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The World Food Situation

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THE WORLD FOOD SITUATION*

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In an article published in early 1982, Lester Brown painted a pessimistic picture about the future of the world food situation: "The period of global food security is over... the worldwide effort to expand food production is losing momentum... world food supplies are tightening and the slim margin between food production and population growth continues to narrow."1/ Yet later in that very year the real prices of both corn and wheat were as low as they had been since the depth of the Great Depression, the U.S. was idling land in an unsuccessful attempt to bring supply in balance with demand, and stocks of grain were at near-record levels. In 1983 U.S. policy makers idled still more land by paying farmers with government stocks to set aside still more land in the hope that in this way costly stocks would be reduced along with government expenditures in dollar terms.

The pessimistic picture sketched out by Brown is not new. In the mid-1970's we were regaled with forecasts of doom as commodity prices skyrocketed worldwide. We heard of triage, the U.S. and other industrialized countries were criticized for consuming too many livestock products, and many speakers' fees were earned advising U.S. citizens how they could help save the world by eating one hamburger less each day.

My paper is divided in two parts. In the first I will attempt to

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provide a brief overview of the world food situation, with an emphasis on what has happened during the 1970's - the decade when many observers thought we were headed for a Malthusian crisis. In the second part I will discuss the factors likely to affect the world food situation in the 1980's and beyond.

To anticipate the findings from my analysis, I will argue that the world, and especially the less-developed countries, did a remarkable job of dealing with their food problem during the 1970's, despite the difficulties of that period. Moreover, the prognosis for the decade ahead is one of cautious optimism, with the ultimate result depending very much on how governments deal with their agricultural sectors.

I. AN OVERVIEW OF THE WORLD FOOD SITUATION2/

The key to understanding the world food situation lies in data on (1) production of food, (2) trends in prices of food, (3) developments in the fertilizer industry, and (4) trade. This section contains a brief overview of each of these topics. For reasons of space I have chosen not to enter the debate on nutritional status, except indirectly. For a recent contribution to the debate on nutritional status, see Poleman.3/

(1) Trends in Production

Selected indexes of world agricultural and food production are summarized in Table 1. These data refer to the 1974-79 period, but they are indexed to a 1961-65 base period. I have chosen to focus only on the latter half of the 1970's because so much of the recent debate on the food crisis was engendered in the early 1970's when there was a surge in international

commodity prices.

The data tell an impressive story. By the end of the 1970's agricultural production for the less-developed countries as a whole has increased an impressive 58 percent over the 1961-65 base period, compared to 42 percent for the developed countries as a whole. Africa was the poor performer among the less-developed countries, with food production having expanded only 32 percent over this period. However, food output in East Asia had expanded by 75 percent, and by 73 percent in Latin America and 68 percent in West Asia. In Pakistan, food production doubled over this period, and it almost doubled in Brazil.

Even if one takes account of the more rapid growth in population, the performance of the less developed countries as a whole is still impressive. The annual growth of food production per capita in the low-income countries as a group was 0.7 percent during the 1970's. The total masks a great deal, however. Per capita production of food had declined by some 9 percent in Africa, compared to the base period. And the increase for South Asia, which includes some 65 percent of the population of the low-income market economies, was only 8 percent compared to the base period. In that region Bangladesh actually experienced a significant decline in per capita production. Although not shown in the table, per capita production also declined in each of the countries of the Caribbean in this same time period.

Although these data suggest a rather mixed and uneven performance on the part of the food economy, they by no means are consistent with any inference that we are running out of production potential, or that the less-developed countries were unable to feed themselves. The increase in

per capita production of 0.7 percent a year during the 1970's, although modest, was a solid achievement in light of the rapid population growth in these countries and in light of the discriminatory economic policies which most of these countries followed vis-a-vis their agriculture (see below). Moreover, the performance of individual countries lends optimism regarding what might be done in the future. In the early 1970's, for example, India was a special cause for concern. By the early 1980's, however, that country was actually exporting small surpluses of food grains.

The enigma, of course, is China, with its large population. Unfortunately, the data on this country are so precarious that it is difficult to know what to make of them. Gale Johnson has tried to disentangle them in one of the references cited earlier.4/ Among other things, he quotes a Chinese source which concedes that grain production per capita was about the same in 1977 as it was in 1955. But he also cites more recent concessions, which suggest that the performance of the Chinese food economy has been anything but good.

(2) Food Prices

The price of food is another measure of scarcity. If the demand for food was outpacing the supply, one would expect to see the relative price of food products increasing. In fact, it was the rapid rise in commodity prices in the early 1970's that gave rise to the world food scare.

