup>
	(billion U.S. dollars)					
Developing Market Economies	17.3	9.5	7.8	54.1	38.3	15.8
Low Income <sup>c</sup>	4.0	2.3	1.7	10.5	6.2	4.3
Middle Income <sup>c</sup>	13.3	7.2	6.1	43.6	32.1	11.5
Developed Market Economies	30.8	40.2	-9.4	107.7	127.6	-19.9
Centrally Planned Economies	4.6	6.1	-1.5	12.0	25.2	-13.2
World Total	52.7	55.8	—	173.8	191.2	—

  

	CHARACTERISTICS OF MAJOR REGIONS						
	Population <sup>d</sup>	GNP/ Capita <sup>e</sup>	Agricultural		GNP/ Capita (1970-78)	Growth	
			Exports	Imports		Population (1970-78)	Agriculture (1970-78)
	(millions)	(U.S. dollars)	(\$/capita 1977-79)			(percent)	
Developing Market Economies	2,227	696	24.30	17.20	—	—	—
Low Income	1,294	200	8.11	4.79	1.6	2.2	2.0
Middle Income	933	1,250	46.73	34.41	3.7	2.4	3.1
Developed Market Economies	668	8,070	161.22	191.02	3.7	0.7	1.0
Centrally Planned Economies	1,352	1,190	8.88	18.64	4.0	1.4	—

Sources: FAO, *FAO Trade Yearbook*, various issues and World Bank, *World Development Report*, 1980, pp. 110-14 and 142-43.

<sup>a</sup>Excess of value of agricultural exports over imports. A negative sign indicates net imports.

<sup>b</sup>Agriculture trade only; excludes forestry and fisheries. In current dollars.

<sup>c</sup>Low income, less than \$370 GNP/capita in 1978; Middle income, more than \$370 GNP/capita.

<sup>d</sup>Mid-1978

<sup>e</sup>1978.

As indicated in Table 3, it is the middle-income and more rapidly growing developing market economies that had the most rapid growth of agricultural imports during the 1970s. In fact, it might be argued that the slow growth (and low per-capita level) of agricultural imports in the low-income developing countries should be the matter of concern. The slow growth of agricultural imports almost certainly signified slow per capita income growth; if these countries had been more successful in increasing their per-capita income growth it is certain that their imports of agricultural products would have grown even more.

Table 4 speaks directly to the issue of cereal imports and changes in origin and destination of trade. Data are for the 1960s and 1970s, but comments will be restricted to the 1970s. During the 1970s world grain imports increased by approximately 80 million tons (nearly 80 percent). In 1977-79 the developing countries (including China but excluding capital surplus oil exporters) imported 73.6 million tons, up from 40.3 million tons in 1969-71. The low-income developing market economies—those with per capita incomes of less

than \$370 in 1978—increased their cereal imports hardly at all during the 1970s.

Particular note may be made of India, which, contrary to most expectations, significantly reduced its grain imports during the decade. This means that other low-income developing countries increased grain imports by 4 million tons during the 1970s. This represents a small part of the increase for all developing countries.

The increase of 33 million tons for the developing countries is accounted for primarily by the middle income developing countries, with an increase of 25 million tons; China increased its grain imports by 7 million tons. The capital surplus oil exporters—five Middle Eastern members of OPEC—were not counted as developing countries in these estimates. This group of countries increased their cereal imports by nearly 5 million tons.

If the major oil exporters are included among the developing countries, as is done by the FAO, the increase in cereal imports by developing countries during the 1970s was 38 million tons. The low-income developing market economies,



**Table 4. International Trade in Cereals by Economic Groups, 1960-62, 1969-71 and 1977-79**

Country Group	1960-62			1969-71			1977-79		
	Exports	Imports	Net	Exports	Imports	Net	Exports	Imports	Net
	(million metric tons)								
Industrial Countries	53.8	37.1	16.7	77.6	52.1	25.5	148.4	63.1	85.3
United States	31.4	0.6	30.8	36.3	0.4	35.9	90.9	0.2	90.7
Canada	10.2	0.7	9.5	13.7	0.5	13.2	18.5	0.7	17.8
Australia	5.9	—	5.9	8.8	—	8.8	11.7	—	11.7
France	3.4	1.0	2.4	11.4	1.0	10.4	14.3	1.9	12.4
Japan	0.1	5.0	-4.9	0.7	14.7	-14.0	0.3	23.3	23.0
Centrally Planned	9.8	12.4	-2.6	12.4	17.6	-5.2	9.3	50.0	-40.7
USSR	7.6	0.6	7.0	8.2	2.7	5.5	3.7	20.7	-17.0
Eastern Europe	1.3	8.3	-7.0	2.2	9.7	-7.5	4.1	16.6	-12.5
China	0.9	3.5	-2.6	2.0	5.2	-3.2	1.5	12.7	-11.2
Low Income Countries	2.4	7.3	-4.9	2.1	10.9	-8.8	2.8	11.7	-8.9
India	—	4.1	-4.1	—	3.6	-3.6	0.8	0.6	0.2
Indonesia	—	1.2	-1.2	0.2	1.3	-1.1	—	2.8	-2.8
Middle Income Countries	9.6	10.9	-1.3	17.6	24.2	-6.6	26.1	49.2	-23.1
Korea	—	0.5	-0.5	—	2.6	-2.6	—	4.1	-4.1
Argentina	5.6	—	5.6	3.5	0.1	3.4	14.6	—	14.6
Brazil	0.1	2.1	-2.0	1.2	2.1	0.9	0.7	4.8	-4.1
Mexico	0.2	0.1	0.1	0.5	0.4	0.1	0.1	4.0	-3.9
South Africa	1.3	0.2	1.1	0.3	1.2	0.9	2.6	0.2	2.4
Thailand	1.9	—	1.9	2.9	0.1	2.8	4.4	0.1	4.3
Capital Surplus Oil Exporters	—	0.7	-0.7	0.1	2.0	-1.9	0.1	6.8	-6.7
Total	75.6	68.4	—	109.8	103.9	—	186.9	183.3	—

Source: FAO, *FAO Trade Yearbook*, various issues.

with a population of 1.3 billion, accounted for just 3 percent of this increase. China, with a population of 952 million and a per capita income comparable to that of the low income category, accounted for 18 percent of the import growth. Nearly 80 percent of cereal import growth in developing countries occurred in those with relatively high and rapidly growing incomes and with only 30 percent of the population of the developing countries as defined by FAO. The centrally planned economies other than China increased their net grain imports during the 1970s by 27.5 million tons. The Soviet Union accounted for more than a quarter of the 1970s increase in world grain imports.

**Availability of Foreign Exchange to Pay for Food Imports.** During the early- and mid-1970s there was concern that the sharp increase in the international prices of grains and other food products would force developing countries to sharply curtail their imports of food products. This concern turned out to be unfounded, since almost all of the low income developing countries are net exporters of agricultural products (see Table 3) and the prices of agricultural products other than grains increased at least as much as did grain prices. Consequently, with only minor exceptions, the surplus in agricultural trade for developing countries increased after 1972. Since the value of agricultural exports

increased by more than the value of agricultural imports, high grain prices did not reduce the capacity of the developing countries to import food.

The sharp increases in oil prices have also had less impact on the availability of foreign exchange to the low income developing countries than was expected. The reason for this is quite simple: the low-income developing countries import relatively little oil.

## *Institutional Changes*

The volume and direction of trade in agricultural products in the world are determined by differences in relative production costs and by policies and institutions. In spite of high levels of protection that affect trade in agricultural products, world trade expanded significantly during the past decade. Trade in agricultural products has shown the capacity to surmount highly protective barriers. For example, the U.S. and other grain exporters continued for a long time to export large quantities of grain to the European Community (EC) against trade barriers that provide 100 percent or more nominal protection. But the high level of protection for grain in the EC has at last shifted it from a large grain importer to a



net grain exporter because of the incentives the protection provides to European farmers to increase production.

**Trade Negotiations.** For more than three decades the industrial countries of the world have engaged in multilateral trade negotiations (MTN) within the framework of the General Agreements on Tariffs and Trade (GATT) to liberalize trade.<sup>6</sup> These negotiations have been remarkably successful in reducing barriers to trade in manufactured products. However, the success has not been universal since many barriers remain for labor-intensive manufactured products that represent the primary non-agricultural export opportunities for many developing countries. In addition, little progress has been made in reducing trade barriers to agricultural products. Minimal changes have been made in tariff protection for these products, and so far there has been even less success in reducing or eliminating the non-tariff barriers to trade (quantitative import quotas; variable levies; state trading; industrial, health and safety standards; labeling; packaging and marking requirements; mixing regulations; and bilateral trading agreements). Other interventions are designed to expand exports where comparative advantage may not exist. These devices include export and credit subsidies and direct payments to farm producers. There is hope that the negotiations on codes will pave the way for significant reductions in the role of non-tariff barriers and in limiting the use of export subsidies to expand a country's share of the world market.

The majority of the interventions in agricultural trade, whether they involve limitations on imports or subsidized promotion of exports, are undertaken as a consequence of domestic agricultural policies. This is an important reason why it has been so difficult to successfully negotiate reductions in agricultural trade barriers. *To do so means to negotiate domestic agricultural programs and policies, such as the level of dairy price supports in the United States and Canada, the target prices set by the European Economic Community, or the high domestic prices for beef in Japan.* So far no country has been willing and able to engage in negotiations over the domestic programs and policies that require particular trade barriers and interventions.

The effect of non-tariff barriers, including state trading, on exports of our agricultural products has grown in recent years.<sup>7</sup> This shift has been due in part to the increasing share

of our agricultural exports going to developing countries and centrally planned economies that either are not members of GATT or are committed to state trading and prefer to deal bilaterally and outside the frameworks of rules and codes established by GATT. The grain agreement between the United States and the Soviet Union has been designed to offset, at least in part, the competitive advantage of state trading. However, the agreement is a bilateral one, and so is inconsistent with our general support of multilateralism.

Over time the capacity of the United States to engage in fruitful MTN efforts has been reduced by increased congressional intervention in trade negotiations. The major reason for the passage of the Reciprocal Trade Agreements Act of 1934 was the belief that the power to reduce trade barriers had to be shifted from Congress to the executive branch if more liberal trade were to be achieved. It was accepted that Congress did not have the capacity, due to its responsiveness to special interests, to undertake a revision of the disastrous Smoot-Hawley tariff. Thus, the Reciprocal Trade Agreements Act of 1934 and subsequent laws transferred the authority to negotiate reductions in trade barriers to the executive branch, subject to quite general guidelines. In 1947 GATT was signed, representing a successful extension of the Reciprocal Trade Agreements Act.

The executive branch was given substantial discretion in the negotiations undertaken within the framework of GATT up through the Kennedy Round of negotiations, which was completed in the late 1960s. Even in that round Congress imposed more restrictions than in earlier negotiations and in the Tokyo Round, congressional intervention was substantial. The increased role of Congress may well mean that further U.S. participation in MTN will be largely fruitless.

**The North-South Dialogue—UNCTAD.** The United Nations Conference on Trade and Development (UNCTAD) has presented its claim for a New International Economic Order as the means by which the inequalities in income between the North and the South could be reduced. The developing countries have pressed the industrial countries for changes in a number of aspects of international economic relations, including trade, aid, foreign investment, technology transfer and the international monetary system. Developing countries also have sought a greater role in international economic policy decisions.

A major part of the New International Economic Order was to be the Integrated Programme for Commodities.<sup>8</sup> A princi-

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6. For an overview of these negotiations with special reference to the attention they have given to agriculture, see D. Gale Johnson, *World Agriculture in Disarray*, London: Macmillan and Co., 1973.

7. A comprehensive review of non-tariff agricultural trade barriers can be found in Jimmie S. Hillman, *Nontariff Agricultural Trade Barriers*, Lincoln and London: University of Nebraska Press, 1978.

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8. Perspective on this program in the context of U.S. and Canadian agricultural trade can be found in T.K. Warley, *Agriculture in an Interdependent World: U.S. and Canadian Perspectives*, Canadian-American Committee, C.D. Home Research Institute and National Planning Association, Montreal, Quebec and Washington, D.C., 1977.



pal argument for the Integrated Programme is that industrial economies' policies result in a high degree of instability in the international markets for agricultural products. Their domestic agricultural policies also restrict access to markets by the developing countries.

Clearly, domestic policies that stabilize internal prices through control of imports or subsidy of exports by any amount that would depress internal prices do result in transferring the sources of instability to international markets and to those countries that permit their domestic prices to be influenced by the international prices. However, it is not only industrial countries that follow price policies which add to instability of international market prices; many developing countries follow similar policies and stabilize domestic prices by varying imports and exports as needed.

Yet the Integrated Programme for Commodities has little to say about modifying domestic agricultural and consumer price policies as a means of increasing access to international markets and increasing price stability in those markets. Nor does the Programme propose corrections for the discrimination of developing-country governments against their own agricultures. In fact, much of the Programme would involve measures that are inimical to trade liberalization—export quotas, export taxes and commitments to import. These measures, when combined with possible supply management schemes by producers and buffer stock programs, are expected to achieve the objective of maintaining prices at “adequate” levels in real terms. There also is a call for indexing the international market prices of major agricultural products.

Little or no progress has been made in agreeing on a program for commodities that would be acceptable to both industrial and developing countries. The developing countries have not embarrassed the industrial countries by pushing for the dismantling or sharp modification of the national programs that result in price instability for others, nor have they argued for liberal trade policies for agricultural products as a means of achieving access. It is perhaps time that they did so in terms of the interests of both groups of countries.

**Changes in U.S. Policies.** The domestic agricultural policies of the United States have undergone significant modifications since the end of World War II. At the end of the Korean War the price support levels for major farm products were high enough to encourage an expansion of output and, at the same time, to discourage domestic consumption and exports. Stocks of wheat, corn, cotton, and dairy products accumulated rapidly. It was necessary to find some means of either restricting production or expanding use. Primary emphasis was placed on Public Law 480, the Agricultural

Trade Development and Assistance Act of 1954, as a means of exporting the products that were surplus to domestic requirements, given the levels of price supports. The act permitted exports of farm products at less than the domestic price and made it possible to transfer food, fiber, and tobacco to low-income countries in return for currencies that were not convertible into dollars or other hard currencies. Thus the transfer of agricultural products under P.L. 480 became an important part of our program of economic assistance to developing nations. Transfers under P.L. 480 reached a peak in the early- and mid-1960s.

