

World Agricultural Markets and U.S. Farm Policy

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ABSTRACT

Agricultural exports are important both to the U.S. farm economy and the nonfarm economy. Future export volume will depend on growth in global agricultural trade and the U.S. share. U.S. policy can have a major influence on both. The United States, for example, has the resources and technology to be competitive in global grain and oilseed markets, but farm policy will play an important role in determining the evolution of U.S. agriculture and its competitiveness on world markets. U.S. policies that support producer incomes are in conflict with strategies to expand exports. The policy choice is between support for today's producers and expanded markets for tomorrow's producers.

KEYWORDS: Agricultural trade, exports, farm policy, imports, market share.

INTRODUCTION

The value of U.S. agricultural exports increased more than fivefold in the seventies and the proportion of farm cash receipts coming from exports increased from less than 15 percent to almost 30 percent. This recent internationalization of U.S. agriculture has been driven by income and population growth, which have caused import demand for food grains and feedstuffs to surge--especially in developing and centrally planned countries. U.S. producers of wheat, feed grains, and soybeans have been major beneficiaries of this growth in import demand.

The growth of exports has serious implications for current U.S. agricultural policy. Present agricultural commodity policy has its roots in the depression era of the thirties when high trade barriers and slow income growth worldwide made trade only a minor consideration in policy formulation. The majority of U.S. crop farmers can no longer rely on the U.S. market--protected and supported by taxpayers--as the only outlet for their produce. They must compete on a world level and they must have a policy framework that encourages them to respond to the rigors of that broader market. This report examines the tradeoffs between traditional objectives of stabilizing and supporting domestic producer incomes and the objectives associated with an agricultural sector which is both competitive on world markets and is responsive to the dynamic forces shaping international trade.

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THE UNITED STATES AND WORLD TRADE

Agricultural exports are important to both the U.S. farm economy and the nonfarm economy. In recent years, agricultural exports have grown to account for one-fifth of total U.S. exports. The main sources of export revenue are food grains, feed grains, oilseeds, and oilseed products, which accounted for over 60 percent of the value of U.S. agricultural exports in calendar year 1984. Most of the remaining value was livestock, livestock products, fruit, vegetables, cotton, and tobacco (table 1).

The resurgence of interest in agricultural trade issues and policies has occurred since 1972 as the real value of agricultural exports in 1975 dollars increased from \$12 billion in that year to over \$27 billion in 1980 (fig. 1), before declining to \$19.7 billion in 1984. In the fifties, little attention was paid to agricultural trade issues, in part because the United States was a net importer of agricultural products (fig. 1). Agricultural exports relative to the size of the agricultural sector are now regaining the level they had reached in the early twenties, that is, about one-fourth of the cash receipts from all farm products (fig. 2). ^{1/}

Commodity Composition of U.S. Exports

Some American farmers have always depended on world trade as a source of income. Cotton and tobacco producers exported between one-quarter and one-half of their crops through most of the nineteenth and twentieth centuries and the United States has exported significant quantities of wheat and rice since the mid-1800's. It was not until the early seventies, however, that corn and soybean exports exceeded 10 percent of domestic production. The inclusion of these two crops in the group of major U.S. agricultural exports has greatly increased the importance of trade issues to the feed-livestock sector--a portion of the agricultural economy which had heretofore focused on production for domestic consumption.

^{1/} The export value includes some processing and transportation.

Table 1--Value of U.S. agricultural exports and imports in current dollars by product category, calendar year 1984

Item	:	Exports	:	Imports
	:		:	
	:	<u>Billion dollars</u>		
Livestock and products	:	4.2	:	4.0
Food grains	:	7.5	:	0
Feed grains	:	8.2	:	.6
Fruits, nuts, and vegetables	:	2.8	:	3.8
Oil crops and meal	:	8.4	:	.8
Cotton and tobacco	:	3.9	:	.6
Other	:	2.8	:	10.1
	:		:	
Total	:	37.8	:	19.3

Source (6).

Figure 1

Real value of U.S. agricultural trade

Billion 1975 dollars

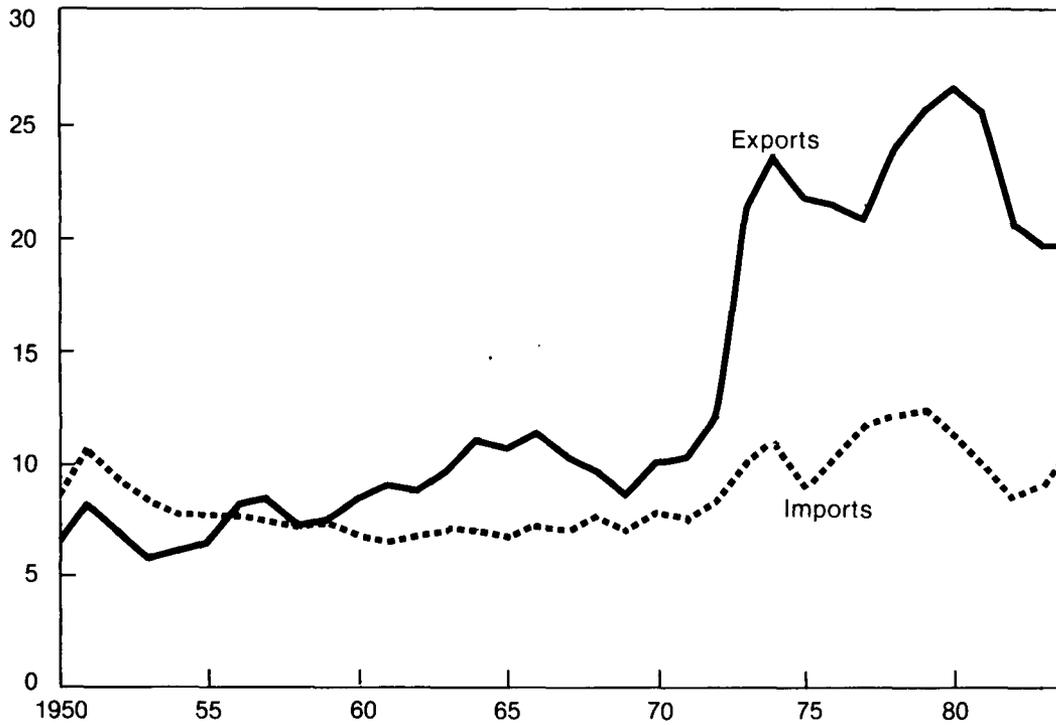
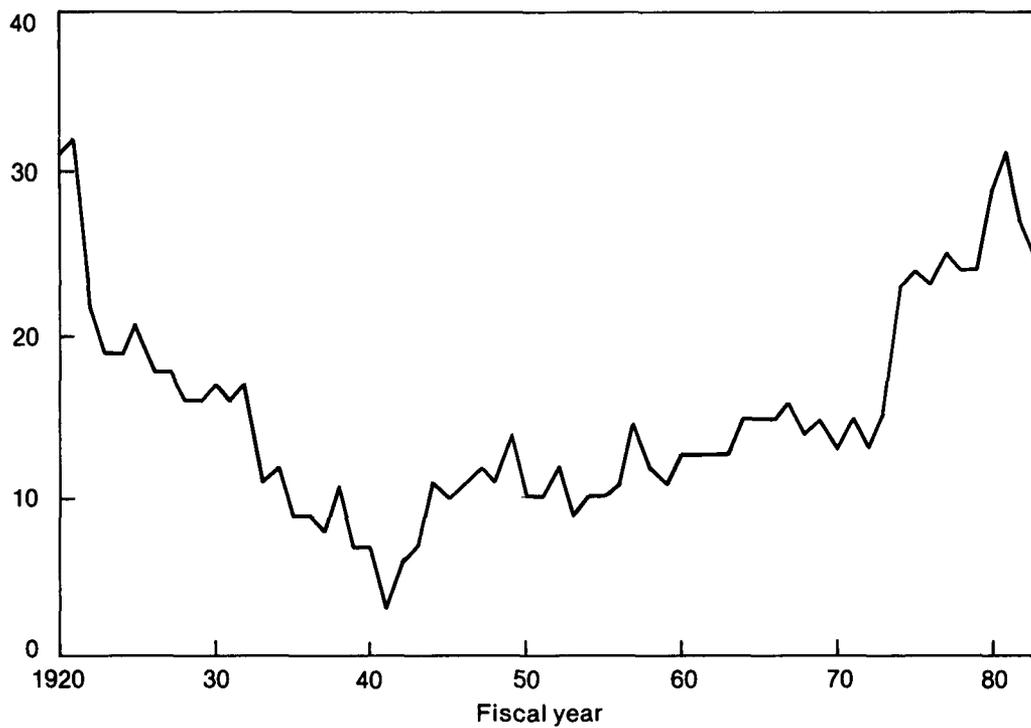