Figure 1 provides historical perspective on the real prices of wheat and corn in the U.S. The price of grains is important since grains are the primary food products of low income people. Although far more people eat rice as a main staple than eat wheat, the price of the latter is a reasonable

proxy for the price of food grains. In contrast to rice, wheat is widely traded and is often consumed in the same countries that are major rice consumers. The price of wheat in the U.S. is also a reasonable proxy for the international price of wheat since the U.S. has long been an exporter of wheat and wheat products.

The data in Figure 1 tell a revealing story. What they show, especially for wheat, is a long-term, secular decline in the real price. This series is indexed to a 1967 base, so the prices are in terms of 1967 dollars. If one were to draw a long term trend line through these data, the base in the mid-1880's would be approximately $3.50 per bushel. By the end of the 1970's, the trend price was down to about $1.50 per bushel. This is approximately half its price in the earlier period. Moreover, by the end of 1982, there was an even further decline in prices. This hardly suggests that scarcity is creating a serious food problem.

These data also put the early 1970 experience in perspective. The price "spike" of that period was obviously short-lived, with prices in real terms quickly declining to the longer-term trend line. Moreover, the peak of that spike did not attain even the prices realized at the end of World War II when war-time scarcity created the last significant runup in commodity prices.

The data also provide some insight into the nature of the hunger or malnutrition problem. They suggest that this is an income or poverty problem and not one of production.

(3) Fertilizer

One of the concerns of the mid-1970's was that increases in fertilizer prices would dampen off the use of this modern input, thereby causing us to lose not only the contribution to production of that input but also to fail to capitalize on the increased fertilizer-responsiveness of the new high-yielding varieties. This concern about fertilizer was due to the dramatic rise in energy prices in the early 1970's; nitrogen fertilizer is based heavily on natural gas.

Fertilizer prices did increase in the first half of the 1970's - by 140 percent in terms of prices paid by U.S. farmers from 1970 to 1975. However, a longer-term perspective shows that the relative price of fertilizer rose only modestly. Table 2 presents indexes of prices paid by U.S. farmers for all production items and for individual components of the input mix. Compared to 1970, fertilizer prices at mid-1982 had increased less than 10 percent more than all production items. The bottom half of the table shows that this pattern was similar in the European Community.

This failure of fertilizer prices to rise as much as energy prices is explained in part by the fact that, important as natural gas is for the production of nitrogen fertilizer, the production process is still capital intensive. Hence the effect of energy prices alone was less than many observers expected. In addition, it appears that there was substantial growth in productivity in the fertilizer industry.

What can we expect in the future? the OPEC appears to be losing its ability to unilaterally mandate high energy prices. It is very possible that we could see a steady decline in real fertilizer prices again, much as

we saw in the 1950's and 1960's. This shift will come about in part due to the relocation of the world's fertilizer industry to parts of the world where natural gas is being flared off. Fertilizer is now a widely traded product.

(4) Trade in Agricultural Products

It was widely expected at the time of the world food crisis in the mid-1970's that the low income developing countries would put inordinate demands on world food supplies due to their inability to feed their rapidly growing population. This is not what happened.

Data are presented in Table 3 on international trade in cereals by economic groups from 1960 through 1980. Between 1969-71 and 1980 world grain imports increased by 118 million tons for more than a doubling of total imports. The centrally planned economies and the middle income market economies accounted for almost all of this increase, with the centrally planned economies accounting for the larger share (56 million tons versus 37 million tons). These two groups together accounted for more than half the world's population (1,321 million and 933 million in mid-1978).

The low-income countries increased their imports only moderately over the decade. The same applies to the industrial economies, whose imports increased by only 22 million tons over the decade, or less than a fifth of the total increase in grain imports. Instead, the industrial economies increased both their gross and net exports by a substantial amount, with the U.S. alone accounting for almost 70 percent of the total increase in grain exports for the decade.

The increased imports by the centrally planned economies reflected a number of factors. Bad weather has been the conventional explanation for the Soviet Union although it is increasingly recognized that mismanagement of the agricultural sector has been an important factor. Holding the nominal prices of livestock products constant for the past two decades has compounded the problem.

In looking to the future it is very likely that the Soviet Union will remain a major grain importer, unless there should be a major change in the economic regime. Imports by Eastern European countries have recently declined from their peak level of 1979-80 (from 17.5 million tons to 14 million tons). The problem in this case has been the lack of foreign exchange.