Shipments of food under P.L. 480 had positive effects, especially in the prevention of famine and reduction of hunger in South Asia in the mid-1960s. Without the massive transfers that were involved, starvation would have been widespread. However, by the end of the 1960s there was increasing recognition that large-scale food aid transfers had two types of disincentive effects. One was that such transfers lowered the prices received by farmers in the recipient countries and thus discouraged production. The second, and perhaps more important, consequence of the transfers was to permit the governments of the recipient countries to give a low priority to agriculture. This low priority could manifest itself in low levels of investment, limited emphasis on research, and establishment of food prices that favored urban consumers at the expense of farmers.

Starting in the mid-1950s there was general recognition that price supports at too high a level were imposing heavy costs upon taxpayers while discouraging agricultural exports. During and after World War II the United States had a significant export surplus for agricultural products, but starting in 1950 and continuing until 1959 the United States imported more agricultural products than it exported except for small surpluses in 1957 and 1958. During these years there were large food aid transfers on concessional terms that were valued at their market prices and thus inflated the export figures.

Price supports were lowered gradually, and by the end of the 1960s they were generally at or below world prices except for wheat and dairy products. Export subsidies continued to be paid on wheat until the grain sales to the Soviet Union in mid-1972. Export subsidies were not paid, except on dairy products and peanuts, from 1973 until the recent slump in exports induced the use of indirect subsidies again in 1983.

With the devaluation of the dollar in 1971 and the adoption of floating exchange rates in 1973, an important depressant for agricultural exports was removed. The overvaluation of the dollar throughout the 1960s has imposed a significant adjustment cost upon U.S. agriculture since the overvalued



dollar acted as a tax on exports.<sup>9</sup> The changes in domestic policies that permitted the markets to allocate available supplies between domestic and foreign users and the elimination of the exchange rate barrier were followed by a remarkable expansion of U.S. agricultural exports. Policy and exchange rate changes were not solely responsible for the growth of exports, but they did have a major role.

**The European Economic Community.** One of the major post-World War II political events was the creation of the European Community (EC). The cornerstone of the EC was and is the Common Agricultural Policy (CAP). The CAP, in simplified form, amounts to the establishment of target prices for several important farm products such as the grains, and the use of variable levies to make up the difference between the target price (as translated to a border or threshold price) and the import price of the same commodity. Thus, a change in the international price of a product would have no effect upon the cost to the purchaser in the EC since the variable levy would be changed to make up any difference. On the few occasions that the international price was above the threshold price, an import subsidy was used to make it possible to import and an export tax was imposed to make it impossible to export more than the amount consistent with keeping prices near the target prices.

The basic price policy objectives of the CAP appear to be twofold: first, stable prices for both producers and consumers, and second, prices high enough to provide adequate or acceptable levels of farm incomes.

The United States has argued that the CAP has seriously restricted imports of agricultural products. It is true that U.S. agricultural exports to the EC of commodities subject to variable levies (grains, beef, pork, dairy products, and poultry and eggs) have been reduced by the high degree of protection. It is also true that EC imports of farm products subject to variable levies have increased by less than imports of farm products subject to other forms of restrictions. But it should be remembered that the CAP replaced national systems of trade interventions that were very restrictive. It may well be that there has been a higher level of imports of variable levy commodities than there would have been if the prior national systems had been retained.

What is clear is that the high level of price supports for grains provided for by the EC has resulted in a significant shift in net trade in cereals during the 1970s. At the beginning of the decade the EC had net imports of almost 17 million metric tons of grain; in 1980-81 net grain export was 3 million tons. This is a shift in net trade of 20 million tons in a decade.

## *Emergence of International Capital Markets*

The years since World War II have seen a revolutionary transformation of international capital markets. International investment has existed for centuries, as illustrated by British and other European investment in North America and Asia in the 17th through the 19th centuries. But the scale of the investments was relatively small, and it would be difficult to describe the process by which capital was made available as an organized market.

However, following World War II the beginnings of a capital market were evident in the large unilateral aid transfers made by the United States. These transfers were followed eventually by the creation of the International Bank for Reconstruction and Development (IBRD) and the International Monetary Fund (IMF). These institutions marshalled funds in the major credit markets of the world, at the time primarily in New York and London, and made them available to areas with an unmet demand for credit.

But perhaps the most remarkable and most important development in the international capital markets during the 1960s and 1970s was the development of the Euro-dollar market which, following the use of currencies in addition to the dollar, became the Euro-currency market. These markets have grown up outside of the formal credit institutions and beyond the control of national monetary authorities. The magnitudes of credit involved are enormous; it is probable that outstanding loans now exceed \$900 billion. Thus, the volume of activity dwarfs the lending activities of the World Bank and the IMF.

At the time of the sharp increase in oil prices in 1973, the major oil exporters increased their foreign exchange earnings by tens of billions of dollars. The countries had limited capacities to spend the enormous increase in income, at least in the short run. There was a major concern that the availability of these enormous amounts of petro-dollars would disrupt the international capital and credit markets, since there would not be adequate opportunities for the holders to invest them. The concern was largely unwarranted, in part because the capital markets, including the enormous Euro-currency market, provide an elastic outlet for the funds, and in part because of the discretion and judgment used by OPEC members in the placement of their funds. The OPEC members had a clear self-interest in the stability of the international credit markets and apparently recognized that interest. In addition, several of the OPEC members soon used a large fraction of their increased earnings to pay for increased imports, thus reducing the need of the credit markets to absorb ever increasing supplies of petro-dollars.

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9. Schuh, G. Edward, "The Exchange Rate and U.S. Agriculture," *American Journal of Agricultural Economics* 56(1974): 1-13.



**Table 5. Indexes of Volume and Values of Agricultural Trade (1969-71 = 100)**

	Imports				Exports			
	Volume		Value		Volume		Value	
	1961-63	1977-79	1961-63	1977-79	1961-63	1977-79	1961-63	1977-79
World	77.93	136.00	70.27	335.33	79.00	138.0	70.27	332.67
Developed Market Economies	77.87	121.33	69.80	304.00	72.87	163.33	66.03	370.33
North America	86.83	116.00	73.27	268.00	83.40	185.33	75.50	399.67
Western Europe	80.80	122.33	71.20	311.33	59.87	161.66	50.97	390.00
Oceania	87.70	111.00	84.03	293.00	76.27	126.00	79.20	265.33
Other	54.60	133.33	53.40	320.33	79.53	108.33	75.43	217.67
Developing Market Economies	74.33	177.33	69.80	407.00	84.97	115.00	78.43	305.33
Africa	79.20	187.66	74.63	445.67	91.83	84.33	77.33	271.00
Latin America	74.37	181.67	68.80	378.00	81.63	127.33	73.57	342.00
Near East	68.13	249.00	65.77	627.00	77.06	98.00	70.07	209.67
Far East	75.73	138.66	69.27	303.00	91.13	132.33	98.03	310.33
Other	54.20	145.66	42.80	292.00	70.17	121.00	60.97	382.66
Centrally Planned Economies	77.63	165.33	74.68	412.67	75.47	106.00	72.03	237.00
Asian CPE	78.37	183.00	84.63	438.66	59.20	112.00	58.80	254.33
Europe and USSR	76.20	158.33	73.27	406.33	78.77	105.00	75.00	231.33
Developed, all	—	126.00	—	317.33	—	155.33	—	352.67
Developing, all	—	178.67	—	411.33	—	115.00	—	302.00

Source: FAO, *FAO Trade Yearbook*, various issues.

As a means of extending the capacity to meet needs the IMF instituted the Special Drawing Rights (SDRs), a new international reserve intended currently to supplement the dollar as the international reserve currency and perhaps eventually to replace the dollar. The value of the SDRs is tied to a bundle of currencies, of which the dollar has an important weight. Decisions to add to or withdraw the SDRs are to be guided by the long-term global needs to maintain reserves and to avoid both deflation and inflation in the world.

Two aspects of these international capital markets are especially important. First, the markets link the economies of the world together in just as effective a way as do trade flows themselves. Second, well-integrated international capital markets in the presence of a system of flexible exchange rates cause monetary policy to impact on the economy in a particular way.<sup>10</sup> Under these conditions, which have prevailed for the United States since 1973, the impact of monetary policy is on the export and import-competing sectors.

Agriculture as an export sector finds itself especially vulnerable. A great deal of the instability in U.S. commodity markets in the 1970s and early 1980s is due to the impact of the extremely unstable U.S. monetary policy on commodity markets through induced changes in the exchange rate.

Equally as important, when other countries fix the value of their currencies to the U.S. dollar, the impact of U.S. monetary policies is felt abroad. Both Brazil and Mexico, to cite only two examples, have had very sizeable shocks imposed on their agriculture in recent years by these exchange rate linkages.

### *Factors Conditioning Future Trade Patterns*

Trade patterns in the decade ahead will be influenced by many of the same factors that determined the changes in trade during the past decade. These include income growth, population growth, exchange rate realignments, changes in technology, domestic agricultural policies, and institutional changes affecting the conduct of trade.

The volume of trade in agricultural products increased to a somewhat greater degree in the 1970s than in the 1960s—about 37 percent and 28 percent, respectively (Table 5). The greater growth in imports during the 1970s came primarily from the developing market economies and the centrally planned economies. Import growth in the developed market

10. See Schuh, G. Edward, "Floating Exchange Rates, International Interdependence, and Agricultural Policy," in *Rural Change: The Challenge for Agricultural Economists*, edited by Glenn L. Johnson and Allen Maunden, Montclair, N.J.: Allanheld, Osmun Co., 1981, pp. 416-25. For a broader discussion of macroeconomic policies and their impact on trade, see Alex F. McCalla, "Impact of Macroeconomic Policies upon Agricultural Trade and International Agricultural Development," *American Journal of Agricultural Economics* 64(1982): 861-868.



economies was modest during both decades and changed little.

Export growth during the 1970s was led by the developed market economies, particularly by North America and Western Europe. Exports by the developing market economies increased by 15 percent and by the centrally planned economies by even less.

The large decline in U.S. agricultural exports since 1981 is part of a general decline in the world trade in grain and cereals. The factors affecting both trends are a severe world recession and a significant rise to the value of the U.S. dollar. Of particular importance to the stagnation of U.S. exports is the interaction between the value of the U.S. dollar and the domestic price support programs. The rise in the value of the dollar has caused the price support programs to price U.S. imports out of the market, provided incentives to producers in other countries to increase their output, and provided a price umbrella for other countries. Moreover, the strong dollar is due in no small part to the burgeoning fiscal deficit in the United States and the tight monetary policies used to contain inflation in the face of those deficits.

This constellation of forces is indicative of the broad perspective necessary to understand trade problems. How these forces will work themselves out in the future is at best uncertain. There is little reason at this point to expect the value of the dollar to decline significantly. There is reason, however, to expect the international economy to recover. Income growth is the key to future market growth.

Future patterns of trade in agricultural products, especially the grains, also will be influenced to a significant degree by the performance of agriculture, prices, and policies followed in the centrally planned economies. These countries account for a third of the world's population. Their per-capita imports, given their income levels, are low compared to the middle income developing countries. Part of the difference is accounted for by the large size of two centrally planned economies—the USSR and China.

## *World Food Problems*

For many low-income developing countries there exists a precarious balance between available food supplies and the

amount required to prevent widespread malnutrition and hunger. There are those who argue that this precarious balance will become less favorable in the years ahead. However, the available evidence indicates that there has been a very modest increase in per-capita food supplies since World War II in all the developing regions except Africa. The reasons for the unsatisfactory performance of agricultural production in Africa are complex, but there is general agreement that there is not a lack of material agricultural resources. Instead, limited human capital, exploitative agricultural price and income policies, and civil and political disorder seem to be primarily responsible for the deteriorating food situation in most African countries.

While hunger and its starkest manifestation, famine, probably affect a smaller percentage of the world's population today than ever before, poverty and inadequate food consumption continue as major policy challenges in the foreseeable future. How these challenges are met will have a significant effect upon world trade in agricultural products.

Food aid has been a popular approach to the alleviation of hunger. However, there is now much greater recognition of the limited effectiveness of food aid than there was during the 1950s and 1960s. Food aid in large amounts can have disincentive effects on farmers in the recipient countries and may well reduce the emphasis governments give to the development of their own agriculture. However, it is generally agreed that food aid can be of substantial value in emergencies, such as floods and typhoons, and in case of production shortfalls due to climatic conditions. Food aid also may be valuable to the recipient country if the aid is carefully targeted for uses such as school lunches, food for vulnerable groups, and food for projects with a high labor content such as rural roads, sanitation or land settlements.

Many developing countries follow policies aimed at achieving self-sufficiency. Such policies are likely to reduce the countries' incomes, since full advantage would not be taken of the potential available through international trade and specialization. Clearly, the United States has an interest in minimizing the emphasis on self-sufficiency, because of both its trade-restrictive effects and its adverse effects on incomes in the developing countries. As noted earlier, income growth is a major factor in expanding world trade.



# Agricultural Trade Policy Issues Facing the United States

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The increased linkage of American agriculture to world markets has a number of important effects. Foreign markets have become basic to economic health on the farm and to future growth in U.S. agriculture. They contribute to the U.S. balance of payments and create substantial employment throughout the food system. U.S. policy thus needs to be formulated in terms of this increased linkage to world markets and the interface of domestic and international policy.

These changing conditions require an expanded information base to assist in formulating domestic and trade policies as well as to provide knowledge that is of more general value to society. In developing this informational base a wide range of policy issues and problems need to be taken into account. Some of the more important of these are discussed in this section.

## *Comparative Advantage in Agriculture*

The issue of comparative advantage concerns whether the world's agricultural resources are being used in the most efficient manner, i.e., whether the world food supply is being produced as cheaply as possible. There are substantial gains to be realized from specialization and exchange through international trade. The United States has a significant comparative advantage in the production and export of a number of agricultural products which has been exploited to our national benefit.

Comparative advantage, however, is a dynamic concept. Unless a country actively strives to maintain its comparative advantage in a particular product or products, its competitive position in the world market may be eroded over time.

Traditional agriculture tends to be based on resources—primarily land, labor, and limited amounts of physical capital in the form of simple implements. Modern, highly productive agriculture, on the other hand, tends to be based on science and technology. This requires investments in agricultural research, extension, and the education and training of the labor force.

Investments in science and technology lead to modern inputs, many of which are purchased from the non-farm sector. These modern inputs include improved high-yielding varieties, fertilizer, machinery and equipment, and pesticides. Increased use of these inputs raises the productivity of land and labor and helps to give a country a comparative advantage in international markets.

Research has shown that the social rate of return to such investments is quite high.<sup>1</sup> In fact, they are so high that they imply a significant underinvestment in such activities, with

the result that society has foregone potential productivity gains.