Figure 2

Agricultural exports as a percentage of cash receipts

Percent

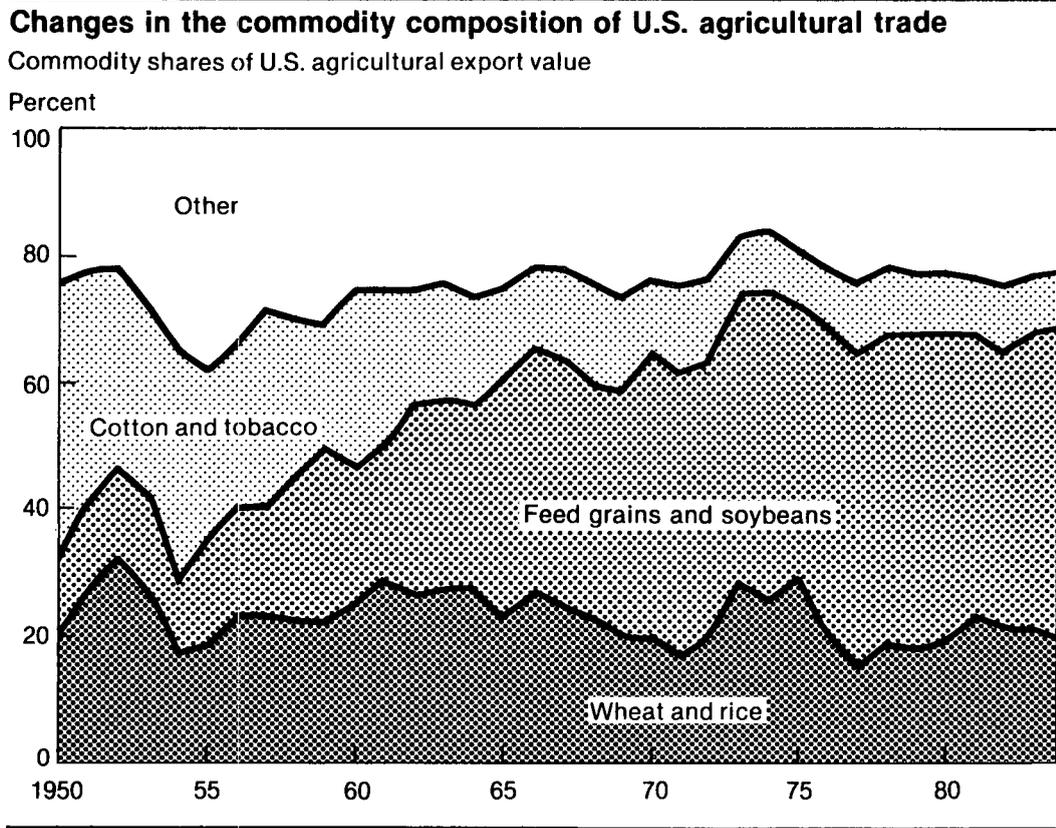


The shift in the commodity composition of U.S. agricultural exports in the past 30 years is shown by figure 3. Although the values of all commodity exports have increased, there has been a substantial shift in the relative importance of major groupings. Wheat and rice as a proportion of the value of U.S. agricultural exports have changed little since 1950, although wheat has shown considerable variability. Tobacco and cotton have declined sharply, falling from a combined total of 30 to 40 percent of U.S. agricultural exports in the early fifties to 10 percent or less currently.

The dramatic change--as mentioned--has come in feed grains and soybeans, which together accounted for 12 percent of the value of agricultural exports in 1950 but 46 percent in 1983. Over the same period, U.S. agricultural exports tripled in real value. The shift in commodity composition has helped make possible the recent rapid growth in agricultural exports and represents a massive new source of income to the agricultural sector.

The emergence of corn and soybeans as major exports has also had a significant impact on how U.S. policymakers view foreign markets. Demand for traditional U.S. agricultural exports such as wheat, rice, and cotton increases relatively little with an increase in per-capita incomes. Hence, global income growth has a smaller effect on trade in these products than it does on trade in soybeans and feed grains for which demand is linked closely to changes in income levels. These commodities are major inputs in the production of meat and livestock products--products whose demand is very sensitive to changes in consumer incomes. This suggests that U.S. agricultural exports are now much more sensitive to changes in global income than they were 15 or 20 years ago.

Figure 3



Factors Affecting Total World Demand for Imports

Growth in any country's import demand is largely the interaction of four major forces: population growth, income growth, income levels, and the growth and productivity of agriculture. Population growth is frequently the key variable in determining long-term food needs of a country or region. In the seventies, annual average population growth rates (table 2) were 1 percent or less in most developed countries but were 2 percent or more in most developing countries. Although population growth is important over the long term, these growth rates are relatively stable over a 1- to 5-year period. Population growth is not usually a source of short-term variability in import demand. Population distribution across rural and urban sectors, however, can have an effect on food demand in the short to medium term. Urbanization in developing countries is frequently associated with a change in food consumption habits as urban consumers switch from traditional foods, with long in-house preparation times, to processed wheat or rice products.

Food needs must be distinguished from food demand. Population levels determine food needs, but the rate at which needs are translated into demand depends on the availability of income to purchase food. Income growth rates in the seventies differed widely across countries (table 2). The OPEC countries, as expected, had extremely high rates of growth (averaging 7.7 percent per year), but even the poorest developing countries had an average growth rate of 4 percent. Much of this growth was financed with petro-dollars recycled through Western banks to non-OPEC developing countries. The global recession that began in 1980 has reduced real income growth, leading to reduced trade and a decline in prices for many commodities and manufactured

Table 2--Factors affecting the growth in food demand
in developed and developing countries

Item	Developed		Developing			
	Total	U.S.	Total	OPEC	Newly industrialized	Low income
			<u>Percent</u>			
Average annual growth, 1970-80:						
Population	0.90	1.00	2.40	2.60	2.30	2.30
Urban population	1.60	1.50	4.20	4.50	4.00	4.20
GDP	3.30	3.00	6.10	7.70	6.40	4.00
			<u>Value</u>			
Income elasticities: ^{1/}						
Total calories	.07	-.01	.35	.48	.19	.38
Animal calories	.21	.02	.70	.85	.63	.93
			<u>1969/71 = 100</u>			
Index of food production per capita, 1980	111	115	102	99	115	99

^{1/} These elasticities, while dated, provide a indication of the relative magnitude of the differences in food demand response to income changes across countries.