China is the big enigma among the centrally planned economies, and in the global context as well. We really understand only poorly what is going on in that country. Agricultural trade optimists see China as an enormous potential market for the future. The problem, however, will be foreign exchange. China's export capacity for other products would have to grow significantly if it were to have the foreign exchange needed to become a major grain importer. Moreover, other countries would have to be willing to accept those exports. Although somewhat equivocal, Gale Johnson judges that Chinese imports could remain at about the present level of 15 million tons a year.5/ That is probably as good a guess as any.

Lesser developed, middle income countries will probably continue to be strong importers in the decade ahead. How strong the demand from these countries will be will depend on how strongly the international economy

recovers and how broadly economic development spreads among the less developed countries. John Mellor expects the input demand from these countries to grow very rapidly in the decade ahead.6/ As I will argue below, in my judgment this will depend very much on government policies, and these are difficult to predict.

To conclude this section, a few remarks on the role of the United States in this system are in order. The large export boom of the 1970's was in large part induced by a decline in the real exchange rate of the U.S. dollar. In the beginning this decline was a connection of the over-valuation of the dollar that had prevailed during the 1950's and 1960's,7/ but which became more severe in the late 1960's and early 1970's. However, during most of the 1970's the dollar was weak in large part because as a nation we were subsidizing petroleum imports at the very time that OPEC was imposing large increases in petroleum prices.

President Reagan's deregulation of the petroleum industry, plus a renewal of the U.S. acting as central banker for the world, has changed all that. The U.S. dollar has risen something like 25 percent in real terms over the last two years. That has choked off the U.S. export boom,8/ with value of exports having declined over 20 percent from its peak in 1981 to marketing year 1983. If OPEC should in fact break up and petroleum prices continue to decline, we could see a continuation of that trend. Export supplies of grain will come in the future from a more diversified set of countries.

II. PROGNOSIS FOR THE DECADE AHEAD

The outlook for the world food situation is one of mild optimism. In my judgment we will continue to do an increasingly better job of feeding the world's population, although not all malnutrition or famine will be eliminated in the decades ahead. Whether my judgment proves to be correct, however, will depend very much on continuation of some policies now in place and further improvement in other policies. In this section I will attempt to explain why I am cautiously optimistic about the decade ahead.

(1) Investments in Agricultural Research

Pessimists about the world food situation predicate their arguments in large part on the fact that output expansion of the past has been largely due to increases in the land under cultivation and judgments that there is little or no additional land to bring into cultivation, at least in some parts of the world.

One could argue long and hard over how much additional land could be brought into cultivation. Obviously this will vary a great deal from one part of the world to another. But that argument is in my judgment largely beside the point. As Professor Schultz,9/ Hayami and Ruttan,10/ and others have long argued, a modern agriculture is based in large part on science and technology and the production of modern imports in the industrial sector. It is not based on land.

The lesson provided by the U.S. experience makes this point quite forcefully. It is difficult to understand why observers of the world food scene have found the lesson so difficult to learn. From roughly the mid-1920's through the mid-1970's there was no increase in the total stock of

imports in U.S. agriculture (Table 4). All the increase in production in that period - and at times the increase was so large that a variety of programs were used to reduce import use, store the surplus, and give it away - were due to increases in productivity. It is time that the import mix changed dramatically over that period (Table 4). But total land use over that period was actually lower at the end of the period than it was at the beginning.

Total import use has increased since the mid-1970's by about 8 percent. But that is due in large part to the major realignment of the real exchange rate. With the dollar back up to its pre-1973 levels again, we can expect to see these resources squeezed out of the sector - painful as that process will be.

An important source of the increase in productivity over this period was due to the investments in agricultural research and development and to the education of the rural population.11/ One of the encouraging things about the world food scene is that other countries - and especially the less-developed countries - have discovered this route to investment and have belatedly begun to invest in agricultural R and D.

Table 5 summarizes data collected by Bob Evenson which indicate how expenditures on agricultural research have increased since 1959. For the world as a whole, expenditures increased by 180 percent in real terms from 1959 to 1971. Although the growth rate leveled off during the 1970's, an increase of 25 percent in real terms - which is what happened from 1971 to 1980 - is still substantial.

The performance of the less-developed countries is even more impressive. Expenditures by countries in these three regions increased 4.6-fold from 1959 to 1971, and by another 39 percent by 1980. Even granting that the initial increase was on a small base, the increase is still very significant.

In addition to these direct investments by individual countries, an international system of Agricultural Research Centers has evolved since the late 1960's. Supported primarily by international donor agencies, that system now includes 12 Centers and an annual expenditure of some $168 million.

With both the International Agricultural Research Centers and the expenditures by less-developed countries it is important to recognize that most of the payoff from these increased expenditures is still to be realized. It takes from 7-10 years from the time expenditures start on a research program until increases in productivity begin to show up at the farm level. The 1970's were devoted to establishing the international system. Moreover, many of the less-developed countries had to train staff and organize their own research program as well. Everything we know about the research process would indicate that an augmented flow of new production technology will be forthcoming from these past expenditures.