Clearly, domestic economic policies, an adequate market and transportation infrastructure, the basic resource endowment, and policies in other countries are all factors affecting the comparative advantage a country has in particular products. However, sustaining a strong technological basis for production also is a key factor.

An important factor on the world scene is that the technological base of agriculture is changing rapidly. The international community has established some twelve International Agricultural Research Centers<sup>2</sup> which produce and distribute new production technology for the less-developed countries. In addition, many countries such as Brazil are investing heavily to develop their own technological base. Hence, if the United States is to retain its competitive edge in international markets it will need to sustain and even increase its investments in agricultural research and development. It also needs to know how investments in science and technology elsewhere are altering its comparative advantage.

## *Sustaining an Efficient Transportation and Marketing Sector*

American grain producers have benefited from a relatively cheap internal transportation system and an efficient marketing system. These have permitted a large fraction of the world market price of grains to be paid at the farm gate, and have permitted the comparative advantage we have in agriculture to express itself.

A key element in the low cost of transportation is the Mississippi River, since water transport is the cheapest way of moving bulky commodities like grains. In addition, the countryside was interlaced early in its history by a system of railroads which, until recently, were required by the government to maintain service regardless of profitability.

In addition to the railroad system, the construction of the interstate highway system in the post-World War II period increased the speed and lowered the cost at which goods could be moved long distances by truck. More recently there

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1. For a summary of the data, see Robert E. Evenson, Paul E. Waggoner, and Vernon W. Ruttan, "Economic Benefits from Research: An Example from Agriculture," *Science* 205 (1979): 1101-1107.
  2. For detail on this system see *The Second Review of the CGIAR System*, A Report of the Review Committee, Consultative Group on International Agricultural Research, November 1981.



have been significant innovations in the railroad system. Large volumes of grain, for example, now move to both Atlantic and Pacific ports on unit trains.

The American transportation system held up remarkably well under the large increase in volume of agricultural products moved to ports for shipment overseas during the 1970s and early 1980s. However, a number of cracks are beginning to show. Rail car shortages have occurred when exports were at peak levels. Interstate highways and bridges are in an increasing state of disrepair. Parts of the river system are in need of expansion and/or major repair.

Government regulation introduced a number of distortions into the transportation system which partly explain some of the problems we now observe. The United States historically and currently controls energy prices. The relatively low price of gasoline stimulated heavier reliance on truck transportation and abandonment of the railroads. The rates that may be charged by both have been regulated by the government.

With lower use rates and fixed prices in the face of rising costs and an inability to adopt labor-saving technologies, railroads have been unable to maintain rights-of-way and rolling stock. Moreover, recent movements towards deregulation have permitted railroads to consolidate their resources on the most profitable runs. Historically, transport costs in many rural areas have been implicitly subsidized since the railroads often lost money on routes which served these regions and made up the difference on more lucrative runs. Now, however, many little-used tracks, often the only long-distance transportation in rural areas, have been abandoned. Consequently, there will be significant changes in the location of production within the United States.

The United States is blessed with an unusually efficient marketing system. The combination of a relatively efficient transportation system, our unusual communication system, open markets, and a dynamic private sector have permitted changes in supply and demand to be reflected quickly in market prices that guide producers and consumers. At times government intervention and commodity programs have interfered with these signals, but the marketing and pricing system overall has performed amazingly well.<sup>3</sup>

An efficient, low-cost transportation and marketing system is required for a country's agricultural comparative advantage to express itself. North America did not become an

important cereal exporter until ocean freight rates fell with the advent of the steamship in the 19th century. We have benefited greatly from the ability of our marketing and transport system to facilitate the large increases in agricultural exports which have occurred in the past decade. However, a number of problems are beginning to arise which must be addressed if we are to maintain our comparative advantage. The problems with the transportation system and the adjustments required by its deregulation are important research topics.

## *Price Instability in International Commodity Markets*

During the 1950s and 1960s U.S. commodity markets were fairly stable. Year-to-year changes in prices tended to be small, and for many commodities there was a downward trend in prices in response to rapid technological change.

A number of factors account for this stability. First, except for a few commodities, agriculture was relatively closed to trade at that time, and hence changes in the international economy had relatively limited effects on the domestic economy. Moreover, domestic commodity programs, buttressed by large government reserves, helped to stabilize prices when there were external shocks. The government accumulated stocks when prices trended downward in order to hold prices up, then released them when market conditions began to push prices up. Monetary policy during this period was also relatively stable.

This situation changed dramatically in the 1970s and 1980s. Instability has become the order of the day as prices fluctuate widely from record peaks to near-record lows. This increased instability has a number of explanations. Most of these will be discussed in this section; the role of monetary policy and monetary instability will be addressed in the next section.

One of the major sources of instability was the expansion of the Soviet Union into international commodity markets in 1972 and 1973, causing rapid price increases. The instability of Soviet agriculture, due in part to unstable weather patterns, was transmitted to international commodity markets.<sup>4</sup> The 1975 U.S.-Soviet trade agreement helped reduce some of this instability by requiring the Soviets to purchase minimum quantities regardless of need and by placing a cap on exports from the United States if necessary to keep domestic prices from rising excessively.

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3. Conklin, Neilson C. and Dahl, Reynold P., "Organization and Pricing Efficiency of the U.S. Grain Export System," *Minnesota Agricultural Economist*, No. 635 (May 1982); and General Accounting Office, *Market Structure and Pricing Structure of U.S. Grain Export System*, Report to the Congress by the Comptroller General of the United States, CED-82-61, June 15, 1982.

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4. Johnson, D. Gale, *The Soviet Impact on World Grain Trade*, Washington, D.C.: National Planning Association, 1977.



The large Soviet purchases of the early 1970s depleted U.S. stocks that had been the main source of reserves in the previous decade. For a number of years this decline reduced the ability to deal with external shocks to the markets. Moreover, it engendered a scarcity syndrome around the world that caused many importing countries to overcommit themselves in relation to their marketing demands. This further increased instability, since it led to higher prices when purchases were made, but lower prices in later years when demands declined.

Another factor contributing to instability was the tendency of many countries to insulate their domestic economies from the vagaries of international commodity markets.<sup>5</sup> This insulation by means of trade barriers means that neither consumers nor producers receive the necessary signals to alter their consumption or production in line with changed market conditions. Consequently, weak—if any—incentives are provided to bring about balance in the markets.

Perhaps the best example of this problem was the large increase and subsequent decline in sugar prices in 1974. During that price gyration only two countries, the United States and Japan, permitted the prices in international markets to pass to domestic consumers and producers. Consequently, only weak signals were given to consumers to reduce consumption or to producers to increase production, and so there were only weak incentives to restore balance to the markets.

The weather, of course, is often given as a cause of instability. This explanation probably tends to be overused. In reality, bad weather in one part of the world is typically offset by good weather in another part. If trade in agricultural products were relatively free, bad and good weather would balance out with, for example, shortfalls in one area being offset by imports from a “surplus”-producing area.

Clearly, large variations in production by important trading countries such as the United States or the Soviet Union could have an impact on the markets. But even in these cases it is the barriers to trade and the failure to let domestic prices reflect international market conditions that are the ultimate source of the instability.

Many observers argue that the key to reducing price instability is to have the government carry large buffer stocks. But experience suggests that such a policy may be misguided. The Food and Agriculture Act of 1977 established a farmer-owned grain reserve that was designed to operate with a system of price bands for the major commodities. Under this system, the government was to pay farmers to isolate stocks from the market when prices went below the lower price

band and release them into the market when prices rose above the upper price band.

This system has been largely ineffective, and for a number of reasons. First, although it is easy to imagine that in principle stocks can be managed so as to be stabilizing, in practice it is a very difficult thing to do. In a world of imperfect information it is difficult to know when stocks should be accumulated or released.

Second, it is very difficult to keep policymakers and politicians from modifying stock levels in response to political pressures. For example, after the 1980 embargo on sales to the Soviet Union, the farmer-owned reserve was opened and incentives were offered to farmers to participate as a means of offsetting the expected effects of the embargo. Similarly, there has been a failure by the present administration to cap the reserve, also in an attempt to raise farm prices. This caused stocks to burgeon once again, leading to more instability and enormous government costs.

Perhaps the most damaging criticism of government-managed stocks is that they tend to insulate the producer from underlying economic forces and therefore postpone adjustment in resource use. This is an important source of instability in its own right.

Ultimately, commodity markets will become more stable only as international trade becomes freer and markets become more open. Instability is a problem of trade policy and not of stocks. The solution to the problem needs to be sought in part in improved trade policy.

## *Monetary Instability as a Source of Commodity Market Instability*

Changes in the structure of the international economy and in institutional arrangements cause monetary policy to now be an important source of instability for agriculture. One of the significant changes in the structure of the international economy was the emergence of a well-integrated international market for capital, as discussed above. Another significant change in international institutional structure was the shift from fixed to flexible exchange rates, which occurred in 1973.

These two changes cause monetary policy to affect the economy in a very different way than it did when there was virtually no international capital market and exchange rates were fixed. Prior to the changes, the effects of monetary policy were felt rather broadly in the economy, with the construction industry generally bearing a disproportionate share of the adjustments to changes in monetary policy. Since the changes, the impact of monetary policy has been felt in

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5. Johnson, D. Gale, “World Agriculture, Commodity Policy, and Price Variability,” *American Journal of Agricultural Economics*, 57(1975): 823-32.



large part in the export and import-competing sectors.<sup>6</sup>

Suppose, for example, the Federal Reserve decides to slow down the economy by pursuing a tight monetary policy. Interest rates will rise, inducing an inflow (reduced outflow) of capital. The inflow of capital will bid up the value of the dollar in foreign exchange markets, making our exports less competitive in foreign markets, and choking off our export sectors. Similarly, the rise in the value of the dollar causes imports to enter the country at a low price relative to that of domestic resources. This inhibits the domestic sectors (e.g., the automobile, steel, and textile industries) which compete with imports.

Precisely the reverse occurs when the Federal Reserve decides to stimulate the economy by pursuing an easy monetary policy. Consequently, we see that the export and import-competing sectors now bear the burden of adjustments to changes in monetary policy. As an export sector, agriculture now has to bear the burden of changes in monetary policy.

Two additional characteristics of the changing world order are important in understanding the significant increase in instability in agriculture in the 1970s and early 1980s. The first is the emergence in the United States of a very unstable monetary policy starting in about 1968. The second is the existence of barriers to trade, which limit adjustment in the world economy, causing monetary shocks to the system to be transmitted in large part to economies such as that of the United States which have relatively open trade sectors.

To summarize, what has been widely interpreted as a problem of the weather in the 1970s, as well as the doldrums that agriculture currently faces, have in reality been largely monetary phenomena. The value of the U.S. dollar has risen dramatically in foreign exchange markets since 1980. This rise has been due in part to the dramatic decline in our petroleum import bill as a consequence of the deregulation of the petroleum industry. It has also been due in part to the burgeoning deficit in the federal budget which the Federal Reserve has been unwilling to monetize. This has caused unprecedentedly high interest rates, which have contributed to a strong dollar.

The key policy issues, of course, evolve out of the greatly increased interdependence among monetary, fiscal, and commodity policy. What we have been experiencing are monetary disturbances which the commodity programs are not able to offset. These linkages need a great deal more attention than they have received in the past.

## *Resource Management in the Context of Rapidly Changing Foreign Demand*

Only a few short years ago the American agricultural plant was at or near full use. The surplus land associated with programs to reduce output during the 1950s and 1960s had been brought back into production. There was concern that we were exporting our natural resource base. And an April, 1981 USDA study suggested that export expansion through the 1980s would be sufficient to create increasing pressure on the U.S. agricultural resource base.<sup>7</sup>

At the time of this writing the U.S. faces exactly the opposite problem. Production has burgeoned at the same time that export markets have dwindled. The result is a serious income problem among American farmers, large stocks that are costly to carry, and commodity programs that have become very costly to the government. In addition, a Payment In Kind (PIK) program has been implemented which seeks to idle up to 30 percent of the land that would have been planted to corn and wheat.

Policies are needed to deal with these resource management problems. Resources must now be adjusted out of agriculture to bring about a better balance between demand and supply. Positive adjustment policies are necessary components of overall economic policy if a country desires to make best use of its own and the world's resources by responding to changing conditions in international markets. Although adjustment policies are not popular with either political constituencies or policy markets, they are the only way to maintain an open economy with relatively free trade.

Despite the current problem of excess production, there is a reasonable probability that within the next decade or so we will be expanding output and again straining against our natural resource base. Using resources efficiently will be a problem then as it is now. Soil erosion needs to receive more attention. And we must do a better job of managing our water resources. Natural aquifers are being drawn down in many areas such as the High Plains of Texas, Arizona, and the Ogallala aquifer of the Central West. These aquifers have been the primary support for significant increases in irrigation over the last ten to fifteen years. The loss of these water sources could have significant policy implications in the future.

In addition, U.S. water policy has resulted in excessive use

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6. Schuh, G. Edward, "Floating Exchange Rates, International Interdependence, and Agricultural Policy," in *Rural Change: The Challenge for Agricultural Economists*, edited by Glenn L. Johnson and Allen Maunden, Montclair, N.J.: Allanheld, Osmun Co., 1981, pp. 416-25.

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7. O'Brien, Patrick M., "Global Prospects for Agriculture," *Agriculture—Food Policy Review: Perspectives for the 1980's*, USDA Economics and Statistics Service, AFPR-4, April 1981.



of water at highly subsidized rates,<sup>8</sup> leading to depletion and loss of water for future generations. Rational policies are needed if this nation is to have the capacity to respond to expanding trade opportunities in the future.

It is true, of course, that U.S. agriculture is no longer primarily resource-based, but is instead based on science and technology. But there is cause for concern even in that area. Federal expenditures on agricultural research in constant-value terms have been stagnant for some time. Moreover, a recent assessment suggests that the potential for increased growth in productivity based on conventional technologies during the 1980s is limited, and that new biotechnologies with potential for significant impacts on yields will not become available until sometime beyond 1990.<sup>9</sup>

To conclude, the trade potential of agriculture in the years ahead will depend very much on how well we manage our resource base. Policies are needed which help adjust resources out of the sector in periods of excess demand, as well as to sustain and strengthen the natural resource base so as to meet expanding demands in the future. The linkages between trade policies and domestic policies also need increased attention.

## *Energy from Agriculture*

The U.S. Energy Security Act of 1980 established a gasohol production target of at least 10 percent of total U.S. gasoline consumption by 1990—a total of nearly 10 billion gallons of fuel alcohol. The program's principal objective is to contribute to U.S. energy security by reducing our dependence on petroleum imports; it also aims to improve the U.S. balance of payments.