Sources: (7, 2).

goods in world trade. Many developing countries are faced with huge debts denominated in U.S. dollars (which have appreciated by more than 40 percent relative to other currencies over the past 4 years) and financed at variable interest rates (which have risen substantially since 1980). Prospects for a return of a boom in U.S. agricultural exports, fueled by import demand by developing and centrally planned countries such as occurred in the seventies, are remote for the next several years.

The third force driving import demand is income levels. The level of income is the major determinant of the income elasticity of food demand, which is a measurement of the responsiveness of consumer food purchases to a change in income. Table 2 shows that doubling per-capita income would increase the demand for food measured in calories by only 7 percent in developed countries, but would result in a 35-percent increase in the demand for food in developing countries. Not only are the major driving forces of food demand--income and population growth--much higher in developing countries than in developed countries, but the income elasticities are also much greater. When incomes grow rapidly, food demand may outpace food production from the agricultural sectors of many developing countries. It also means, however, that a decline or slowdown in income growth will have a much greater impact on food demand growth than will a similar change in income in the developed countries.

The final force affecting import demand is the growth and productivity of the agricultural sector. The index of food production (table 2) shows that developing countries as a group lagged well behind developed countries in agricultural output per capita in the seventies. Among the country groupings shown, only the newly industrialized countries were able to increase food production faster than population. Developed countries were increasing food output faster than their growth in food demand, while developing countries were unable to keep pace with their food demand growth in the seventies.

U.S. GRAINS IN WORLD MARKETS

U.S. grain and oilseed exports were the primary beneficiaries of the surge in agricultural trade during the seventies. Hence, much of the concern about the relationship between U.S. domestic farm policy and international trade policy is centered on these products. Both grain and soybean trade are shaped by changing demographics, economics, global stocks management, unique commodity characteristics, and global politics. Each needs to be understood in order to evaluate U.S. grain policy.

World Food and Feed Grain Trade

The emergence of the United States as a leader in world grain trade is a recent phenomenon (fig. 4). Grain trade patterns in the thirties resembled those of colonial empire days. Most regions of the world produced an exportable surplus that went to the grain-deficit countries in Western Europe. Japan and China also imported some grain. The United States was an insignificant grain exporter.

Thirty years later a new trade pattern emerged. Western Europe imported slightly less grain in the sixties than in the thirties, but many other countries, formerly grain exporters, became significant importers. The United States, Canada, and Australia emerged as principal exporters. By the late seventies, the United States established its dominant position as a grain exporter. Dependence on grain imports by the Soviet Union, Eastern Europe,

Japan, and the developing world also emerged as an important world trade pattern.

An examination of the world grain markets in which the United States has been a significant factor--wheat, rice, and feed grains--for the past 30 years helps to put the events of the seventies into perspective and provides a backdrop against which future policy proposals can be judged.

Wheat

Figure 5 shows U.S. exports of wheat since 1950 as a proportion of U.S. wheat production and as a share of world trade on a volume basis. The proportion of U.S. wheat production sold on foreign markets has gradually trended upward but has varied substantially from year to year. This variation has resulted from fluctuating U.S. production and large U.S. wheat stocks which allow the United States to respond to short-term changes in world import demands. Between 1971 and 1972, for example, a drawdown of U.S. wheat stocks allowed the United States to almost double exports.

The U.S. share of the world market shows very little long-term trend, with U.S. exports varying between 30 and 45 percent of world trade during the past 30 years. Except for the early fifties, there is relatively little variability in the U.S. market share. These trends indicate that U.S. wheat exports kept pace with the expansion of world wheat trade--which increased from 21 million tons in 1950 to 105 million tons in 1982.

Figure 4

Annual world grain trade, selected periods

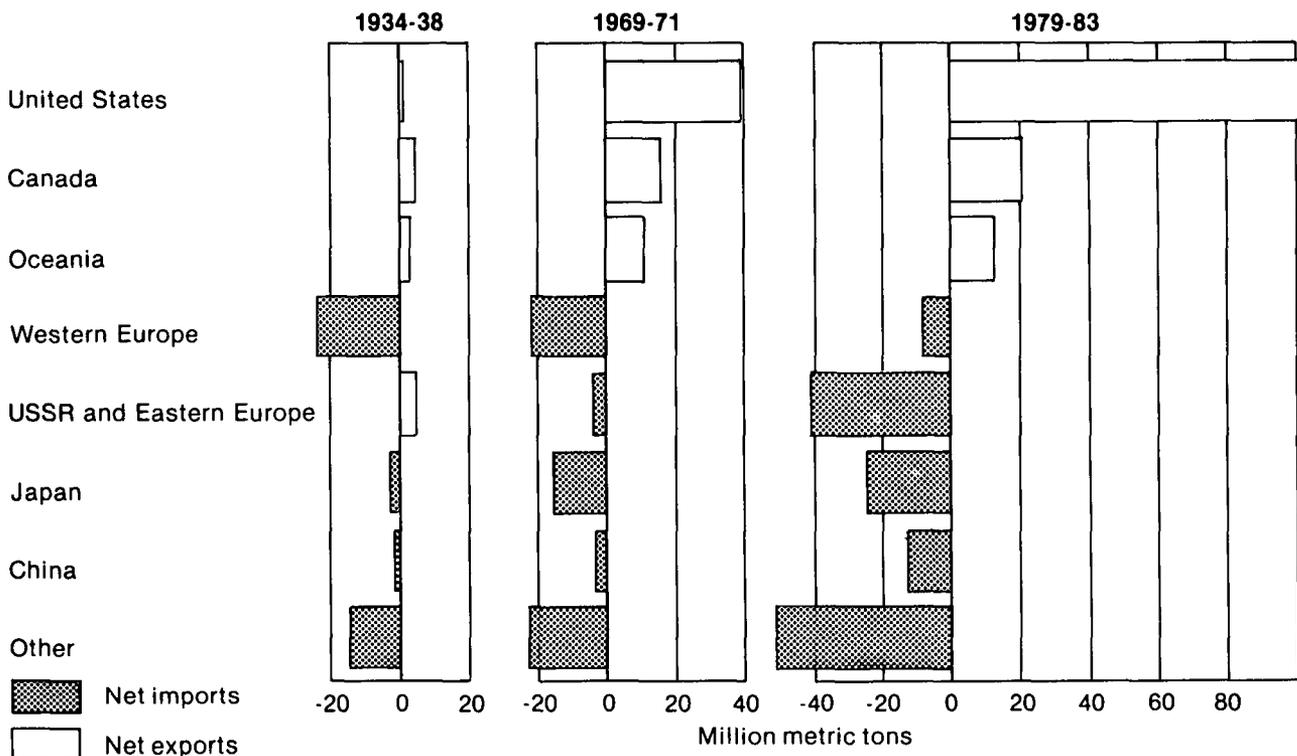
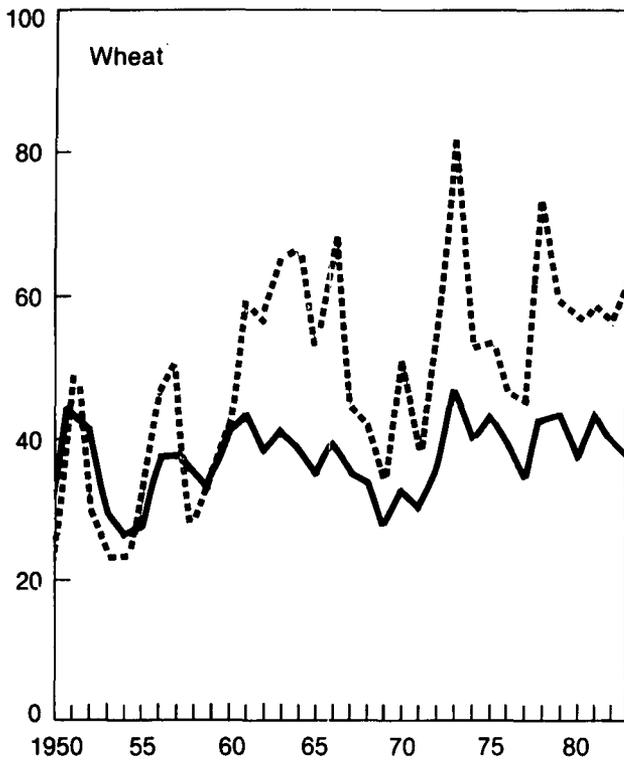