(2) Price Policies and Social Profitability

The last five years have seen a rediscovery of price policy and incentives as an important component of agricultural development policy.12/ It is increasingly recognized that most governments intervene vis-a-vis their agricultural sector. Moreover, there is an important dichotomy between the less developed countries and the industrialized countries of the West

in how they intervene. The latter tend to set domestic prices above international opportunity cost levels. The former tend to set agricultural prices below their international opportunity cost levels.

Two aspects of agricultural price policy have not in my judgment received the attention they deserve. The first is the extent to which trade and exchange rate policies have been the main instruments by which governments have intervened and the extent to which they have played a major role in shifting the domestic terms of trade against agriculture. The second is the general failure to examine the social profitability of agriculture in a general equilibrium framework as the basis for evaluating policies affecting agriculture.

The failure to address the effects of trade and exchange rate policy on the domestic terms of trade is somewhat ironic in light of the importance the less developed countries have attached to the external terms of trade. At the very time these countries issue complaints about declining external terms of trade and lack of export opportunities, these same countries have in many cases severely overvalued their currency in foreign exchange markets, imposed explicit export taxes, limited exports, and imposed complicated export licensing provisions to limit exports. The net effect of these policies is to divert agricultural output away from visible export markets and to the domestic market. To put it succinctly, limitations on external markets have in important respects been self-imposed. Moreover, domestic prices of agricultural products have been less than they otherwise would have been as a consequence of these policies.

Parallel to these export restricting policies, high levels of effective protection have been provided for the industrial sector. The combination of discriminatory policies against agriculture and high levels of effective protection for the industrial sector has caused in many countries a dramatic shift in the domestic terms of trade against agriculture. Unfortunately, analysts dealing with agriculture have all too often taken a sectoral approach to the problem. They examine the ratio of agricultural product and import prices and make inferences about whether policy is discriminatory or not. To do the analysis properly, however, the domestic terms of trade have to be considered if one wants to have any insights about the relative social profitability of agriculture. And it is the relative social profitability of the sector which determines whether investment funds flow into or out of the sector.

Table 6 provides data on Egyptian agriculture which provide insights into the degree of distortion that often occurs. A naive interpretation of these data would focus on a comparison of prices paid to farmers with border prices evaluated at the official exchange rate. Even that comparison shows a significant discrimination against agricultural producers. But it tells only part of the story. For example, overvaluation of the currency amounts to an implicit export tax. As the data in the table illustrate, if an equilibrium exchange rate is used to evaluate the border prices, the degree of discrimination is even more severe. Moreover, if one recognizes that, whereas agricultural prices are distorted below their border price opportunity costs, industrial prices are set above them - and in the case of Egypt by about 25 percent - one begins to see the degree of policy

discrimination against agriculture.13/

Unfortunately, this is not an unusual case. Overvaluing one's currency has probably been the single most common policy distortion among less-developed countries. And the degree of overvaluation is not small. The implicit export tax from the overvaluation of the currency alone in Brazil, for example, ranged from 22 to 37 percent between 1954 and 1966.14/ In an earlier three-year period the implicit export tax due to the over-valued currency was 48 and 49 percent in the three year period 1952-54.15/ The recent float of the Mexican peso provides another example of how over-valued currencies often are. It is little wonder the agriculture of these countries does so poorly. It is also little wonder that countries imposing such distortions shift from being a net exporter of food to being a net importer. After all, the over-valued currency is an implicit import subsidy as well as an implicit export tax.

A proper way to measure the distortion in social profitability of agriculture is by means of effective protection. Case after case of such studies shows the effective protection of the industrial sector to range from, say, 25 percent up to 100 percent or more,16/ while the effective protection of agriculture is negative - and by large amounts in some cases.

To summarize, trade and exchange rate policies have undervalued agricultural resources by very significant amounts in country after country. These same policies have caused many low-income countries to shift from being net exporters to being net importers of agricultural products. It is not that these countries can't do a better job of feeding themselves. It's that their policies make agriculture a very unprofitable activity, and

eventually channel resources to other sectors of the economy where profitability is greater.

The important point, of course, is that changing these policies can change the output mix of the economy. And that is what gives rise to cautious optimism about our ability to deal with the world food problem. Somewhat paradoxically, the present crisis in international financial markets may be the harbinger of a brighter future for agriculture in many countries experiencing such crises. Policy makers will be forced to realign their exchange rates to bring their external accounts in line in order to pay off their debts. These realignments will reduce the discrimination against agriculture. They will also reduce the import subsidies that have caused imports of food to grow so rapidly in some countries.