Substantial federal subsidies have been provided to help reach the stated production goal, and numerous states have exempted gasohol from excise taxes. D. Gale Johnson<sup>10</sup> estimates that the total subsidy for this program will be on the order of \$10 to \$12 billion per year and the dead-weight welfare loss will be approximately the same amount. Subsidies of this magnitude imply a substantial diversion of resources from food production.

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8. GAO, *Federal Charges for Irrigation Project Reviewed Do Not Cover Costs*, Report to the Congress by the Comptroller General of the United States, PAD-81-07, March 13, 1981.

9. Sundquist, W.B., "Management of our Productive Capacity," *Increasing Understanding of Public Problems and Policies—1981*, Farm Foundation, 1981.

10. Johnson, D. Gale, "Agricultural Policy Alternatives for the 1980's," in: *Food and Agricultural Policy for the 1980's*, edited by D. Gale Johnson, Washington, D.C.: American Enterprise Institute, 1981.

Although they are seldom considered in discussion of this issue, this program has important trade implications. If fully implemented, it would use approximately 25 percent of the U.S. corn crop. It would also bring about important changes in the soybean sector. Diversion of this much of our output to the domestic industrial sector would be at least partly at the expense of our export markets. Moreover, gasohol would reduce petroleum imports. Either way, the trade implications are significant, both to the United States and to other countries.

## *Grain Prices and Food Prices*

As noted earlier, the U.S. food and agricultural system is now part of a world food and agricultural system. Consequently, food and grain prices in the United States are determined as much by supply and demand conditions in the rest of the world as by conditions in the United States itself.

The apparent instability of this new system is of special significance to U.S. producers and consumers alike. Since the implications for producers and for commodity policies have been discussed elsewhere, we focus in this section on implications for the consumer and for food policy.

The cost of the raw agricultural product represents a fairly small fraction of the price paid by consumers for many foods. Nevertheless, increases in the prices of the raw agricultural products are often viewed as the culprit when consumer food prices start to rise. There are probably a number of reasons for this association. For one thing, processors and distributors probably mark up prices somewhat, increasing the prices of the final product when the prices of their raw materials start increasing. In addition, the prices of raw agricultural products are likely to increase at a time of generalized inflation since they tend to be more flexible than the prices of other products. Hence, there is a certain amount of guilt by association.

When prices of agricultural products were relatively stable, as in the 1950s and 1960s, this link between the price of agricultural commodities and the price of food was seldom a serious issue. When agricultural prices became highly unstable during the rapid general price inflation of the 1970s, they became a serious issue. Consequently, an embargo was placed on the export of soybeans in 1973, and a temporary embargo was placed on exports of all commodities to the Soviet Union in 1975.

These embargoes constituted serious disruptions to trade. The soybean embargo in particular had serious consequences because it gave the Japanese incentive to diversify their trade. More generally, erratic disruption of trade of this kind encourages individual countries to become more self-sufficient and less dependent on trade. This results in loss of markets for U.S. producers, and also a loss in income for the



world economy as a whole if self-sufficiency is pushed into inefficient ranges.

The policy issues involve all those things needed to make for more stable commodity markets: fewer barriers to trade, a reduction in monetary instability, a system of reserve stocks that can be effectively deployed in times of tight markets, and an improved information system that enables decisionmakers, both public and private, to make better decisions. They also call for research to better understand the forces that create instability and to provide means of dealing with it.

## *Agriculture as a Source of Foreign Exchange*

The large increase in foreign exchange revenue from agricultural exports in the past decade has contributed significantly to our balance of payments and to the strength of the U.S. dollar. This has been particularly important since the 1973 and 1979 increases in petroleum prices. It appears that the United States maintains its strongest comparative advantage in agricultural products and in high-technology manufactured products. However, in contrast to the more than \$20 billion surplus which it reaps on its agricultural trade accounts, the United States incurs approximately a \$60 billion deficit in its trade accounts of non-agricultural products.

The overall balance of payments equals the net balance on trade in goods and services plus net capital flows to or from the rest of the world. The latter includes returns on past American investments overseas as well as direct investments by foreigners in the United States, including purchases of stocks and bonds, manufacturing facilities, and hotels and farmland. When we import more than we export, we must either borrow abroad or reduce our net worth by selling assets to foreigners in the same way that other countries have let Americans invest in their countries.

Without a high volume of agricultural exports, the U.S. dollar surely would have been even weaker on foreign exchange markets than it was in the latter half of the 1970s. This would have caused still higher prices on traded goods in the United States, greater net acquisitions of U.S. assets by foreigners, or some combination of the two. A strong export performance enables us to purchase the petroleum, raw materials, and consumer and capital goods that we need from abroad, and helps to maintain a strong dollar. This in turn allows importation of those goods and services at a smaller sacrifice in terms of domestic resources.

U.S. policy in recent years has been to maximize agricultural exports, in part because of the income support for farmers which a strong export performance brings. At the same time we have had a strong export drive, however, critics have contended that we were exporting our natural resource

base. The goal should be to make most efficient use of our resources, including the most efficient use through time. The policy issue, then, is to identify an optimal export strategy that includes an optimal level of exports.

Another current issue is the drive to export more value-added and fewer raw agricultural products. The expectation is that this will earn more income for the United States and create significantly more employment in the processing and distribution sectors.

The difficulty with this otherwise desirable policy objective, however, is that most countries—including this one—escalate their tariff structures against value added. Raw coffee beans, for example, come into the United States with no tariffs, but freeze-dried coffee commands a tariff of sixty cents a pound. Obviously, every country prefers to create employment at home.

If this problem is to be solved it will be only through negotiations which lead to general reductions of tariffs. Such negotiations demand knowledge of the consequences of the protective measures and of the trade-offs from reducing them.

## *The United States as an Importer of Agricultural Products*

The United States is not only a major exporter of agricultural products; it is also a major importer. These imports are for the most part tropical products such as coffee, tea, cocoa, and bananas, which do not compete with domestic products. However, some imports such as cheese, Mexican tomatoes, beef, and sugar compete directly with domestic products.

Two categories of policy issues arise from these imports. The first category involves the imports of products that compete directly with domestic producers. One such policy issue has to do with whether these products can be imported at a lower cost than they can be produced at home. If they can be, consumers and the nation as a whole benefit from the imports. A second policy issue has to do with the displacement of domestic production and the ability to adjust the displaced resources to other activities.

Overall, the United States has probably been more protectionistic for some of these products than it really needed to be. However, such protectionism should not be confused with the Section 22 provision of the Agricultural Adjustment Act, which protects the U.S. Treasury when domestic commodity programs set prices above international levels at prevailing exchange rates.

The second set of issues has to do with the noncompeting tropical products which foreign countries would like to export with more value added. With both these products and



those that compete with domestic production we need to keep in mind that trade is a two-way street. The United States can export more only if it is willing to accept more imports, all other things being equal. If those countries should have a comparative advantage in those products over the United States it is in our best interests to accept the products and deal with our adjustment problem accordingly.

### *Maintaining U.S. Commodity Policies That Are Consistent With an Open-Economy Exporting Stance*

When exports are as important as they have become to U.S. agriculture, commodity policies should be consistent with a trade stance. Unfortunately, that is not now the case in the United States; domestic commodity programs are inimical to the interests of U.S. producers as well as the nation as a whole.

The reasons for this inconsistency are largely historical. In the immediate post-World War II period, trade was much less important to U.S. producers in both relative and absolute terms. When, for a number of reasons, U.S. products were priced out of international markets, exports were sustained by a combination of direct export subsidies and indirect subsidies by means of concessional food aid (PL-480). Shipments under PL-480 in the early and mid-1960s accounted for a relatively large share of our total exports.

When the export boom arrived in the 1970s and the United States became very competitive in foreign markets—in part because of the decreased value of the U.S. dollar—concessional sales declined very significantly, direct export subsidies were phased out, and the bulk of our exports were sold on a direct commercial basis. At the same time, significant changes were made in domestic commodity programs through the Food and Agricultural Act of 1977. Policy shifted from a system of rigid price support towards one of price

bands that permitted more price flexibility and a greater play of market forces.

Together with the system of price boards, a farmer-owned grain reserve and greater use of deficiency payments to support farmers' income created a greater range for the free flow of market forces. Nevertheless, policymakers maintained several policy instruments such as the reserves, the target price level, and the loan rate which in principle enabled them to manage the markets.

This innovative set of policies was consistent with increased dependence on trade, and worked reasonably well until the embargo on exports to the Soviet Union in early 1980 and the later large rise in the value of the dollar. In response to the embargo, both the administration and Congress began to change the rules of the game to compensate producers for their loss in sales. Many of the desirable properties of the system were lost as income protection came to the fore again.

The very large rise in the value of the dollar during 1981 and 1982 has had similar deleterious consequences for the commodity programs. As domestic prices were translated abroad at much higher rates (the dollar rose some 20 percent on a trade-weighted basis in these two years), U.S. exports were priced out of foreign markets. Moreover, the loan levels in some cases became an umbrella for producers in other countries to undersell U.S. exports. Hence, we find ourselves in an anomalous situation: our programs are sending strong signals to producers in other countries to produce more; they provide an umbrella for their sales; and we cannot effectively compete. It would be difficult to find a better policy for losing market share.

To further compound the problem, the programs have provided a mechanism by which the "excess" production is channeled into farmer-owned reserves. These stocks have burgeoned and are now becoming a major drain on the U.S. Treasury as well as hanging over the markets.

A key policy issue facing U.S. agriculture today is to devise commodity programs that are more consistent with our increased dependence on trade and with the changes in the international system which make such large realignments in currency exchange rates possible.



# Scope, Participants, and Current Trade Research Activities

This section is organized into two parts. The first briefly characterizes and identifies the practitioners of current agricultural trade research. The second presents a brief overview of the resources devoted to trade research.<sup>1</sup>

## *Scope, Nature, and Apparent Participants in Trade Research*

Despite the breadth of information reviewed, it is difficult to characterize research related to agricultural trade. The closest one can come is to say that it is diverse (scattered) and generally thin. It is relatively easy to identify research which explicitly deals with (1) the description of trade origins, destinations, and flows and related policies; (2) operations of international markets (usually commodity markets); (3) impacts of domestic policies on trade; (4) product development, packaging, standards and transportation explicitly for international markets; and (5) international market intelligence. It is harder to differentiate ongoing production, marketing, policy, and resource research which is primarily domestically oriented yet which implicitly has international ramifications. Further, there is the problem of potentially trade-related research done in public agencies outside of the USDA and the State Agricultural Experiment Stations (SAES)

or in the private sector, since there is no organized directory for such work.

Finally, it is difficult to draw the line between research and market intelligence or current outlook material. A great deal of information accumulated and transmitted by various USDA agencies, particularly the attache service of the Foreign Agricultural Service (FAS) falls into this category, as does a considerable amount of similar work done on an ad hoc basis by the private sector. The volume of such activity has increased substantially in the last ten years.

Despite these difficulties, an attempt is made here to categorize research. A classification scheme for looking at research activities (Figure 1) is used in this section to briefly characterize the nature and practitioners of research. In the next section an attempt is made to quantify the effort in terms of dollars and scientist years (SY).

Research is first separated into economic (social science) and physical-biological research. These categories are then subdivided into research which explicitly contains some reference to trade, traded products or international ramifications and research which, while domestically oriented, may have usefulness to international research. Each of these four categories is discussed in turn. A separate section then provides an overview of the market intelligence work.

### **IA. Economic Research—Explicitly International**

*1. World Market Analysis.* Four subcategories are identified. The first two, macromonetary and conceptual and methodological, contain occasional work from the agricultural research establishment; however, as one would expect, most of the research in these categories is economy-wide and is pursued mainly in economics departments and economics research agencies. In general this research is the disciplinary base upon which agricultural trade research builds.

The third subcategory relates to global analysis of trade relationships among national agricultural sectors. Here there are few entries, principally because of the massive time, data, and computing requirements of such research. The USDA Grains, Oilseeds, and Livestock (G.O.L.) model and the Michigan State University (MSU) model are prime examples.

Most global agricultural trade research falls in the fourth category, analysis. Here, four different but closely related types of research activities occur: descriptive research on trade patterns and flows; research on price formation, frequently done in terms of net supply and demand models; attempts to introduce domestic policy into both price and trade pattern research as an endogenous variable; and—most prominently—development of future policy scenarios. A review of printouts from the Current Research Information System (CRIS) and dissertation abstracts suggests that significant quantities of commodity-oriented research occurs in the Economic Research Service/USDA and in universities. Most attention is paid to major commodities—grains, oilseeds,

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1. The information contained in this section is drawn from the following sources:
    - (1) two CRIS printouts, one keyed to pull all research projects in the following Research Problem Areas (RPAs) (FY 79-80 + NEW):
      - 506—Supply, Demand, Price Analysis—Crop and Animal Products
      - 507—Competitive Interrelationships in Agriculture
      - 508—Development of Domestic Markets for Farm Products
      - 509—Performance of Marketing System
      - 601—Foreign Market Development
      - 602—Evaluation of Foreign Food Aid Programs
      - 603—Technical Assistance to Developing Countries
      - 604—Product Development and Marketing for Foreign Markets
    - (2) A search of the Bibliography of Agriculture (AGRICOLA-Agriculture on-line access) key words: international agriculture trade—1970-77.
    - (3) A search of Dissertation Abstracts 1970-77—key words: international economics-agriculture.
    - (4) Ph.D.s awarded at the University of Chicago.
    - (5) Summary Data from FY 1979 Inventory of Agricultural Research—Funding Support and Total Funds by Performing Organization. Shows dollars and scientist years (SYs) for RPAs 506-509 and 601-604.



**Figure 1. Classification Scheme for Agricultural Trade Research**

- I. *Economic Research*
  - A. Explicitly International Research
    1. World market analysis
      - a. macromonetary analysis—general
      - b. conceptual and methodological
      - c. agricultural sector—e.g., G.O.L., MSU
      - d. commodity analysis
        - i. trade patterns—flow—origins—destination
        - ii. price formation
        - iii. integrated, including policy and/or prices and patterns
        - iv. prospects
    2. Country-oriented with explicit international component
      - a. country supply and demand characteristics leading to import demand or export supply—current and future prospects—projections
      - b. U.S. models with world built in—usually bilateral U.S.—ROW
    3. State-Commodity approaches
      - a. export prospects for state commodities
      - b. flows of state products to export markets
      - c. state or region export market analysis, e.g., demand for Pacific Northwest soft white wheat in Japan
  - B. Research with Implicit International Impact
    1. Domestic supply, demand, price and policy analysis
      - a. general
      - b. commodity
    2. Domestic marketing and/or industry analysis
    3. Domestic policy analysis
    4. Agricultural development research
    5. Transportation analysis
- II. *Physical and Biological Research*
  - A. Explicitly International Research
    1. Production research on export crops
    2. Product development, packaging, grades and standards, etc.
    3. Technology for trade or transfer—e.g., cooperative research with International Centers
  - B. Research with Implicit International Impact
    1. Production, pest management, etc.
    2. Product development, food science, nutrition, etc.
    3. Technology and mechanization
    4. Basic research—e.g., nitrogen fixation
- III. *Market Intelligence*

livestock products, and tropical products. Far less attention is paid to specialty crops, although a number of Ph.D. dissertations have been done on specialty crops of particular interest to the state or to the student's home country.