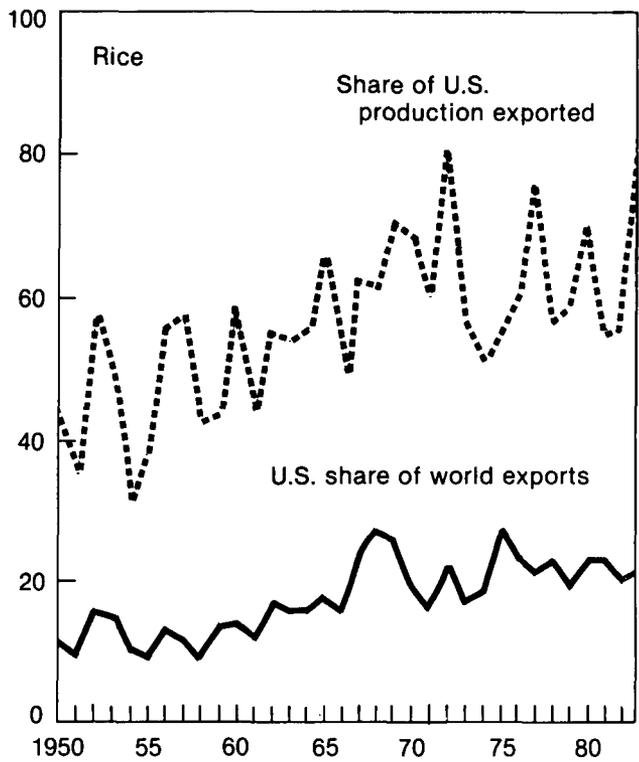
Figure 5

U.S. exports as a share of world exports and U.S. production

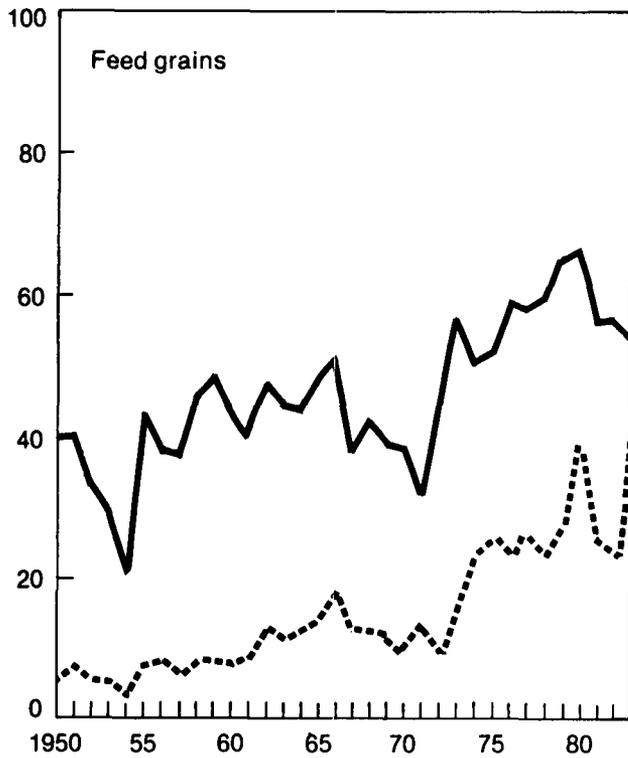
Percent



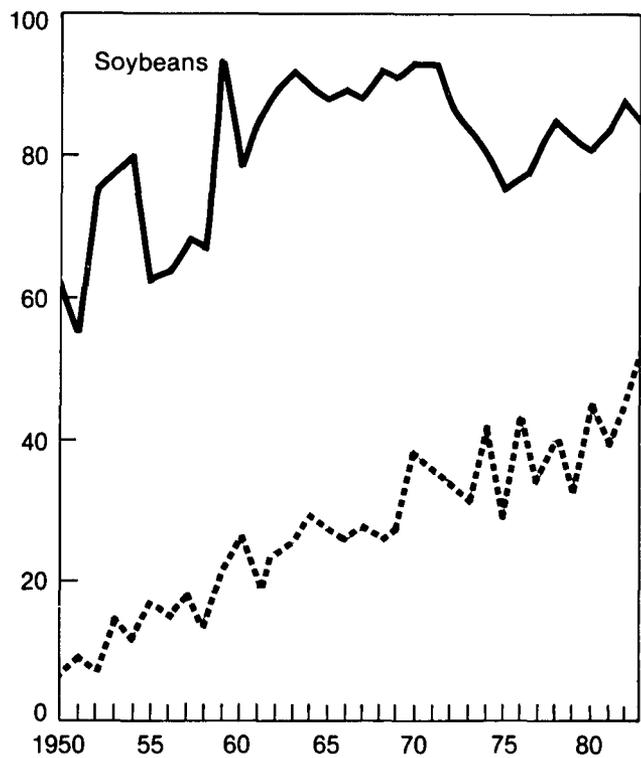
Percent



Percent



Percent



Sources: (1, 5).

Rice

U.S. rice exports comprise a much smaller share of world rice trade (10 to 25 percent). Also, the world rice market is much smaller than the world wheat market and it has been growing at a slower pace (from 4.3 to 12 million tons between 1950 and 1982). Rice variety differences have a much greater influence on trade flows and market shares than do variety differences for other grains.