(3) Soil Erosion

The latest cause celebre of those who expect a food crisis in the years ahead is soil erosion. This has become a big issue in the U.S. but it also receives attention in other countries.

There is little doubt that in some countries and in some areas of individual countries there are serious problems of erosion. No one who has visited the hill country of India, for example, can come away insensitive to the problem. However, some of the polemies about soil erosion appear to be a throw-back to an earlier day when it was assumed that farmers are stupid - that they don't know how to husband their resources. All the evidence we have suggests that farmers are not stupid, despite the proclivity of urban intellectuals to assume they are. Hence, there seems little reason to assume that farmers will not protect their basic resource base by

proper management.

Having said that, there is an important way in which misguided policy can lead to more erosion than would otherwise be the case. The policies described above, which severely undervalue agricultural resources, obviously reduce the incentives to protect and to invest in agricultural land. Moreover, there is some evidence that the incidence of the implicit export taxes and other policies which discriminate aginst agriculture is on the small producer.17/ But the incidence is skewed in this direction in large part because small producers tend to face imperfect product and factor markets. The solution to this problem is to reduce the degree of discrimination against agriculture and to make the markets more perfect.

In the case of the U.S., Bill Larson, a distinguished soil scientist at the University of Minnesota has recently carefully assembled data which suggests that serious soil erosion is a problem on no more than 8-10 percent of our available land.18/ Moreover, his data show that the share of land which is subject to serious erosion has declined over the years.

To conclude, my purpose is not to argue that soil erosion does not merit our attention as a policy issue. It is, instead, to argue that the economic basis for much of this erosion is rooted in the same policies that have discriminated so severely against agriculture. Changing those policies can provide much stronger incentives for farmers to husband their soil resources and to invest in them just as they would their other resources.

(4) Water

The adoption of improved seed and modern inputs such as fertilizer has increased the demand for water and caused many to question the adequacy of

of supply of this critical input in the future. And in fact many less-developed countries such as India have invested heavily in developing irrigation systems to provide larger supplies of water for agriculture.

The concern about water as a constraint on expansion of food output derives in large part from perceived wastage of water under rather wide socio-economic conditions. And there is wastage, tracing in large part to the failure to establish effective pricing systems for management and allocation of water. The use of proper pricing policies will help reduce this wastage and assure adequate supplies for years to come.

(5) Trade

Trade in agricultural products has provided increasing supplies of food to many countries over this past decade, especially to the less-developed countries and the centrally planned economies. The United States provided a major share of this increase in exports.

We may see rather major shifts in trade flows and in their role in feeding the world's population. In the first place, the augmented flow of new production technology can very well change the pattern of competitive advantage on the world scene. In fact, we may well see some major shifts in production patterns.

Second, the U.S. may well decline in relative importance as a supplier of food in the next decade. The U.S. export boom of the last decade was driven in large part by a very weak dollar, which in turn was a byproduct of the energy crisis and misguided energy policies in this country. The dollar is now strong, and in part because as a nation we are no longer subsidizing petroleum imports. There is no obvious reason to expect the

value of the dollar to experience another major decline in the years ahead. Consequently, our exports are likely to stagnate in the years ahead and we will become relatively less important in world markets.

Similarly, if the less developed countries alter their policies as I expect, there will be less subsidization of food imports in the decade ahead. In fact, many countries that are now net importers may well become net exporters.

These developments do not necessarily mean that trade in the aggregate will decline. It does suggest that the character and directions of this trade may well change, however. The centrally-planned economies are likely to continue to be major importers, as will the low-income countries that experience significant economic development. Consequently, the flow of agricultural trade will likely become more diversified and the markets are likely to become a great deal more competitive.

III. Concluding Comments

The world food economy has become increasingly internationalized, with individual countries linked together in a reasonably effective world food system. This system is heavily distorted with a wide range of government interventions designed to give particular economies an advantage in international markets and to deal with domestic policy objectives. The challenge in the decade ahead will be to reduce and alter these distortions so that market forces can work and the world's agricultural resources can be used more efficiently. Some should be reasonably successful in reducing these subsidizing petroleum imports. There is no obvious reason to expect the

the world food problem is an effective way.19/ In fact, it is very likely that the challenge of the decade ahead will be to deal with serious adjustment problems in world agriculture, not with a problem of inadequate food production.