2. *Country-Oriented*. Two subcategories are identified. The first deals with country analysis in terms of analysis of supply and demand (including policy variables) in a particular country's agricultural sector as a means of projecting export supply or import demand. This type of study is usually short-term and is predominately done in the USDA (ERS and FAS) as policy or projection analysis, or in universities as Ph.D. dissertations. A surprisingly large number of country

studies are produced in the latter case; the most obvious characteristics of these studies is their almost random character and their lack of additivity.

The second category covers studies of U.S. agriculture and its interactions with the rest of the world. These studies are most frequently done in the USDA and tend to be oriented toward particular subsectors or commodities rather than toward the entire agricultural sector.

3. *State-Commodity Approaches*. For many SAES the only project on the books with an international flavor relates to the first two categories in this section, namely export prospects and export flows for important state crops. In general, these types of analyses border on market intelligence work, producing mainly descriptive information useful in extension or teaching efforts. A few state or regional projects focus on the third category, markets for crops peculiar to the state or region.

The largest concentration of economic research on agricultural trade in Category IA is in the International Economics Division (IED) of ERS/USDA. The efforts of IED are divided into large global projects: World Demand, Supply Price and Forecasting; World Agricultural and Food Statistics; International Agricultural and Economic Policy Research; and a series of Regional Research projects covering the six regions that the IED recognizes (Africa and the Middle East; Eastern Europe and the USSR; Western Europe; North America and Oceania; Latin America; and Asia). IED efforts represent about one-third of the total research activities of the ERS.

Several international organizations also conduct agriculturally related trade research. These include the International Food Policy Research Institute (IFPRI); the World Bank; GATT; UNCTAD; and the Organization for Economic Cooperation and Development (OECD). While these efforts are not large and are often either descriptive or oriented toward developing countries, they do represent an ongoing contribution to our total knowledge.

In summary, much explicitly international economic research, particularly that covered in categories 1c, 2, and 3, seems sporadic and unique. Individual studies tend to be one-shot efforts which address specific questions; they quickly become dated and add to general knowledge of country or commodity trade only by coincidence. This is particularly true of SAES projects and Ph.D. dissertations. Only the major modeling efforts of the USDA seem to stress continuity and intercountry and intercommodity relationships. This results not necessarily from lack of concern about issues of continuity or additivity, but from the complexity and costs of doing continuous, general equilibrium research which builds on previous work.

### **IB. Economic Research with Implicit International Impact**

Little can be said specifically about this category. Clearly,



**Table 6. Scientist Years and Funding for Agricultural Trade Research: SAES, Forestry and Cooperating Institutions; USDA; and National Totals—RPA's<sup>a</sup> 506-509 & 601-604, Fiscal Years 1975-79**

RPA No.	Year of Report									
	1975		1976		1977		1978		1979	
	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000
<u>SAES, Forestry and Coop Inst.</u>										
RPA's 506-509	96.50	4,976.2	107.8	6,430.7	111.1	7,066.5	114.5	7,890.3	118.1	9,234.4
RPA's 601-604	30.20	1,187.5	38.0	1,970.0	33.3	2,227.1	34.0	2,051.2	40.8	2,588.8
Total	126.70	6,163.7	145.8	8,400.7	144.4	9,293.6	148.5	9,941.5	158.9	11,823.2
<u>USDA</u>										
RPA's 506-509	161.30	8,350.9	162.7	9,840.9	175.2	9,815.9	171.6	11,305.8	176.7	11,294.0
RPA's 601-604	101.20	5,599.1	123.1	6,746.8	107.7	6,378.6	105.8	6,962.5	105.2	8,307.2
Total	262.50	13,950.0	285.8	16,587.7	282.9	16,194.5	277.4	18,268.3	281.9	19,601.2
<u>National Total (SAES &amp; USDA)</u>										
RPA's 506-509	257.80	13,327.1	270.5	16,271.6	286.3	16,882.4	286.1	19,196.1	294.8	20,528.4
RPA's 601-604	131.40	6,786.6	161.1	8,716.8	141.0	8,605.7	139.8	9,013.7	146.0	10,896.0
Total	389.20	20,113.7	431.6	24,988.4	427.3	25,488.1	425.9	28,209.8	440.8	31,424.4

Source: Collated by the authors.

<sup>a</sup>Research Problem Areas

better understanding of major variables of supply, demand and policy on a country-by-country basis is crucial to effective trade research. Similarly, an understanding of domestic marketing and transportation systems and of the role of agriculture in economic development is important to trade research. The difficulty is that it is hard to determine from statements of objectives or reports of results if the international dimension was considered or if the results, produced to satisfy domestic objectives, are useful for trade analysis. There is, as the CRIS printouts suggest, considerable work done on U.S. domestic policy issues in both the USDA and the universities (Table 6), but how well it is articulated with trade research needs is open to question.

### ***IIA. Physical and Biological Research—Explicitly International***

1. *Production Research on Export Crops.* There are occasional projects on the books which report production research on specific (generally new) commodities with the intent of exploiting marketing opportunities. Such research is much more likely to occur in the form of research for domestic purposes (see IIB-1) with intended or unintended international ramifications. Thus, it is impossible to accurately assess the character or quantity of this research.

2. *Product Development, Packaging, Grades and Standards, Etc.* The amount of effort here represents 20 percent of USDA efforts under Research Problem Areas (RPAs) 601-604. Most of this research is reported under RPA 604. As Tables 7 and 8 show, this area is almost the exclusive province of the USDA, principally the Agricultural Research Service (ARS). A sample of the project titles illustrates the character of this research as commodity and market oriented: Transporting

Livestock Overseas; High-Temperature Soybean Oil for Export Markets; Improved Preparation, Packaging, and Handling Methods for Overseas Marketing of Perishable Products; Maintaining Quality in Exported Texas Fruits and Vegetables.

3. *Technology for Trade or Transfer.* Little research is reported in this category except for cooperative production (principally breeding) projects with the International Agricultural Research Centers (CGIAR). It is difficult to go further in characterizing this category.

### ***IIB. Physical and Biological Research with Implicit International Impact***

This category is included in order to complete the classification, but little can be said about international dimensions of this research. It is in this category that the vast majority of USDA-SAES funded research occurs. Clearly, some of it must have international implications. For example, basic research on nitrogen fixation could have significant world market impacts, but it is unlikely that much attention is being paid to that potential impact. Our suspicion is that, in general, international dimensions of biological and physical science research receive even less attention than those of economics research; however, we have no way of proving this.

### ***III. Market Intelligence***

As noted earlier, the Commodity Analysis, Trade Policy and Attache divisions of the FAS collect and disseminate very useful information about commodity trade and agricultural development and policy in individual countries. While most of this work is best characterized as market intelligence work, it is nonetheless an important and necessary input into trade



**Table 7. Scientist Years and Funding for National Total SAES/USDA, FY 1975-79**

RPA No.	1975		1976		1977		1978		1979	
	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000
506	108.7	5,699.3	123.2	7,049.3	130.0	7,875.7	127.9	8,732.3	136.7	9,932.0
507	24.0	1,173.7	27.6	1,386.3	20.6	1,035.5	21.6	1,345.8	26.8	1,916.7
508	19.7	1,166.8	21.7	1,375.5	22.4	1,312.3	19.9	1,274.5	20.2	1,296.2
509	105.4	5,287.3	98.0	6,460.5	113.3	6,658.9	116.7	7,843.5	111.1	7,383.5
601	75.9	3,981.4	93.7	4,783.1	93.9	4,887.7	80.6	5,295.9	87.2	6,474.0
602	0.2	11.8	0.3	12.3	0.3	22.3	0.3	16.7	.4	31.0
603	27.5	931.3	37.3	1,679.1	29.1	1,685.9	36.2	1,760.8	29.6	1,782.7
604	27.8	1,862.1	29.8	2,242.3	27.7	2,009.8	22.7	1,940.3	28.8	2,607.3

**Table 8. Scientist Years and Funding for SAES, Forestry Schools and Other Cooperating Institutions, FY 1975-79**

RPA No.	1975		1976		1977		1978		1979	
	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000	SY	\$1,000
506	36.4	1,833.3	39.9	2,464.7	43.5	2,929.4	40.7	3,271.4	47.3	4,000.7
507	9.9	507.2	11.6	619.0	8.5	551.7	11.8	774.1	11.0	956.5
508	9.6	596.5	10.7	665.0	8.7	552.1	9.2	603.6	12.0	788.5
509	40.6	2,039.2	45.6	2,682.0	50.4	3,033.3	52.8	3,241.2	47.8	3,488.7
601	10.6	638.9	14.2	909.1	13.2	1,002.7	13.1	1,042.3	15.8	1,261.0
602	0.2	11.8	0.3	12.3	0.3	22.3	0.3	16.7	0.4	31.0
603	18.4	453.0	22.4	886.1	19.0	1,135.2	20.0	940.4	24.2	1,240.9
604	1.0	83.8	1.1	112.5	0.8	66.9	0.6	51.8	0.4	55.9

research. The joint work of FAS and ERS through the World Board provides continuous information on the world food situation which represents the most consistent set of data available.

We have made no attempt to identify market intelligence work carried out on a continuous basis by the private sector.

## *Quantitative Dimensions of Trade Research*

Tables 6, 7, 8, and 9 provide what information we have been able to collect on dollars and scientist-years (SYs) expended for research on trade and related subjects. Table 6 shows USDA, SAES and total efforts on groupings of RPAs. Note that RPAs 601-604 are the only ones which explicitly relate to export markets. The national totals in these RPAs in 1979 were over \$10 million and 146 SYs. Eighty percent of this effort is in the USDA. These efforts represent less than 1 percent of total agricultural research expenditures (Table 9).

Tables 7 and 8 break down the efforts by RPA and research institution. Three interesting observations emerge. First, virtually no one works on RPA 602 (Evaluation of Foreign Food Aid Program). Second, product development research (RPA 604) falls almost exclusively under the jurisdiction of the USDA. Third, the SAES put almost equal effort on RPA 601 (Foreign Market Development) and RPA 603 (Technical Assistance to Developing Countries), while the USDA puts much more effort on the former.

**Table 9. Trade and Related Research as Percent of Total Expenditures on Agricultural Research Reported by the USDA and SAES**

	1977	1978	1979
Total Expenditure on on all RPAs-USDA-SAES (million U.S. \$)	1,031.8	1,147.4	1,182.6
Expenditure on RPAs 506-509; 601-604 (percent)	2.47	2.46	2.66
Expenditure on RPAs 601-604 (percent)	.83	.78	.92

Source: SAES and USDA annual research reports organized by Research Problem Areas.

RPAs 506-509 are domestic economic objectives which might include trade-oriented work. However, since the CRIS printout did not differentiate projects by RPA, there is no way of telling what percentage of the efforts here are international. Our suspicion is that it is small. Even if it is not, research under these RPAs represents only about 1.5 percent of the total research effort.

It can also be noted from Table 6 that there has been a relatively small increase over time in the SYs in RPAs 506-509 and 601-604. However, most of this increase is in domestic-oriented RPAs (605-609). No significant trend is evident in research oriented to export markets.

One other interesting pattern of research emerged from the CRIS printouts when the titles and objectives of all projects were reviewed, and those which had any reference to international trade were enumerated: it appears that 40 percent of the stations conduct no trade research, and trade research (usually market intelligence) comprises only one percent of total projects at a quarter of the stations. Only nine stations report four or more projects. The Northeast, Southern and Western regions pursue relatively less trade research than the North Central Region.

## Summary

The information presented in this section is largely impressionistic as a result of incomplete data. The CRIS classification scheme was designed primarily for reporting on domestic research; thus, only 4 out of 98 RPAs have an explicit trade or international orientation. Clearly, research reported under RPAs 601-604 understates the true effort. A further difficulty arose because the search did not identify projects by individual RPA.

However, data difficulties do not prevent the observation that, despite the fact that the United States is now exporting the production of two in five acres, the efforts devoted to trade research are limited. This conclusion is supported by the committee's collective knowledge of research activities. Further, two other recent comprehensive attempts to survey past research in agricultural trade<sup>2</sup> uncover deficiencies as well.

Beyond being limited in overall effort, much of the research is limited in scope. SAES projects and Ph.D. dissertations particularly are individualistic (in terms of commodity, region, country or methodology), one shot, and non-additive. Only the USDA maintains ongoing programs, but even these are heavily skewed towards short-term policy analysis and long-term projections.

One final caveat: we have no way of knowing how much trade research goes on in non-land grant universities, research institutes and the private sector. The University of Chicago, for example, does substantial international trade research, though only 6 of 60 trade research theses published in the 1970s were explicitly agricultural. With regard to the private sector, our judgment is that most of the economic research is either market intelligence or long-term projection. Most of the physical-biological research appears to be oriented towards product and market development.

Our general conclusion, however, remains valid. Relative to the importance of export markets to U.S. agriculture, trade research receives limited attention. Moreover, the bulk of the research that is done is fragmented and scattered, with very little additivity.

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2. McCalla, Alex F. and Josling, Timothy E. (eds.), *Imperfect Markets in Agricultural Trade*. Montclair, New Jersey: Allanheld, Osmun, 1981; Robert L. Thompson, *A Survey of Recent U.S. Developments in International Agricultural Trade Models*. IED, ERS/USDA Bibliographies and Literature of Agriculture No. 21, 1981.



# Building the Base for Expanded Trade Research

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This section is divided into two parts. The first part addresses the constraints to effective trade research in an attempt to identify why the United States appears to significantly underinvest in this area. The second part reviews some of the externalities in trade research and recommends new institutional arrangements that might be more conducive to effective trade research.

## *Constraints to Effective Trade Research*

This discussion of constraints to effective trade research focuses on four key sets of constraints: (1) deficiencies in the conceptual framework for research on trade issues; (2) deficiencies in the data; (3) U.S. institutional limitations; (4) the dearth of human resources trained to work in the agricultural trade area.