Despite these factors, figure 5 shows an upward trend in the U.S. share of world rice trade. The proportion of U.S. rice production exported increased from 46 percent in 1950 to 68 percent in 1970, but this trend is less apparent in succeeding years. Concessional sales of rice under P.L. 480--which accounted for more than half of U.S. rice exports in the early seventies--now comprise only 15 to 20 percent of rice exports. Although the United States likely will continue to export more than one-half of its rice production, the slow growth of the world rice market is likely to preclude a rapid increase in U.S. exports.

Feed Grains

Feed grain production in the United States over the past 30 years has been more than 3 times the combined U.S. production of wheat and rice. Until the early seventies, 90 percent of this production was destined for domestic use. Beginning in 1972, with the Soviet grain purchase growth in world feed-grain import demand increased the proportion of U.S. production exported from 7.4 percent in 1971 to more than 30 percent in 1980 (fig. 5). The volume of U.S. feed-grain exports increased from 14 to 65 million tons over the same period.

Feed-grain exports subsequently fell to 50.3 million metric tons in 1982, but still equaled 20 percent of U.S. feed grain production and 56 percent of the world export volume.

It is apparent, given their volume and recent growth, that U.S. feed-grain exports have been a major factor in the recent internationalization of U.S. agriculture. It is also significant that the demand for feed grains is closely linked to the demand for meat and livestock products. Economic conditions and business cycles have a much larger impact on the demand for livestock products--and hence on the demand for feed grains--than on the demand for food grains such as wheat and rice. Closer links between U.S. agriculture and the world market in the seventies have therefore meant a closer link between U.S. agriculture and world economic conditions. These economic conditions represent a source of variability which has gained new significance for U.S. agriculture.

Grain Stocks

The United States plays an important role in world agricultural markets by holding large quantities of grain. Between 1979 and 1983, about one-third of the world's total wheat stocks and 60 percent of the world's total coarse grain stocks--consisting of corn, grain, sorghum, barley, oats, and other grains--were held by the United States (table 3).

It is useful to divide stocks into two functional categories--working stocks and carryover stocks. Working stocks are those normally in the grain and food industry pipeline. Carryover stocks are those in excess of working stocks. Countries that hold the world's carryover stocks hold the world's insurance

against future expected shortages. In recent years the United States held most of that insurance. From 1979 to 1983, the United States held nearly one-half of world wheat carryover stocks and 80-85 percent of world coarse grain carryover stocks.

World grain stock levels have shown considerable variation over time (fig. 6). Relative to consumption, stocks were at record low levels after poor harvests in the early seventies. Global stocks at the end of the 1983 marketing year again approached record low levels. The combined effects of a drought and acreage reductions under the payment-in-kind program sharply reduced 1983 U.S. harvests, drawing down stocks precipitously. Figure 6 shows, however, that U.S. stock levels were back up at the end of the 1984 season. Over time, changes in the U.S. stock level have accounted for most of the variation in global stocks, while Canada and the Soviet Union, which have had large stocks periodically, have been most important in accounting for the residual variation.

The global pattern of grain stocks illustrates a curious interdependence that has evolved among the world's grain trading nations. The United States has provided much of the world's carryover stocks of grain as an often unwanted byproduct of its domestic policy. Most other countries carry minimal stocks at no cost to their taxpayers. They rely instead on the world market to absorb much of their production variability. In other words, they rely on U.S. stocks. The success of their domestic grain policies rests upon the willingness of the United States to continue to hold stocks. From a global perspective, grain stock levels of the early eighties appear about optimal. Smaller stocks would be inadequate to prevent against normal fluctuations in trade; but the cost of holding substantially more stocks likely would exceed the benefits of added protection. The high interest costs of the early eighties make stockholding especially expensive. The location of global stocks--mainly in the United States in low-cost storage near low-cost transportation routes--also appears to be near-optimal for the mass of the world's consumers who depend on trade for part of their grain supplies. But the allocation among countries of the costs, benefits, and risks associated with that global distribution of stocks is cause for dissatisfaction in both the United States and in importing countries. There is a sentiment within the United States that the U.S. Government bears too much of the burden of holding

Table 3--Stocks of wheat and coarse grain held by leading stockholding countries, 1979-83 average 1/

Country or region	Wheat	Coarse grains
	<u>Million metric tons</u>	
United States	30	62
Canada	11	6
European Community	9	6
Soviet Union	7	3
Other	30	27
World	87	104

1/ Quantity of grain held at the end of the marketing year. Some rice stocks also are held, but data are not available for some of the most important producers, especially China.

grain stocks while many importing countries feel insecure about the concentration of world grain stocks under U.S. control. Yet, as long as U.S. commodity policy continues to rely heavily on stock management to achieve income redistribution objectives, private traders in the United States and abroad are unlikely to shoulder the high costs of carrying stocks-- particularly at the high level of current interest rates. Until U.S. policy changes, the global distribution of grain inventories is likely to remain the same.

Substitution among Grains

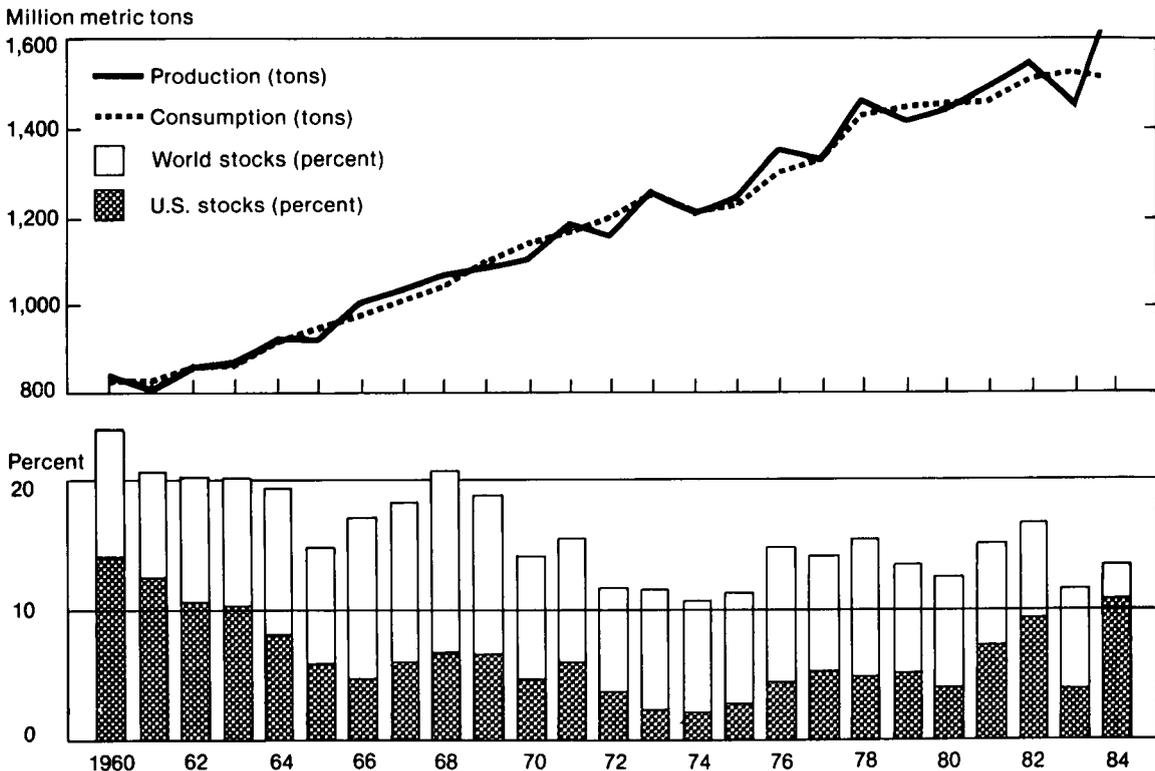
There are many varieties of grain, each with its unique characteristics. Some are used primarily for human food and others for livestock feed. For an individual person or animal, these differences might be important. But in global markets there is substantial substitutability. ^{2/} Some wheat is fed to livestock. Some corn goes directly to human consumption. Technology now allows marginal substitution of different types of wheat in the production of various feedstuffs. Argentine wheat substitutes for Canadian wheat. Wheat substitutes for corn on the margin. Sorghum and corn substitute in feed rations. All this means that grains are particularly interchangeable. Consequently, prices of all grains tend to move up and down together over time.