NOTES

1/Lester R. Brown, "Global Food Prospects: Shadow of Malthus", Challenge, January/February, 1982. For other pessimistic assessments see Barney, Gerald O., Study Director. The Global 2000 Report to the President, A Report Prepared by the Council on Environmental Policy and the Department of State, New York: Penguin Books, 1982; International Food Policy Research Institute (IFPRI), Report 1 81, Washington D.C.: IFPRI; and O'Brien, Patrick M., "Global Prospects for Agriculture", in Agricultural-Food Policy Review, Perspectives for the 1980's, AFPR-4, April 1981, pp. 2-26.

2/D. Gale Johnson has provided two recent excellent surveys of the world food situation that provide more detail than is possible in the present paper. See "The World Food Situation: Developments During the 1970's and Prospects for the 1980's", in U.S.-Japanese Agricultural Trade Relations, edited by Emergy N. Castle and Kenzo Hemmi, with Sally A. Skillings, Resources for the Future, Inc., Washington, D.C., 1982, and "The Current World Food Situation", Paper prepared for conference on "The Role of Markets in the World Food Economy", Minneapolis, October 14-16, 1982. In some cases I have drawn on data from these two sources for this paper.

3/Poleman, Thomas T., "World Hunger: Extent, Causes and Cures", paper prepared for conference on "The Role of Markets in the World Food Economy", Minneapolis, October 14-16, 1982.

4/See "The World Food Situation", op. cit.

5/Johnson, D. Gale, "The Current World Food Situation", op. cit.

6/IFPRI, Report 1981, op. cit.

7/See Schuh, G. Edward, "The Exchange Rate and U.S. Agriculture: Reply", American Journal of Agricultural Economics 57(4): 696-700, November 1975.

8/For more detail, see Schuh, G. Edward, "Agriculture in Transition", testimony presented before the Joint Economic Committee, U.S. Congress, April 1982.

9/Schultz, Theodore W., Transforming Traditional Agriculture, Yale University Press, New Haven, 1964.

10/Hayami, Yujiro, and Vernon W. Ruttan, Agricultural Development: An International Perspective, the Johns Hopkins Press, Baltimore, 1970.

11/See Hayami and Ruttan, Ibid., for example.

12/For a perceptive recent empirical analysis, see Bale, Malcolm D., and Earnest Lutz, "Price Distortions in Agriculture and Their Effects: An International Comparison", American Journal of Agricultural Economics, Vol. 63, No. 1 (February, 1981), pp. 8-22.

13/Data in Table 6 also show another major policy distortion, the wedge that is driven between consumer and producer prices. Such distortions further aggrevate the input demands placed on the international economy. In this case an import share of the import bill is made up with concessional food shipments.

14/See Bergsman, Joel, Brazil: Industrialization and Trade Policies, London: Oxford University Press, 1970, Chapter 3; and Bergsman, Joel and Pedro S. Malan, "The Structure of Protection in Brazil", in The Structure of Protection in Developing Countries, by Bila Belassa and associates, Baltimore: Johns Hopkins Press, 1971.

15/See Fishlow, Albert, "Foreign Trade Regions and Economic Development of Brazil", New York: National Bureau of Economic Research, processed, 1974; and Homen de Melo, Fernando, and Maria Helena G.P. Zockun, "Exportacoes Agricolas, Balanco de Payamentos e Abastecimento do Mercado Interno", Fundacao Instituto de Pesquisas Economicas, Sao Paulo, processed, undated.

16/For example, see Bergsman, op. cit., for data on the Brazil case, and Bellassa and associates, op. cit., for more general data.

17/See Lopes, Mauro Resende and G. Edward Schuh, The Mobilization of Resources from Agriculture: A Policy Analysis for Brazil, Colecao Analise e Pesquisa - Vol. 18, Comissao de Financiamento do Producao, Ministerio de Agricultura, Brasilia, 1979 (in Portuguese).

18/Larson, William, "The Threat of Soil Erosion to Long-Term Crop Production", Science (in press).

19/While changing policies of individual countries will be important, our international institutions also need a major reform. For an attempt to address this latter set of issues, see Schuh, G. Edward, "Reforming Our International Institutions", presented at Colorado State University, December, 1982. (Department of Agricultural and Applied Economics, University of Minnesota, St. Paul.)