***Deficiencies in the Conceptual Framework.*** Deficiencies in trade theory have undoubtedly limited research on agricultural trade issues. Some of the principal inadequacies of the theory are reviewed in Appendix A. These deficiencies include:

1. *The lack of a straightforward way to account for technological differences among countries or to account for changes in technology over time.* The ability to handle technological differences and technological change is important in attempting to study comparative advantage and changes in comparative advantage.

2. *The unsettled state of monetary theory, especially in an international context.* This deficiency makes it difficult to understand the monetary aspects of trade.

3. *The need to better conceptualize the gains from trade.* An understanding of the gains from trade is important in developing a negotiating strategy for trade liberalization.

4. *The failure to incorporate concepts of imperfect competition and institutional interactions into trade theory.* This deficiency makes it difficult to understand trade when state trading companies and state monopolies are important participants in trade.

5. *The lack of a well-developed theory to explain the behavior of governments and the response of policymakers to economic forces.* Understanding government behavior is the key to understanding government intervention in trade to distort market forces.

The lack of a completely satisfactory theoretical framework need not preclude an expanded research program on trade problems. Much can be done with the conceptual framework now available. Moreover, solutions to some of these theoretical problems will probably appear only as applied research

programs increase. It is out of the crucible of attempting to solve practical problems that theoretical contributions often appear.

A limited literature on the modeling of agricultural trade has appeared during this past decade. A synthesis of Thompson's<sup>1</sup> review and analysis of this literature may be found in Appendix B.

***Deficiencies in the Data.*** This subject really deserves a paper of its own. However, the focus here is on six areas in which the data are either conspicuously absent or available but in need of strengthening.

1. *Domestic prices in other countries.* Trade research requires knowledge of internal prices in other countries and how they change over time. In countries with a multiple-price domestic system, separate estimates of each would be useful. Both consumer and producer prices are important if estimates are to be made of import demand and export supply.

ERS is synthesizing some of these data series for the advanced countries, but the number of countries for which they are available needs to be expanded. The development of data series is important work, and the ERS is to be commended for its contribution in this area.

2. *Factor prices.* Any estimate of costs requires some knowledge of factor prices, yet some of the greatest deficiencies exist in this area. Agricultural wage rates, for example, are of particular importance in agricultural trade research, yet estimates of these are all too often not available. A major investment is needed to obtain such data. In many cases individual countries need outside help in collecting such data. Such assistance should be sensitive to interregional differences within countries, which can be quite large in countries like Brazil and India.

Some countries may also need assistance in revising and improving series that are already available. Many of these either are based on inadequate samples or measure something very different from what is needed for the analysis of trade problems. The positive externalities from the help given by an agency such as the ERS could be quite large.

3. *Transportation rates.* International transportation data constitute a major challenge to empirical research in trade. There is a maze of rates, and it is often difficult to make sense out of them. Rates fluctuate widely because the short-run supply response of the industry is rather limited. Moreover, particular rates can vary, depending on the direction of travel and characteristics of the carrier. Systematic work is needed

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1. Thompson, Robert L., *A Survey of Recent U.S. Developments in International Agricultural Trade Models*. IED, ERS/USDA Bibliographies and Literature of Agriculture No. 21, 1981.

to make available data more useful for research in trade problems.

The sheer lack of data on internal transportation, as important to economists as international shipping data, is another important problem. In lieu of such data, information on port prices versus producer prices can be useful.

4. *Policy variables and policy interventions.* Many economists have stressed the importance of domestic policy and policy interventions in understanding trade problems. What has not been brought out sufficiently is the multitude of policies that affect the agricultural sector, either directly or indirectly, and the frequency with which these policies change. Identifying and documenting all of these policy interventions is a Herculean task. Such a collation for Brazil, recently completed, is composed of four volumes, each about two inches thick.

Although the social payoff from translating such important collations can be quite high, there has been difficulty in finding the resources to assemble them, since such historical research is no longer considered a respectable academic endeavor. The task thus falls to government agencies such as the FAS, the ERS, or the FAO. Collaboration with foreign scientists will be essential to its accomplishment, and social scientists will be needed to help identify the pertinent policies and interventions.

5. *Exchange rates.* Better data are needed for both multiple exchange rates and real exchange rates. Averages are meaningless in the use of multiple exchange rates; what is needed is the specific exchange rate that is pertinent to the question being asked. For example, Brazil at one time had some 21 different exchange rates. If data on these multiple rates were made available in a systematic way, they could be of considerable value to individual researchers.

The development of real exchange rates requires considerable work with the published data, as well as the availability of the appropriate deflators. It is the real exchange rate that is significant, although often much economic discussion and research is done in terms of the nominal exchange rate.

6. *Input-output tables.* For those interested in studying effective protection, the input-output estimate tables are important. Such tables are available in many countries, although often only through a central bank or planning agency. The tables vary greatly in quality and timeliness, some dating back to the early 1960s.

Perhaps the first step in remedying this deficiency would be to collate and evaluate those tables that are available. Those needing additional work could then be updated and improved, after which it could be determined to what extent the various tables or parts of them can be generalized to other countries. The final step would be to help researchers elsewhere put together the first tables for their own countries. Obviously, a great amount of work is required, much of

it tedious. But, again, the payoff would be high to all researchers.

#### ***Deficiencies in U.S. Institutional Arrangements.***

Deficiencies in institutional arrangements governing trade have already been mentioned; some rather serious deficiencies exist as well, however, in domestic (U.S.) institutional arrangements governing trade *research*. These problems are especially severe for the universities.

One point worth emphasizing is the importance of knowing something about the rest of the world in order to do good trade research. There has been increased recognition of trade problems in recent years, and some research administrators support additional research in this area. But their conception of what is required to do such research often needs to be broadened. Too commonly, it is believed that useful trade research can be done with secondary data on trade flows and on export and import prices. But that hardly scratches the surface of the problem.

There *are* some interesting hypotheses that can be tested with aggregate cross-country data or even with time series data on individual countries. But a great deal of knowledge about individual countries is required to analyze trade problems in any depth. Information is needed about the policies (domestic and international) that major trading partners pursue, as well as the economic forces affecting those policies. Moreover, knowledge is needed about how commodity markets work, how products are produced, and so forth. Clearly, to get very far with the analysis one has to have some rather specialized knowledge about the country involved—knowledge that extends beyond simple time series data. Language skills are required if one is to understand past policies or make effective use of published documents and research on the individual economy. And some in-depth knowledge of the particular economy is required, which usually assumes some investment in research. Unfortunately, relatively few universities can develop this kind of program for more than a handful of countries.

In addition to these rather basic difficulties, there are often a number of localized constraints. For example, many state legislatures forbid the use of state money for travel abroad, or for the salary of a researcher working in a foreign country even when another agency will pay transportation costs. Current budget constraints also make it difficult to bring people from other countries to campus, so that outside funding must often be found. And often local libraries are deficient in materials pertinent to research on other countries.

An additional set of problems has to do with the political sensitivity of doing policy research on other countries, particularly that which might threaten a comparative advantage held by those countries. For example, Brazil has long welcomed outside researchers, but an American who now



attempts to study Brazil's soybean industry may find that data are suddenly difficult to find, that copies of previous studies are scarce, and that information on current government policy is not available.

There is no easy solution to these problems. With regard to trade-threatening research, collaborative research that attempts to capitalize on mutual complementarities and permits a reasonable degree of cooperation can be helpful. Policy research, on the other hand, is a bit more difficult. Most governments are sensitive to criticisms of their policies, especially when the political process is less than open and the criticism comes from a foreigner. Perhaps the only solution to this problem is development of long-term collaborative arrangements based on mutual respect and confidence.

There are a number of things researchers can do to strengthen their own capability for trade research. For example, they may educate local groups on the importance of trade research. In addition, they may take the leadership in developing domestic sources of support for such research—even in the state legislatures.

There are probably also some sensible divisions of labor that can be worked out within the United States to ensure a more effective research effort. Clearly, there are advantages to having a central organization provide some services such as collation and processing of policy and economic data. It is not clear, however, whether this is properly a role for the FAS, the IED, or some new organization that might serve both agencies and the university community. In any event, little can be accomplished without the allocation of additional funds for data collection and analysis.

More collaboration and a greater division of labor is needed between the federal bureaucracy and the universities. The universities can do some analysis and publish some reports more easily than ERS, for example. At the same time, the ERS could be the vehicle by means of which such research could be introduced into the decisionmaking process.

A similar division of labor may be needed among the universities, with each specializing in one or two key countries or regions of the world. Alternatively, some universities may specialize by commodity or by some functional aspect of trade (transportation problems, domestic agricultural policies or trade policies, for example). A mechanism whereby researchers can meet periodically to discuss their research and develop some joint projects is essential.

The research must remain decentralized, with a trade specialist and a person knowledgeable about other parts of the world in each department of agricultural economics. A real disservice is done to students if they are not exposed to trade theory and world agriculture. Moreover, teaching and research programs complement each other.

Finally, the importance of multidisciplinary approaches to

trade research must be stressed. Careful studies of governments and government policy—and such studies should receive high priority—require the involvement of political scientists. Similarly, studies about production technology—again a must—could be more thorough and complete when done jointly with production scientists.

Obviously, the administrative and organizational implications of these suggestions are great. Resulting problems need to be faced directly and pragmatically. Questions on international economic policy are likely to become increasingly important, and a concentrated effort is needed to find the answers.

***The Dearth of Human Resources Trained to Work in the Agricultural Trade Area.*** The training most U.S. agricultural economists have received has emphasized microeconomics and a firm orientation. Even those trained to work on marketing problems take very much of a domestic economy approach to their problems, and tend to have only a limited amount of training in macroeconomics. Training in international trade per se is even more limited.

An attempt to strengthen the capability for trade research will have to address this training issue. Established professionals may need to dedicate their sabbatic leaves to developing skills in this area. The new generation of agricultural economists needs to receive more training in macroeconomics and international trade. And departments adding staff need to search out those with the requisite training.

## *The Externalities of Trade Research*

Most research generates externalities, in the sense that it produces facts and knowledge which can be used at virtually zero cost in other research. Such externalities are especially important in well-conceived trade research.

Often data series collected for a particular study (prices, currency exchange rates, or consumption and production of particular commodities, for example) are tremendously valuable to other researchers. Foreign students doing dissertation research in U.S. universities may provide another form of externality in the wealth of knowledge they have on their own countries.

In a somewhat different context, data on both demand and supply sides of the markets in many countries are often available in fragmented form in fugitive literature, unpublished dissertations, and widely scattered professional journals.

Third, sound trade research requires specialized expertise on particular economies that is seldom sufficiently available in one institution. If some way could be found to link experts in a collaborative effort, the payoff could be quite high.

These brief comments suggest the need for new institutional arrangements to allow researchers to collaborate, collate new knowledge and facts as they become available, and make resulting information easily accessible to researchers in this field. Such an information system would substantially increase

the productivity of the combined research efforts in the United States because it would enable individual researchers to more effectively capitalize on the data and information generated by other researchers.



# Research Priorities

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Presenting a comprehensive and detailed listing of specific research priorities is neither possible nor desirable. Priorities will change, often quickly, in response to changing conditions. The purpose of this section is to outline a set of general objectives that should underlie an expanded research program in food and agricultural trade.

**1. Assessing the Impact of Changes in Economic and Technical Factors and Resource Endowments on Import Demand, Availability of Export Supplies and Comparative Advantage in Agricultural Production.** A broader underlying data base on technical, economic and institutional variables that influence trade and comparative advantage is needed. Overall food demand in individual countries is determined by population level and income available for food purchases, but import demand will reflect other conditions as well. Most countries maintain internal price support and trade policies that affect food prices and consumption levels. At the present time, many countries suffer from foreign exchange shortages because development of export industries has been insufficient to provide adequate foreign exchange earnings. This problem has been exacerbated by substantial increases in costs of competing imports, particularly energy.

The availability of basic resources like land and the capital, technology and infrastructure required for food production determines underlying capacity to produce. Whether this capacity is developed depends on the nature of the incentive system, the ability of farmers to respond to production opportunities, the market system for both products and inputs, and the values and rules that guide economic organization and production.

Great differences exist among nations in their capacity to meet current and future food needs. Understanding these differences and the dynamics of macro- and micro-changes that will influence future growth in world food production and the role of American agriculture in world food markets is imperative.

**2. Analyzing the Impact of Economic Policies on Trade Patterns.** Relevant economic policies include domestic macroeconomic and resource policy, domestic food and agricultural policies, and trade and exchange rate policies. As previously implied, domestic food and agricultural policies are closely linked with trade policies in all major countries. The specific kinds of policies that have been developed in individual countries vary widely even though the central thrust in all high-income policies distorts consumption patterns and leads to commitment of resources to production that exceeds market clearing levels at established policy prices. These domestic policies in turn lead to import protection and/or export subsidies that distort international prices and resource use. Appended to these broader policies

are policies related to technical and quality standards, consumer subsidy and nutrition policy, market organization and regulations, and input subsidies. These all affect the trading position of individual countries and need to be understood.

Exchange rate policy has a broad and pervasive effect on trading patterns and trade policy. Again, great variation exists among countries, ranging from free and open use of foreign exchange by private traders to closely controlled and rationed supplies of foreign exchange consistent with trade objectives formulated by central governments. Exchange rate policy thus becomes an important variable influencing market opportunities for American farm products; in the short term, it influences the course of economic activity and investment patterns that have a long-term effect on supply and demand and on evolving comparative advantage in individual countries.

**3. Identifying and Analyzing Monetary Linkages Among Countries and Assessing the Implications of Monetary Phenomena on Trade Flows, and the Functioning of Financial, Commodity, and International Capital Markets.** When commodity prices exploded in 1973, analysts found that supply shortfalls and demand growth could account for only part of the observed price rise. Several other forces were also at work.

Excessive monetary expansion in the late 1960s culminated in the devaluation of the U.S. dollar in August 1971 and February 1973. This lowered the price of our agricultural exports to foreign purchasers. From the U.S. perspective this had the same effect as an increase in export demand: it raised domestic prices. While the empirical evidence varies on the size of this effect, a consensus has emerged that the effect was significant. There is also evidence that changes in the total value of agricultural trade now affect the exchange rate, although the magnitude of this effect is not known.

Recent research provides evidence that, because agricultural prices are more flexible than other prices, an expansion or contraction in the money supply tends to raise or lower agricultural prices relative to other prices. Events in the financial markets also affect agricultural prices. As the interest rate rises, the cost of holding commodities also increases, and commodity prices must fall if existing stocks are to be held. There appears to be considerable interaction among the agricultural commodity and metals futures markets, and current markets associated with speculators' activity. These linkages and the magnitudes of their effects are weakly understood at best. Similarly, the linkages among interest rates, international flows of capital, induced drops in exchange rates, and consequent drops in agricultural prices are only poorly understood.