Substitution increases competition in the grain trade. The United States does not have as much power in international grain markets as its stock and

^{2/} There is less short-term substitution among varieties of rice and between rice and other grains than there is for wheat and feed grains and various feedstuffs.

Figure 6

World grain production and consumption, and stocks as a percentage of world consumption



production levels might indicate. This is illustrated with two examples. First, although the United States accounts for 75 percent of the global exports of corn, a shortage of U.S. corn in world markets would tend to be offset by supplies of barley, sorghum, or even wheat. U.S. corn exports represent about 50 percent of world coarse grain trade but only 25 percent of total grain trade.

As a second example, consider U.S. exports as a share of foreign production. U.S. wheat exports are equal to only 11 percent of wheat production in the rest of the world. The equivalent value for feed grains is 13 percent; all grains, including rice, 10 percent. This means, for example, that the rest of the world would only have to increase grain production 5 or 6 percent to offset half of U.S. grain exports. Policies that make U.S. grain more expensive on the world market thus run the risk of eventually reducing U.S. exports.

History has shown that it is difficult for countries to manipulate grain trade because of grain's interchangeable nature. Embargoes tend to fail, or are at most successful for only a short time. Likewise, it would be very difficult for exporting countries to enforce a grain export cartel.

Agricultural Policy and Grain Trade

Grain trade patterns shown in figure 3 are only partly determined by the global distribution of productive capacity, population, and wealth. Government policies also play an important role. Although there are exceptions, one can make some generalizations about grain policy by dividing the world into four groups: the Soviet Union, the United States, other developed countries, and developing countries.

Developed Countries (Excluding the United States and Soviet Union)

The developed countries including most of Western Europe and Japan generally support prices of domestic farm commodities well above prices in the world market. The policy mechanism most often chosen in these countries to support prices tends to stabilize domestic prices at the expense of destabilizing the world market.

Over the last 50 years, agriculture has been viewed in developed countries as a sector with a high concentration of low-income families with limited alternative employment opportunities. Citizens of Western European countries and Japan emerged from World War II with vivid memories of food shortages and with a strong desire to achieve national food self-sufficiency. The food and agricultural policies which have emerged during the past 3 decades in the developed countries have therefore emphasized support of the rural farm sector--often at the expense of taxpayers and consumers who are concentrated in urban areas.

A side-effect of domestic agricultural policy in most developed countries is that adjustments to variations in domestic grain production are forced onto the world market, increasing the instability. All countries seek to stabilize domestic food supplies, but they face unpredictable variation in domestic crop production. Given the variation in domestic production, a country can add stability to the domestic food supply by either managing domestic buffer stocks to offset production variability or by using the world market--importing more when domestic production is down and exporting when it is in surplus.

Most developed countries hold small stocks of grain and rely on trade to stabilize the domestic market. This destabilizes the world market in two ways: the market impacts of domestic crop shortfalls or surpluses are transferred to the world market and domestic producers and consumers do not have to adjust to world shortages or surpluses that may exist in the rest of the world. The quantity imported is determined by the gap between domestic production and consumption at the stabilized domestic price, regardless of the world market price. If grain supplies are low in the rest of the world and world prices are high, developed countries can bid grain away from the poorer countries—which cannot afford the high-priced grain—and from consumers and livestock producers in countries such as the United States and Canada where domestic grain markets are linked closely to the world market. In other words, developed countries with insulated markets export the effects of shocks to their markets while protecting themselves from world shocks.

This description is also appropriate for the policy impacts of most of the developed grain-exporting countries. Few countries, other than Canada in this group (and the United States, which is considered separately), hold significant grain stocks. These exporting countries also tend to stabilize domestic markets and let the export market absorb most of the variation in domestic production.

Developing Countries

Developing countries generally set domestic grain prices below world price levels. They are less successful than the developed countries in stabilizing domestic grain supplies, but their grain policies still tend to destabilize the world market.

The agricultural policies of the developing countries, as a group, tend to favor urban consumers at the expense of agricultural producers by holding down the prices of major foods. This discourages food production, increases the income disparities between the urban and rural sectors, and increases the already strong incentives to migrate to urban areas. Initially, a cheap food policy pays high political dividends for a relatively modest outlay of government revenues. Resources are transferred to large, diverse, politically vocal, and influential urban groups. In the longer term, however, urban population growth (which is in part a result of this policy) places an ever-increasing burden on government revenues. This, coupled with falling domestic food production, requires larger food imports (or reduced food exports). A cheap food policy, once initiated, is difficult to remove because of the sensitivity of the politically powerful urban sector to an increase in food prices.

Policies of developing countries tend to increase their demand for grain imports, thereby strengthening world grain prices. As with developed countries, these policies also have the side effect of destabilizing the world grain market. Developing countries are less successful, however, in using trade to offset variations in domestic production. The lack of foreign exchange prevents them from completely offsetting a poor harvest with increased imports. Likewise, they cannot afford to hold more than minimum working stocks of grain from one year to the next because of high storage costs and lack of facilities. Internal transportation is also typically expensive and inadequate. Thus, a large share of domestic production variability is absorbed directly by the population, with the remainder offset by trade. As a result, developing countries export their domestic production shocks.

The newly industrializing countries (NIC's) are an important subgroup of developing countries. These countries—including, among others, Taiwan, South Korea, Mexico, Brazil, and Argentina—have experienced rapid economic growth as well as many of the structural transformations associated with that growth. Price stability for food staples is still likely to be important, but these countries can afford price stability at higher prices because they have higher income levels. Importing countries can move toward producer price support policies which promote food self-sufficiency and exporting countries devote government revenues to promoting agricultural exports. Taiwan and South Korea greatly increased price support payments for rice production in the past decade while Brazil and, to a lesser extent, Argentina, have pursued programs to diversify and expand their agricultural exports. The NIC's are therefore likely to become a more frequent source of agricultural trade disputes.

The Soviet Union

The Soviet Union deserves special mention because of the magnitude of its impact on the world grain market. It accounts for 14 percent of the world's production and 17 percent of the world's consumption of wheat and coarse grain. Prior to 1970, the Soviet Union was a net exporter of grain, but 10 years later it was the world's largest grain importer.