Table 1

Country and region	Total agricultural production						Total food production						Per capita food production					
	1974	1975	1976	1977	1978	1979[a]	1974	1975	1976	1977	1978	1979[a]	1974	1975	1976	1977	1978	1979[a]
Developed countries	129	128	134	137	144	140	131	130	137	139	147	142	118	116	121	123	128	123
United States	117	126	129	136	136	143	122	134	137	143	144	152	109	118	120	124	125	130
Canada	112	127	138	143	146	137	112	128	143	144	148	138	94	106	116	117	118	108
Western Europe	128	125	125	128	136	134	128	125	123	129	136	134	119	115	113	117	124	122
European Community	123	121	118	127	133	132	125	121	118	127	133	132	116	112	109	117	122	121
Eastern Europe	140	137	144	144	149	147	140	137	144	145	150	148	130	128	133	132	136	132
USSR	145	130	153	149	163	144	144	128	153	148	163	142	128	113	133	128	141	121
Japan	110	115	109	118	117	116	111	115	109	118	117	116	97	100	94	101	98	96
Oceania	119	125	124	122	135	129	127	137	138	134	152	142	105	112	111	106	119	110
Republic of S. Africa	146	134	135	146	150	142	154	141	143	152	157	148	114	102	100	105	106	98
Developing countries	134	141	144	150	155	154	135	145	149	154	159	158	103	107	108	109	110	106
East Asia	149	156	165	168	171	176	147	155	164	167	170	175	112	116	120	119	119	120
Indonesia	138	140	145	146	157	153	140	142	144	149	161	156	108	107	107	107	114	107
Philippines	146	161	172	173	175	180	147	163	173	175	177	183	107	116	120	118	117	118
Republic of Korea	144	158	170	176	170	187	141	155	167	170	165	181	109	118	125	125	119	129
Thailand	156	162	167	168	181	180	157	167	174	170	182	180	114	118	120	115	121	117
South Asia	124	138	135	147	154	144	124	140	137	150	157	146	97	107	103	110	113	103
Bangladesh	110	122	114	126	125	123	114	128	118	130	127	124	87	95	85	91	87	83
India	122	139	135	147	156	143	122	140	136	149	158	144	96	108	103	111	115	103
Pakistan	162	155	165	184	178	192	164	161	177	193	190	200	119	114	121	128	123	126
West Asia	144	154	169	166	171	167	141	154	168	166	171	168	104	110	117	112	113	108
Iran	160	179	192	190	199	192	160	183	197	192	203	197	116	129	135	127	130	123
Turkey	136	150	163	164	164	159	131	149	160	161	162	158	99	110	116	114	112	106
Africa	125	128	129	128	131	131	125	130	132	129	133	132	95	96	95	90	91	88
Egypt	118	119	120	118	123	126	125	131	132	129	132	136	95	98	97	92	93	93
Ethiopia	111	107	104	100	95	98	109	100	97	92	88	91	84	75	71	65	61	61
Nigeria	119	121	123	125	126	125	119	122	124	126	127	126	90	89	88	87	85	82
Latin America	138	142	145	152	157	161	145	151	158	163	168	173	108	110	111	112	112	113
Mexico	143	151	148	153	159	162	150	169	165	166	175	180	103	112	105	102	104	103
Argentina	122	123	133	134	149	152	126	127	138	138	155	158	109	108	116	115	127	128
Brazil	150	153	158	170	166	176	164	168	185	193	186	197	121	120	130	131	123	127
WORLD	131	132	138	142	148	145	132	135	141	144	151	147	113	113	117	118	122	118

Source: U.S. Department of Agriculture, Economics, Statistics and Cooperatives Service, World Agricultural Situation, WAS-21, (Washington, D.C., January 1980) p. 4.

[a]Preliminary

Note: This table is taken from Johnson, D. Gale, "The World Food Situation: Developments During the 1970's and Prospects for the 1980's", in US-Japanese Agricultural Trade Relations, edited by Emery N. Castle and Kenzo Hemmi with Sally A. Skillings, Resources for the Future, Inc., Washington, D.C., 1982, pp. 24-25.

TABLE 2

FARM INPUT PRICES, THE UNITED STATES AND THE EUROPEAN COMMUNITY

(1970 = 100)

	1973	1975	1977	1979	1980	1981	Mid-1982
United States							
All Production Items	135	169	185	231	256	274	278
Fertilizer	117	250	208	225	279	300	304
Agricultural Chemicals	108	165	161	154	165	178	195
Fuels and Energy	110	169	192	263	362	410	384
Feed	159	185	185	203	228	248	235
European Community[a]							
Goods and Services Used in Agriculture	130	169	211	234	257	291	--
Fertilizer	120	198	211	243	286	332	--
Energy and Lubricants	123	194	245	306	376	454	--
Feeding Stuffs	134	156	204	215	228	258	--

Sources: United States: U.S. Department of Agriculture, Agricultural Prices, various issues. European Community: Commission of the European Communities, The Agricultural Situation in the Community, annual reports for 1976, 1980 and 1981.

[a]Data are for the Nine members except that 1981 price indexes were based on differences between 1981 and 1980 prices for the Ten members.