There was little research on the monetary and financial market linkages to agriculture before the last decade. Identification and improved understanding of the linkages among

these markets is essential for well-informed policymaking and forecasting agricultural prices. If adjustment lags vary significantly across economic sectors, the Federal Reserve needs to consider the effect of monetary policy on sectoral price movements, not just on the broader indicators of the general price level. If it does not, monetary and agricultural policy may work at cross-purposes to one another.

**4. Trade-offs and Linkages Between Domestic Agricultural and Trade Policies.** The relationships between domestic agricultural policies and trade policies is conceptually simple but operationally very complex. When policies are implemented that do not permit national commodity prices to follow world market prices, either import protection or export subsidy is required to protect domestic programs and balance quantities produced with quantities used. The trade policies of industrial countries reflect the imperative of domestic price and income support programs for agriculture. The level at which prices are set depends on a number of factors, including costs of production and the attitudes that nations have toward the need to preserve a given agricultural structure and rural economic and social base.

The general failure to understand the impact of domestic commodity programs on international trade helps explain the income problems American farmers are now facing. As noted elsewhere, these programs have priced U.S. products out of world markets as a consequence of the dramatic rise in the value of the U.S. dollar. This has choked off exports and led to a large accumulation of stocks and low prices in domestic markets. Yet farmers and farm groups continue to pursue higher prices, not recognizing that the structure of their economic environment has changed significantly.

The existence of these policies creates recurrent commercial conflict and political friction among nations and generates instability in international markets. Economic impacts arise that are difficult to quantify. Protection results in extensive costs to government and to consumers through higher food costs. A set of international income transfers is generated in which producers in importing countries with protected agriculture gain at the expense of producers in lower-cost exporting countries. The importance of these interactions between domestic and trade policies warrants ongoing evaluation to analyze costs and benefits and define options available to deal with the multiplicity of market and policy situations that exist throughout the world.

**5. Devising an Optimal International Commodity Trade Policy for the United States.** An optimal trade policy is difficult and probably impossible to define. Yet there are numerous export strategy and import policy issues influencing consumer welfare and the role of U.S. agriculture in world markets that need to be understood. The United

States must be willing to accept imports if foreign countries are to acquire foreign exchange with which to buy American products; in the case of developing countries, this includes many agricultural products. An important dimension of our willingness to import industrial products is the implication for agricultural production costs. Import of basic items like steel and manufactured products provides an important competitive stimulus to the U.S. industrial economy, affecting prices paid by farmers for many items they buy.

U.S. export strategy has traditionally sought open export markets with little government intervention and has provided various forms of export promotional aids, market development assistance and credit to importing countries. Although a limited number of bilateral agreements have recently been entered into, the United States has not favored the use of international agreements to stabilize markets or to expand export sales.

Formulation of U.S. trade policy is influenced by frequently conflicting interest groups that seek specific ends related to export expansion or import protection. Thus, policy must be formulated within a set of broader guidelines. Trade policy should be concerned with at least three major issues: 1) seeking improved resource allocation, 2) stabilizing international markets, and 3) providing a measure of equity in the distribution of gains from trade. Clearly the basis exists for improvements in each of these directions.

**6. Assessing and Evaluating the Gains from Trade and the Implications of Restrictive Trade Policies and Practices in Terms of Who Gains, Who Loses, What Benefits and Costs Will Arise from Policy Changes, and What Positive Adjustment Policies are Warranted.** Each country has a comparative advantage for some combination of goods. Therefore, international trade allows a country to exchange goods on more favorable terms than exist internally, permitting a higher real income and standard of living than would otherwise be possible. Nevertheless, most countries intervene extensively in agricultural commodity trade. This raises the income of some groups in society and lowers the income of others. Estimates of the magnitudes and recipients of the gains and losses are necessary for informed policymaking. In cases where the potential gains exceed the losses, policies may be needed to compensate the losers and to facilitate their adjustment to the new environment. Empirical research is needed to provide a basis for determining the magnitude of the adjustment assistance.

**7. Understanding Why Governments Make the Kinds of Policy Decisions They Do.** This difficult task involves understanding the historical confluence of technical and economic conditions, political forces, and institutional relationships, as well as how and why governments perceive



problems and solutions as they do.<sup>1</sup> The values and objectives imbedded in food, agricultural and trade policies differ among countries. In Japan, for example, maintaining food security and avoiding dietary patterns that rely excessively on foreign sources condition approaches to farm and food policy. Political pressures exist which reflect the structure of agriculture and the overall economy, as well as the values placed on agriculture and rural society. The willingness to support high food prices in Europe, as previously noted, reflects an attitude toward farmers and rural society but also stems from past traumatic conditions created by wars and the aftermath of war.

The discipline of agricultural economics in and of itself does not provide a complete basis for evaluating why governments implement the policies they do. However, major contributions can be made by agricultural economists to understanding the relationship between economic variables and policy decisions through computer modeling, political-economic analysis, interdisciplinary research and careful evaluation of the flow of historical and current events. These research approaches are necessary to arrive at realistic policy recommendations and interpretations of policy actions as well to project future world market developments.

**8. Assessing Institutional Relationships (State Trading, Monopolistic Business Practices, and Government Involvement in International Agreements) and Their Impact on Performance of International Markets, Information, and Transaction Linkages.<sup>2</sup>**

The structure of international markets is determined by a mixture of private and public institutions that influence trading relationships. The grain trade system, for example, includes five large multinational institutions. Their ability to acquire knowledge of markets superior to that which is available to domestic buyers and sellers and even governments often places them in a position of advantage. Governments intervene in international markets through direct arms of government (as in socialist countries and some developing countries) or through national cooperatives that control both buying and selling (as in Canada and Australia). Greater understanding of the effect of these institutional

arrangements on trade flows and on price formation in international transactions is needed.

Research is also needed to evaluate the impact of major structural changes like the formation of the European Economic Community. Changes in domestic policy that are large enough to affect international markets is another important form of structural change, as is the development of both multilateral and bilateral international commodity agreements. The signing of a sugar agreement a few years ago, which from the United States's perspective was intended to supplant a domestic price support program and unilateral policy, is a case in point. Transaction linkages through state trading, monopolistic business practices, and government involvement through international agreements or through unilateral control of major policy action create a market structure widely different from that assumed in most past analyses of international market relationship, and this difference needs to be understood.

**9. Improving the Conceptual Framework for International Agricultural Trade Research.** Agricultural trade research draws on the general theory of international trade as a source of testable hypotheses. However, a number of deficiencies exist in that general theory which need to be remedied to increase its power to help explain agricultural trade. Several examples can be cited of promising areas in which recent progress has been made, but much more work is needed.

Agricultural research and education are the key to understanding shifts in comparative advantage in a rapidly changing world. More work is needed on understanding the rationale behind investments in these activities. Monetary and financial market developments in an open trading economy appear to have important effects on agricultural prices. The shift from fixed to floating exchange rates represents a structural change which appears to have introduced a new source of instability into agricultural markets. The determinants of the terms of trade and the welfare effects of changes in trade are a source of great concern for developing countries, but are not well understood. While a number of observers argue that world markets are less than perfectly competitive, little attempt has been made to introduce imperfect competition into the analytical framework for agricultural trade research. Finally, further theoretical developments are needed to more adequately conceptualize why governments intervene as they do in agricultural trade when the gains from trade are so large. Progress on improving the theoretical foundations for agricultural trade research in these and related areas should contribute significantly to advancing the state of empirical trade research.

**10. Developing and Using Improved Empirical Models for Policy Analysis.** Emphasis should be placed on policy analysis that recognizes the linkages between

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1. For an attempt to develop an analytical framework for understanding the economic dimensions of international relations, see G. Edward Schuh, "Economics and International Relations: A Conceptual Framework," *American Journal of Agricultural Economics* 63(1981):767-778.

2. For a more comprehensive evaluation of this area see Alex McCalla, "Structural and Market Power Considerations in Imperfect Agricultural Markets," in: *Imperfect Markets in Agricultural Trade*, edited by Alex F. McCalla and Timothy E. Josling, Montclair, New Jersey: Allanheld, Osmun, 1981.

domestic and international policy and in turn provides information for policy development. The United States is a sufficiently large trading country that its policy actions affect the price received in the export market or paid in the import market for many traded commodities. Informed policy formulation requires estimates of the likely magnitudes of the effects of proposed policy changes in the domestic market and in the rest of the world. The effects on market price, export volume, foreign supply and utilization, and the U.S. share in various foreign markets are of concern. The distribution of costs and benefits of a proposed policy change are also

of interest. Quantitative models of the interrelations between the United States and other trading countries are needed to allow analyses of the consequences of selected policy changes. Models can also be used in policy formulation to achieve objectives in the least cost manner. While a number of resources have been committed to agricultural trade modeling for policy analysis, an ongoing commitment is needed to maintain and improve the empirical content and validity of the models in the face of rapidly changing world market conditions.



# A Strategy for the Future

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A strategy for strengthening agricultural trade research requires action on a number of different fronts. Sizeable investments will be needed in areas like developing skill levels and information systems. In other areas, institutional creativity is required. Still other areas will demand major attitudinal changes. This section attempts to sketch out a comprehensive strategy which over a period of years would give the United States a significantly strengthened capability for research into problems of agricultural trade.

**1. Experiment station directors and others responsible for agricultural research need to recognize that U.S. agriculture is now an integral part of the world economy and the world food system.** Moreover, given our present institutional arrangements, they need to recognize that monetary, fiscal, exchange rate, trade, and other macroeconomic policies have as much influence on the welfare of farm and rural people as do the more familiar commodity programs. This broader perspective should also include awareness that the United States is a major importer of agricultural products as well as the world's largest exporter.

International trade obviously has direct impact on the agriculture of most states in our nation; thus, each state should attempt to contribute to research on trade issues. This means that many stations will need to broaden their perspectives on what research is pertinent to the welfare of their rural and urban populations.

A great deal of "building-block" research can be done by individual state experiment stations. Researchers need support for such research, including that which deals with monetary and fiscal policy and how it affects agriculture and agricultural policy.

**2. A sizeable effort is needed if the United States is to develop an understanding of trade problems as well as effective trade strategies and policies.** Strengthening is needed along at least three lines. First, more staff with capability in international trade and in the macroeconomic aspects of trade are needed. The U.S. agricultural economics profession tends to have a strong microeconomic orientation, with less emphasis on the macroeconomic aspects of the economy. Moreover, departments of agricultural economics need to strengthen their teaching and training programs in these areas.

More language skills are also needed. Effective trade research requires knowledge about the economy of trading partners. In most cases analysts will need to have language skills if they are to have access to the literature on other countries. Perhaps the language programs associated with the strengthening grants of the Board for International Food and Agricultural Development can make a contribution here.

Finally, the system as a whole needs to develop a cadre of professionals who are knowledgeable about the economies

and agriculture of other countries. No station can have expertise on all parts of the world. But with a little planning and coordination, the system as a whole should be able to develop a cadre with a broad base of expertise. These professionals could then be shared and their input obtained through collaborative efforts.

The critical issue here is for individual stations to be willing to make the investments that are required to develop and maintain this expertise. Typically, an individual will need to live in a country for a year or two as a visiting professor or scholar to develop initial expertise. A research program on that economy is needed to retain and further develop that capability. Support may also be needed to attend meetings in these countries as well.

**3. Institutional linkages need to be strengthened among research institutions here and abroad.** Linkages which need strengthening include those among researchers in the various U.S. universities conducting trade research; between researchers in universities and researchers in non-university research institutions such as ERS and FAS; between researchers in the universities and professionals in governmental and international organizations such as the U.S. State Department, the U.S. Trade Representative, the U.S. Dept. of Commerce, FAO, GATT, and IMF; and between researchers in this country and researchers in other countries.

Linkages such as these can be established in a variety of ways. However, collaborative research is an especially productive means of establishing such linkages. Experiment station directors may want to set aside special allocations to facilitate such research. Other institutional linkages can be devised to share data and country-specific knowledge.

**4. The United States needs a network of Centers of Excellence in agricultural trade research.** We believe that almost all stations should contribute in some way with "building-block" research designed to strengthen our knowledge base on international trade issues. However, a critical mass is needed if significant research programs are to be developed in the international trade area. Hence, we encourage a limited number of institutions to take on the challenge of building Centers of Excellence. We also hope that national and regional leaders and administrators will be willing to commit the resources to see that such Centers are developed, although the title obviously should be earned rather than bestowed.

**5. Experiment station directors may want to consider institutional specialization along geographic, commodity, or functional lines.** Possible geographic specialties are the European Community, Latin America, Africa, the Middle East, the middle-income developing countries, and the centrally planned economies. Commodity specialization could focus on any one of our major

exports or imports. Non-tariff barriers, the monetary aspects of international trade, comparative advantages, and the behavior of governments and governmental agencies are areas of possible functional specialization.

Such specialization is the key to the critical mass issue. With a little bit of planning and coordination a highly complementary and mutually reinforcing system could evolve that would give the nation an effective, low-cost research capability. A Regular Research Funded (RRF) or Inter-regional Research (IR) project type of structure could facilitate collaboration among institutions specialized along these lines.

**6. The FAS and the ERS need to be sustained and strengthened, and both need to be linked to universities and other agencies doing trade research.**

These two federal agencies should play a critical role in a strengthened national capacity for international trade research. The agricultural attaché system of FAS is a vital source of economic intelligence and policy information. FAS also recently has developed an international information system.

The ERS-IED presently is the strongest of any national agricultural trade research organization. It also has a reasonable capability on individual countries and regions of the world. Both the FAS and the ERS should be strong institutions; however, they both would also benefit from stronger interactions with a strengthened university community.

ERS and FAS have for the last couple of years been supporting an informal consortium of agricultural trade researchers from a limited number of universities in the United States, Canada, Germany, France, and Australia. Individual universities contribute by providing travel money to attend the semiannual meetings.

The consortium has stimulated a significant amount of

research, has provided the means whereby trade researchers can meet to discuss their research and common problems, and has helped provide input into current policy issues. We encourage further such collaboration.

**7. Additional funding sources for trade research should be developed under the competitive grants and special grants programs.** Increased funding of trade research is badly needed. Perhaps the most effective way to obtain it is through these grant programs.

**8. Public education programs in the trade area need to be strengthened and augmented.** Trade issues are an important component of contemporary public policy debate. Moreover, trade policies in the United States and other countries are important determinants of the welfare of farmers and rural residents. The real payoff from a strengthened research effort will come in the form of a body politic that is more well-informed and instructed on these issues. In addition, an enlightened and informed public is the key to continued support for an expanded research effort.