The Soviet Union has larger annual variation in grain production than any other country. Historically, the variation was mostly offset internally with adjustments in stocks and consumption. In recent years, however, the Soviet Union has relied more on the world market (especially the coarse grain market) to offset domestic production variability. Policy decisions were made to provide more stability of grain supply for consumers and also to let stock levels dwindle. These actions had the effect of transferring a larger share of their production variability to the world market. Consequently, the Soviet Union has become the largest single source of instability in world grain markets. Some analysts contend that the variability of Soviet grain import demand may actually increase over the next 10 years. Kogan (5), for example, argues that new high-yielding varieties are more sensitive to fluctuations such as weather, insects, and disease and, given past patterns in Soviet weather, this could lead to grain losses of up to 25 percent of normal production.

The United States

Grain policy in the United States, as in other developed countries, supports producer prices and incomes. The major differences are that world and domestic prices are linked and move up and down together as long as world prices are above the U.S. loan rate. U.S. price supports and stocks, as a result, have added substantial stability to the world market.

Grain policy in the United States took shape during the thirties—a time when agricultural exports had fallen sharply (fig. 2) and had little relevance to policy. As in other developed countries, one of the main objectives of the policy had been to support producer incomes. In recent years, the United States has become a dominant force in world grain trade and trade has become much more important to U.S. agriculture. But, policy conflicts have developed. Policies that support producer incomes have tended to thwart trade. This conflict has yet to be resolved.

The major components of U.S. grain policy for many years have been (a) price support, (b) storage of excess grain stocks, (c) production control, using

cropland diversion, and (d) various methods for disposing of surplus stocks, mainly abroad. Each year, the Government, through the use of nonrecourse loans, is a buyer of last resort of eligible farmers' grain at the loan rate. ^{3/}

Because of price supports and accumulated Government stocks, the United States has provided substantial price stability for the world market over many years. The United States acts as a shock absorber--accumulating excess grain by increasing stocks and allowing livestock production to expand when the world market is oversupplied and making stocks available and reducing livestock production when supplies run short. But, certain U.S. policies such as embargoing exports, massively reducing production and stocks, or making major changes in price support levels can be destabilizing.

THE WORLD SOYBEAN MARKET

Soybean exports, in conjunction with feed grain exports, were the dynamic growth sector of U.S. agricultural trade in the seventies. World trade in soybeans grew from 800,000 tons in 1950 to 28.9 million tons in 1982, with U.S. exports commanding 80 to 90 percent of the market over this period (fig. 6). U.S. soybean production has expanded rapidly to meet both domestic and foreign demand, increasing from 8.1 to 62.0 million tons over the same period. The growth in foreign import demand, however, has been more rapid than the growth in U.S. domestic demand. Hence, the volume of soybean exports has increased from 6 percent of U.S. production in 1950 to over 40 percent in 1982. Most of the world's soybeans are produced in the United States, China, Brazil, and Argentina. Although some soybeans are used directly for human food, most are processed into soybean meal (a high-protein animal feed) and soybean oil (used for human consumption). Even though the United States dominates trade in soybeans, U.S. dominance of the world soybean meal market has eroded with the emergence of Brazil and Argentina as major exporters.

The U.S. share of world soybean meal market fell from 80 to 90 percent in the sixties to less than 35 percent in 1981. In spite of this decline, a growing share of U.S. meal production is being exported. Meal exports have increased from 2 to 3 percent of U.S. production in the early fifties to 28 percent in 1981.

Brazil's domestic tax structure, which encourages domestic crushing of beans and the export of meal and oil, has been a major factor in the emergence of that country as a meal rather than a bean exporter. Brazilian meal exports accounted for 44 percent of the world market in 1981. The European Community (EC) accounts for another 20 percent of the world soymeal market, but most of this is from imported beans which are crushed and reexported as meal. Thus, within the total product market of whole beans, meal, and oil, the United States contributes about 65 percent of the world's trade in "soymeal equivalent."

Unlike grains, soybeans are relatively freely traded. The major importers--Japan and the EC--have no quotas or duties on soybean imports. Although the United States has a commodity program for soybeans, loan rates are set at levels which have seldom taken effect. Soybeans are not included in the farmer-owned reserve and the U.S. Government does not hold significant stocks of soybeans.

^{3/} The operation and consequences of U.S. farm programs are discussed in the following article of this publication.

As with grains, there is substantial substitution among protein meals and between grains and soybeans in both production and consumption. In production, a large area of the United States is equally adapted to producing corn or soybeans. Slight changes in price ratios can stimulate a shift in production from one crop to the other. On the consumption side, other protein meals--for example, fishmeal, cottonseed meal, sunflowerseed meal, and rapeseed meal--can substitute for soybean meal. Although many of these protein meals are imperfect substitutes because of economic or technical factors, new varieties and improvements in processing technology may improve their substitutability in livestock feeds. More important, soybean meal can substitute for other nonprotein meal feeds in livestock rations. In the EC, the high price of grain relative to soybean meal encourages livestock producers to substitute soybean meal for corn.

These substitution possibilities cause the world price of soybeans to rise and fall over time in proportion to the rise and fall in grain prices. Factors influencing grain prices affect soybeans. Some analysts argue that soybeans compete effectively in the world market and earn their producers reasonable profits without Government storage and production control programs. Others suggest that Government price support programs for grain indirectly support soybean prices. High support prices for corn, for example, tend to increase the corn area planted--some of which would have been planted in soybeans. This reduces U.S. soybean production and strengthens prices.

Prospects for continued growth in U.S. soybean exports are linked closely to the same factors affecting world import demand for feed grains. Global income growth drives the demand for livestock products, of which soybeans (and feed grains) are a major input. Income growth will be slower in the next decade if for no other reason than much of the income growth in rapidly expanding developing country markets was financed in the seventies with loans that now must be repaid. Slower expansion in world trade will increase domestic pressures for higher trade barriers for all products. Even if soybeans are not affected directly, measures affecting the total quantity or the feed mix of livestock rations in major importing countries could have a substantial impact on U.S. soybean exports.

POLICY IMPLICATIONS

The future of U.S. agricultural export earnings will depend on the rate of growth in global volume of agricultural trade and the U.S. share of that volume. These factors will be determined by many forces--some outside U.S. control and others under U.S. control. The former include global disorders of the magnitude of past oil embargoes, the rise and fall of trade barriers, and new technology in crop or livestock production.

U.S. policy can have a major influence on the rate of growth in global volume of agricultural trade. For example, macroeconomic, trade, and aid policies can influence the rate of growth of developing countries and, consequently, their volume of agricultural imports. The United States can also influence the global environment towards trade liberalization. Reduced trade barriers should expand agricultural trade.

U.S. policy can also have a major impact upon the U.S. share of global agricultural exports. The United States has abundant land resources and the technology to compete effectively in the growing global market, especially for land-intensive agricultural commodities such as grains and soybeans. As a

result, regardless of world prices and other countries' policies, the United States has the basic ingredients to be competitive. But, actual competitiveness will depend upon U.S. domestic policies--macroeconomic policy, trade policy, and farm policy. These are discussed below.

Macroeconomic Policy

The last 10 years have shown how macroeconomic forces, such as interest rates and exchange rates, can influence agricultural exports. As the value of the dollar fell throughout the seventies, both the volume and price (in dollars) of exports went up. During the early eighties, the value of the dollar went up, while the volume and dollar price of exports dropped. Between the first quarter of 1980 and the fourth quarter of 1984, the inflation-adjusted value of the dollar increased 42 percent. Thus, while grain prices were falling in the United States, they were rising in terms of the currencies of importing countries. For example, the farm price of corn, corrected for U.S. inflation, decreased 10 percent over that period, but the typical importing country had to pay 32 percent more in its currency, corrected for inflation, to buy U.S. corn. U.S. macroeconomic policy has a substantial influence on the value of the dollar, and directly affects agricultural exports.

The serious debt situation in many developing countries compounded the dampening effects on food demand of macroeconomic forces in the past 5 years. The debt crises in the eighties was in part generated by the loose monetary policies of industrial countries--especially the United States--in the wake of OPEC's unilateral increase in the price of petroleum in 1973. Many developing countries took advantage of the easy credit to avoid adjusting to the increased price of energy. Subsequent increases in interest rates and appreciation of the dollar--the currency in which much of the debt is denominated--have increased the real burden of the original obligations and have reduced the amount of foreign exchange earnings available for import purchases. There have been direct and indirect effects on food imports.

The direct effect has been to reduce food imports. But this effect is probably much smaller than the indirect and longrun effects that the reduction of all imports by these countries have on global trade and income growth. Income growth was the driving force behind world agricultural trade growth in the seventies and it is the decline in that rate of growth that is a major source of the current decline in trade.

Trade Policy

As in recent years, much of the growth in grain and feed imports likely will be in the developing world. These countries need foreign exchange from export sales to purchase U.S. farm products. Their main exportable products tend to be agricultural, some that compete with U.S. products and some that do not.

As shown in tables 1 and 2, the United States is a major importer of some agricultural products. By keeping our own trade barriers down--for both agricultural and nonagricultural products--we help to enable these developing countries to purchase U.S. exports.

Farm Policy

U.S. farm policy in the past had two broad impacts on grain and feed markets, world price stability, and world price support. These two impacts, stability

and support, need to be examined separately because they are independently related to U.S. export volume.

Stability and Trade

Much of the future growth of imports of grain and feeds will occur in developing countries. The growth rate may depend on their confidence in the availability of grain on the world market. The political consequences of food shortages can be severe in many developing countries. If these countries feel there is a high risk that grain will not be available on the world market when needed, they will have a strong incentive to maintain trade barriers, to invest extra resources in agriculture, and to push for self-sufficiency, even though the diversion of resources into grain production may be uneconomical given their resource endowments and expected world prices. If the world grain market appears reliable, then they might be more willing to increase grain imports and use their scarce resources to produce and trade other goods. U.S. agricultural policy can generate longrun growth in global trade by enhancing world market stability. ^{4/} This would benefit all grain and feed exporting countries, but the United States would gain the most because of its large market share.

The United States, however, pays a price for providing greater world grain market stability. This price includes the cost of Government outlays to subsidize the maintenance of large grain reserves or a willingness of U.S. producers and consumers to make short-term adjustments which will mitigate world grain market variability. U.S. policies have supported world grain prices with a commitment to purchase stocks when prices are low and have dampened price increases by releasing stocks and by allowing high world prices to be transmitted to the domestic market where additional supplies are generated from the adjustments of producers and consumers. From a policy perspective, we must decide whether the benefits have been worth the economic and social costs of this policy.

Loan rates are used by the U.S. Government to insure a minimum return to producers who agree to fulfill the conditions of receiving program benefits. The price support guarantee associated with the loan rate also has a trade impact. If the world price is above the loan rate, the world market is not affected. If world price falls below the loan rate, the U.S. Government will purchase enough of the U.S. crop to raise prices to the loan rate. Foreign producers benefit as well. Once prices fall to the loan rate, other countries no longer have the incentive to increase utilization or to reduce supply. The U.S. Government is committed to making the adjustments by purchasing stocks. The world wheat market illustrates this point. Since 1981 the wheat loan rate has provided a floor under the U.S. price. Between 1981 and 1983 marketing years, U.S. wheat exports dropped 10 million metric tons (20 percent) and ending stocks increased 11 million tons (40 percent), even though production dipped in 1983 due to the Payment-in-Kind program. At the same time, other wheat exporting countries increased wheat production 10 million tons (20 percent) and increased exports 8 million tons (24 percent).

A lower wheat export price by the United States would have forced more of the adjustment on exporting countries and less of the adjustment on U.S. taxpayers

^{4/} Research on this linkage is limited, but there is some evidence that a developing country can justify emphasizing a greater degree of self-sufficiency in food-grain production when facing a highly variable world grain price (2).

who have to finance the purchase and holding of U.S. Government wheat stocks. U.S. producers would have faced lower prices, but so would have foreign producers. A broader sharing of the cost of adjustment worldwide would lower the cost of adjustment to be borne by any one country. Prices will fall without the loan rate support commitment of the United States, but by less than one would expect if U.S. producers had to make the entire supply adjustment to compensate for the loss of price supports.

Farm Policy Tradeoffs

Looking to the future, it is clear that our choice of farm policies will have a big effect on exports. Certainly the policies of other nations and the effects of factors outside the control of policymakers--such as droughts, civil strife, and technological changes--will have a significant impact on U.S. grain and soybean exports. But many of the most important choices lie within the realm of U.S. farm policy. Perhaps the most important is the level and structure of grain price supports.

A reduction of price supports implies that the U.S. agricultural sector will be more closely linked to price changes on the world market and will depend less on intervention by the U.S. Government. It means that U.S. producers will have to accept lower prices for their crops when world market prices fall but, with reduced U.S. Government intervention to purchase stocks, foreign producers will also have to accept lower prices. The adjustment to lower prices will fall on producers or taxpayers in all countries, rather than primarily on U.S. producers and taxpayers.

A key issue is how other countries would react. Some countries may allow lower world prices to be passed along to producers and consumers, but others would maintain or increase trade barriers to prevent domestic adjustments. Although government outlays in countries with high domestic grain support prices would have to increase (to maintain the same nominal level of support) while taxpayer costs in countries with consumer subsidies will fall (given the same nominal consumer prices), most of these countries are not likely to change their food and agricultural policies. If policies remain as they are today, most of the adjustment to lower U.S. support prices would likely take place in the major grain-exporting countries.

There are both long-term and short-term implications of lower U.S. support prices. In the short run, less U.S. Government intervention--including smaller Government-owned or subsidized stocks--means greater grain price variability on world and U.S. markets. The increase in price variability would depend, in part, on how much the private sector and foreign countries would increase stockholding, but certainly there would be greater uncertainty associated with grain producers' annual incomes. Livestock producers would also experience greater price variability. This would increase the risk associated with livestock production and could result in somewhat higher as well as more variable consumer meat prices.

CONCLUSIONS

The longrun outlook seems promising for growth in world trade of grain and soybeans. World trade should continue to grow for the same reasons it grew in the past--more people with more income are living in countries with limited agricultural resources. Many forces outside U.S. control will help determine

the rate of growth in world agricultural trade and the share captured by the United States. But the most important forces are under U.S. control.

How well the United States competes will largely be determined by U.S. policy. Farm policy will play a most important role. Relatively high grain price supports could cause a gradual decline in the U.S. share of the world export market. That market share could be maintained or increased with lower price supports. High price supports help today's producers. Lower price supports help tomorrow's producers by expanding exports. One of many policy challenges is to reconcile this tradeoff of gains and losses between farming generations.

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