**9. Where feasible, an augmented program of agricultural trade research should be linked to the various research programs of BIFAD and the U.S. Agency for International Development (AID).** Programs of these two agencies provide an important means of developing inhouse expertise on the agriculture and economies of other countries. Effective linkages of trade and development efforts will provide strengthened capability and a greater payoff from investments and expenditures in both. Our development objectives may on occasion compete with our trade objectives. It is easy to overstate the degree of such competitiveness, however, since our foreign markets are very much dependent on rising per capita incomes in other countries.



# Appendix A

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## *Deficiencies in the Conceptual Framework for Trade Research*

The major deficiencies in the conceptual framework needed to analyze trade and trade policy issues are as follows:

1. Despite recent contributions, trade theory is still for the most part cast in either the Ricardian or Heckscher-Ohlin tradition of thought. These comparative-cost perspectives take technology as a given; however, technology obviously differs among countries, and in some cases it changes rapidly over time. The key to understanding shifts in comparative advantage in a dynamic world is to be able to incorporate technology as a variable in trade models and to evaluate the contribution of technological changes to changes in comparative advantage.

Kenen's<sup>1</sup> two-sector growth model, which is based on previous work by Vanek,<sup>2</sup> Schultz,<sup>3</sup> and Becker,<sup>4</sup> is an important starting point for incorporating differences and changes in technology into a more realistic trade theory. Valentini<sup>5</sup> extended the Kenen model to include Hayami and Ruttan's<sup>6</sup> model of induced technical change, thereby introducing differences in relative factor prices as an explanation of differences in level and resource-intensity of technology among countries, and changes in relative factor prices over time as an explanation of changes in technology over time.

Other efforts have been made to deal with differences in production technology and with the changes in that technology over time.<sup>7</sup> However, work along these lines is still quite

preliminary. A great deal more research is needed before models that can forecast accurately and so serve as a realistic basis for policy are available.

2. Monetary theory has been in a state of flux, and with it the monetary aspects of trade theory. Some authors such as Friedman<sup>8</sup> have argued that a shift to flexible exchange rates such as took place in the early 1970s would give policymakers autonomy in macroeconomic and monetary policy and thus gave them control over their nominal price level. Mundell<sup>9</sup> and others have argued that with open and reasonably well-integrated international capital markets policymakers have no control over the real quantity of money in their countries. Consequently, monetary policy as conventionally conceived has little effect on the nominal price level.

These issues have a great deal to do with the factors affecting the real exchange rate of a country—an important determinant of the terms on which a country exchanges its goods and services for those produced by other countries. It will be difficult to develop realistic trade policy models until these issues are resolved.

3. The theory and empirical work on the gains from trade or economic intercourse are in a similarly confused state. Neoclassical economists tend to talk about the gains from trade. Opponents of neoclassical economics talk about unequal exchange,<sup>10</sup> which implies that one trading partner gains at the expense of another. Proponents of the latter view argue that shifts in the terms of trade are of major significance in understanding who benefits and who loses from trade. Proponents of the neoclassical view argue that shifts in the terms of trade reflect changes in technology and quality of products, and are prone to argue that changes in the terms of trade are generally less significant than proponents of the opposing view suggest.

Neither side in this debate has given sufficient attention to the fact that the gains and losses from economic intercourse are determined by developments on both the trade and capital accounts. Brandao<sup>11</sup> has used a fairly simple trade model to derive the welfare function for an individual country. He finds that whether a country gains or loses from

1. Kenen, Peter B., "Nature, Capital and Trade," *Journal of Political Economy* 78(1965): 437-460; and Peter B. Kenen, "Toward a More General Theory of Capital and Trade," in: *The Open Economy*, edited by Peter B. Kenen and R. Lawrence, New York: Columbia University Press, 1968.
2. Vanek, J., *The Natural Resource Content of the United States Foreign Trade, 1870-1955*. Cambridge, Massachusetts: MIT Press, 1963.
3. Schultz, Theodore W., "Reflections on Investment in Man," *Journal of Political Economy* 70(1962): 1-8.
4. Becker, Gary, *Human Capital*. New York: National Bureau of Economic Research, 1965.
5. Valentini, Rubens, "Technology and International Trade in Agricultural Products: Some Tests of Hypotheses," unpublished Ph.D. dissertation, Purdue University, Lafayette, Indiana, 1974.
6. Hayami, Yujiro, and Ruttan, Vernon W., *Agricultural Development: An International Perspective*, Baltimore: The Johns Hopkins Press, 1970.
7. Keising, D.B., "Labor Skills and International Trade: Evaluating Money Trade Flows with a Single Measuring Device," *Review of Economics and Statistics* 47(1965): 287-293; and D.B. Keising, "Labor Skills and the Structure of Trade," in: *The Open Economy, Essays on International Trade and Finance*, edited by Peter B. Keising and R. Lawrence. New York: Columbia University Press, 1968.

8. Friedman, Milton, "The Case for Flexible Exchange Rates," in: *Essays in Positive Economics*, Chicago: University of Chicago Press, 1953, pp. 157-203.
9. Mundell, Robert A., "Problems of the International Monetary System," in: *Monetary Problems of the International Economy*, edited by Robert A. Mundell and A.K. Swoboda, Chicago: University of Chicago Press, 1969, pp. 21-38.
10. Emmanuel, Arghiri, *Unequal Exchange: The Study of the Imperialism of Trade*, New York: Modern Reader, 1972.
11. Brandao, Antonio, "New Perspectives on the Gains from Trade: A Case Study of Brazil," unpublished Ph.D. dissertation, Purdue University, Lafayette, Indiana, 1978.

trade is determined not only by the terms on which exports and imports are exchanged, but also by the terms on which capital is exchanged and by a host of parameters for the "trading" countries. Only preliminary tests have been made of this model.

4. Concepts of imperfect competition, market structure, behavior of intermediaries, and institutional interactions have not been fully incorporated into trade theory. Instead, the conventional approach has been to use variants of competitive spatial equilibrium models, on the assumption that international markets are highly competitive and leave little room for exploitative behavior.

Evidence of the failure to introduce concepts of imperfect competition into trade analysis can be found in the writings of a number of trade theorists. In his comprehensive review of trade models and methods, Caves<sup>12</sup> devotes less than half a chapter to the issue and concludes that there has been little success primarily because imperfect competition theory is partial equilibrium and neoclassical trade theory is general equilibrium, making marriage difficult. Johnson<sup>13</sup> has pointed to the almost total exclusion of notions of monopolistic competition from the development of trade theory despite the fact that, in his view, monopolistic imperfections are important in actual trade. Magee<sup>14</sup> also has pointed to the neglect of this area in research on the structure of international markets. Finally, there are only two references to imperfect international markets in the published proceedings of a major conference on international trade.<sup>15</sup>

Despite this neglect in the theoretical literature, economists and policymakers are often faced with problems of changes in structure or "market power" in international agricultural markets.<sup>16</sup> To evaluate such changes, current structural and power relationships must be clearly specified. Changes in these relationships are often more fundamental

than changes in prices or quantity flows. The environment within which trade occurs has both spatial and temporal dimensions. When an international market approximates a perfect market, market power can be disregarded and competitive models can be used to analyze prices, flows, welfare implications, and long-term structural change. But there is an increasingly important subset of cases where elements of structure—government and private intermediaries—distort prices by altering quantities supplied or demanded. A detailed understanding of structure and power relationships, therefore, is a necessary precursor to useful policy analysis.

5. Finally, there is a lack of a well-developed theory to explain the behavior of governments and the response of policymakers to economic forces.<sup>17</sup> Government is typically seen as a constant in most economic analyses. Yet surely policymakers respond to changing economic forces in ways very similar to private individuals, firms, and other entities. In addition, it is often assumed that government behavior is irrational, but there is very little evidence to support such a perspective.

Downs<sup>18</sup> has provided a reasonably well-developed theory of a political democracy, and researchers at the Virginia Polytechnic Institute and State University have continued to work in this area over the years. Recently there has been some empirical research using fairly simple models. Brock and Magee<sup>19</sup> have looked at the connections between political and economic markets in the case of the tariff. A number of ad hoc models of government behavior also have been specified and related hypotheses tested.<sup>20</sup> More recently, Quezada<sup>21</sup> has worked out a taxonomy of the kinds of price policy behavior which might result from different types of government behavior

Despite these efforts, the theory is still rather rudimentary,

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12. Caves, Robert E., *Trade and Economic Structure: Models and Methods*. Cambridge: Harvard University Press, 1960.

13. Johnson, Harry G., "International Trade Theory and Monopolistic Competition Theory," in: *Monopolistic Competition Theory: Studies in Impact*, edited by R.E. Kuenne, New York: John Wiley and Sons, 1967.

14. Magee, Stephen P., "Prices, Income and Foreign Trade," in: *International Trade and Finance: Frontiers for Research*, edited by Peter B. Kenen. Cambridge: Cambridge University Press, 1975.

15. Kenen, Peter B., (ed.), *International Trade and Finance: Frontiers for Research*. Cambridge: Cambridge University Press, 1975.

16. McCalla, Alex F., "Structural and Market Power Considerations in Imperfect Agricultural Markets," in: *Imperfect Markets in Agricultural Trade*, edited by Alex F. McCalla and Timothy E. Josling, Montclair, N.J.: Allanheld, Osmun, 1981.

17. For a survey of the literature on endogenous government behavior, see Gordon C. Rausser, Erik Lichtenberg, and Ralph Lattimore, "Developments in Theory and Applications of Endogenous Government Behavior," in: *New Directions in Econometric Modeling and Forecasting in U.S. Agriculture*, edited by Gordon C. Rausser, Amsterdam: North Holland Publishers, Inc., 1983.

18. Downs, Anthony, "An Economic Theory of Political Action in a Democracy," *Journal of Political Economy* 65(1957): 135-150.

19. Brock, W.A., and Magee, Stephen P., "Equilibrium in Political Markets on Pork Barrel Issues: The Case of the Tariff," Center for Mathematical Studies in Business and Economics, Report 7545. Chicago: University of Chicago Press, 1975.

20. Abbott, Philipp C., "Modeling International Grain Trade with Government Controlled Markets," *American Journal of Agricultural Economics* 61(1979): 22-31.

21. Quezada, Norberto A., "Endogenous Agricultural Price and Trade Policy in the Dominican Republic," unpublished Ph.D. dissertation, Purdue University, Lafayette, Indiana, 1981.



and little use has been made of it to predict the behavior of governments and policymakers. Given the importance of government in economic activities, especially in international trade, greater progress is needed in this field before realistic policy models can be developed to deal with trade

problems. In addition, the behavior of increasingly important international organizations must also be understood. In this case some of the more recent developments in the theory of bureaucratic behavior may have some relevance.

# Appendix B

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## *A Synthetic Review of the Literature on Agricultural Trade Modeling<sup>1</sup>*

Numerous advances have been made in agricultural trade modeling in the last decade. Most of the research, however, has fallen short of its potential for contributing to understanding world markets and relationships among trading countries. The quality of the empirical parameter estimates in many studies surveyed is questionable. Inadequate data (no single organization collects and banks all the data needed by trade researchers) and insufficient resources to collect better data lie at the root of many problems with existing trade models. Furthermore, specification errors and use of inappropriate estimators often biased the estimates of parameters in the models. The generally weak empirical content was the principal deficiency of all the trade models reviewed.

The simplest means of including international trade in existing U.S. commodity market models was to add export demand or import supply equations. This approach, however, has limited capabilities. Even with acceptable parameter estimates, two-region models can be used to analyze only domestic policy issues because it is impossible to tell how to shift the export demand schedule in response to events in individual foreign countries.

Multiple-region models are basically simultaneous systems of equations which reflect the behavior of a number of trading regions and their interrelationships in the world market. The three classes of multiple-region models—spatial price equilibrium models, nonspatial price equilibrium models, and trade-flow or market-share models—differ principally in the nature of the price linkages assumed to hold among trading regions and in the mathematical procedure used to solve the models.

Nonspatial price equilibrium models generally include more domestic market detail and are often better validated than other multiple region models. Work on these models has improved our understanding of the relationships among different countries' agricultural sectors. Nonspatial equilibrium models generate the net trade of each region, net trade flows and market shares. For some purposes this is a disadvantage. While tariff policies easily can be reflected in such models, most have an exaggerated free trade bias. Nevertheless, some very good estimates have been made of price transmission equations and policy reaction functions to reflect the policy environment in which trade occurs. Nontariff barriers to trade, which tend to dominate in agricultural markets, have been much more difficult to reflect in nonspa-

tial equilibrium models than tariff policies.

Spatial price equilibrium models are the most common agricultural trade models. These models have three advantages: they generate trade flows and market shares; they readily incorporate quotas and other nontariff barriers to trade; and they generate a spatial pattern of prices consistent with transportation costs. Most models have been linear and solved by quadratic programming. The disadvantage of linear equations has been overcome by separable programming, Bender's decomposition, and nonlinear solvers. Nevertheless, the spatial equilibrium technique mathematically cannot replicate all the observed trade flows for a variety of reasons: the product may not be perfectly homogeneous, but may be differentiated by country of origin; harvests occur six months out of phase in the Northern and Southern Hemispheres; some countries impose quota restrictions on trade flows; and importers may diversify their purchases among several suppliers to spread risk. Nevertheless, work with these models has contributed, in particular, to testing spatial equilibrium theory and to carrying out trade policy analyses.

Several mechanical techniques ("transition matrices," constant market shares, and Markovian models) have been employed in trade-flow and market-share models. Although useful for forecasting, these generally lack normative content and can offer little guidance for policy formulation. All techniques assume that importers differentiate goods by country of origin. The validity of this assumption has been supported by attempts to estimate demand equations for exports by destination, market share equations, and elasticities of substitution for various agricultural commodities. A few attempts have been made to integrate this finding into complete agricultural trade models, but such models need better empirical content. This is a currently active area of research.

The strongest recommendation for future trade modeling work is to improve the empirical content of existing models. This will require, among other things, improved data availability, particularly on prices and policies. Work is also needed on evaluating the relative importance of the hypothesized causes of the divergences of observed trade flows from what spatial equilibrium theory would lead one to expect and on incorporating imperfectly competitive behavior into agricultural trade models.

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1. This synthesis of the literature on agricultural trade modeling is based on Robert L. Thompson, *A Survey of Recent U.S. Developments in International Agricultural Trade Models*. IED, ERS/USDA Bibliographies and Literature of Agriculture No. 21, 1981.