Note: This table is taken from Johnson, D. Gale, "The Current World Food Situation".

TABLE 3 --International Trade in Cereals by Economic Groups, 1960-62, 1969-71 and 1977-79 (million metric tons)

Country Group	1960-62			1969-71			1977-79			1980		
	Export	Import	Net	Export	Import	Net	Export	Import	Net	Export	Import	Net
Industrial Countries	53.8	37.1	16.7	77.6	52.1	25.5	148.4	63.1	85.3	194.3	74.4	119.9
United States	31.4	0.6	30.8	36.3	0.4	35.9	90.9	0.2	90.7	112.9	0.2	112.7
Canada	10.2	0.7	9.5	13.7	0.5	13.2	18.5	0.7	17.8	21.6	1.4	20.2
Australia	5.9	--	5.9	8.8	--	8.8	11.7	--	11.7	19.5	--	19.5
France	3.4	1.0	2.4	11.4	1.0	10.4	14.3	1.9	12.4	19.6	1.6	18.0
Japan	0.1	5.0	-4.9	0.7	14.7	-14.0	0.3	23.3	-23.0	0.8	24.5	-23.7
Centrally Planned	9.8	12.4	-2.6	12.4	17.5	-5.2	9.3	50.0	-40.7	7.7	69.2	-61.5
USSR	7.6	0.6	7.0	8.2	2.7	5.5	3.7	20.7	-17.0	2.3	31.2	-28.9
Eastern Europe	1.3	8.3	-7.0	2.2	9.7	-7.5	4.1	16.6	-12.5	3.6	17.2	-13.6
China	0.9	3.5	-2.6	2.0	5.2	-3.2	1.5	12.7	-11.2	1.4	17.8	-16.4
Low Income Countries	2.4	7.3	-4.9	2.1	10.9	-8.8	2.8	11.7	-8.9	2.8	14.9	-12.1
India	--	4.1	-4.1	--	3.6	-3.6	0.8	0.6	0.2	0.5	0.1	0.4
Indonesia	--	1.2	-1.2	0.2	1.3	-1.1	--	2.8	-2.8	--	3.6	-3.6
Middle Income Countries	9.6	10.9	-1.3	17.6	24.2	-6.6	26.1	49.2	-23.1	17.4	53.1	-35.7
Korea	--	0.5	-0.5	--	2.6	-2.6	--	4.1	-4.1	--	5.1	-5.1
Argentina	5.6	--	5.6	3.5	0.1	3.4	14.6	--	14.6	10.0	--	10.0
Brazil	0.1	2.1	-2.0	1.2	2.1	0.9	0.7	4.8	-4.1	--	6.7	-6.7
Mexico	0.2	0.1	+0.1	0.5	0.4	0.1	0.1	4.0	-3.9	--	7.1	-7.1
South Africa	1.3	0.2	1.1	0.3	1.2	0.9	2.6	0.2	2.4	3.8	0.2	3.6
Thailand	1.9	--	1.9	2.9	0.1	2.8	4.4	0.1	4.3	5.1	0.2	4.9
Capital Surplus Oil Exporters	--	0.7	-0.7	0.1	2.0	-1.9	0.1	6.8	-6.7	0.3	10.3	-10.0
Total	75.6	68.4	--	109.8	103.9	--	186.9	183.3	--	222.5	221.9	

Source: FAO, FAO Trade Yearbook, various issues.

Note: This table is taken from Johnson, D. Gale, "The Current World Food Situation".

Table 4

Indexes of Total Farm Input and Major Input Subgroups, United States, 1924-26 and 1974-76

(1967 = 100)

	1924-26	1974-76
Total Input	100	101
Farm Labor	337	76
Farm Real Estate	100	96
Mechanical Power & Machinery	33	113
Agricultural Chemicals	8	137
Feed, Seed & Livestock Producers	32	106
Taxes and Interest	69	101
Miscellaneous	87	109

Source: Economic Research Service, Economic Indicators of the Farm Sector: Production and Efficiency Statistics, 1980, Statistical Bulletin No. 679, U.S. Department of Agriculture.

Table 5

Research Expenditures by Region, 1959-80
(000 Constant 1980 U.S.$)

	1959	1971	1980
North America & Oceania	760,466	1,619,404	1,722,390
Western Europe	274,984	971,704	1,489,588
Eastern Europe & U.S.S.R.	568,284	1,360,196	1,492,783
Latin America	79,556	237,088	462,631
Africa	12,740	55,615	75,156
Asia	261,114	1,339,769	1,734,535
TOTAL	1,957,144	5,583,776	6,977,113

Source: Summary tables from Bob Emerson

Table 6

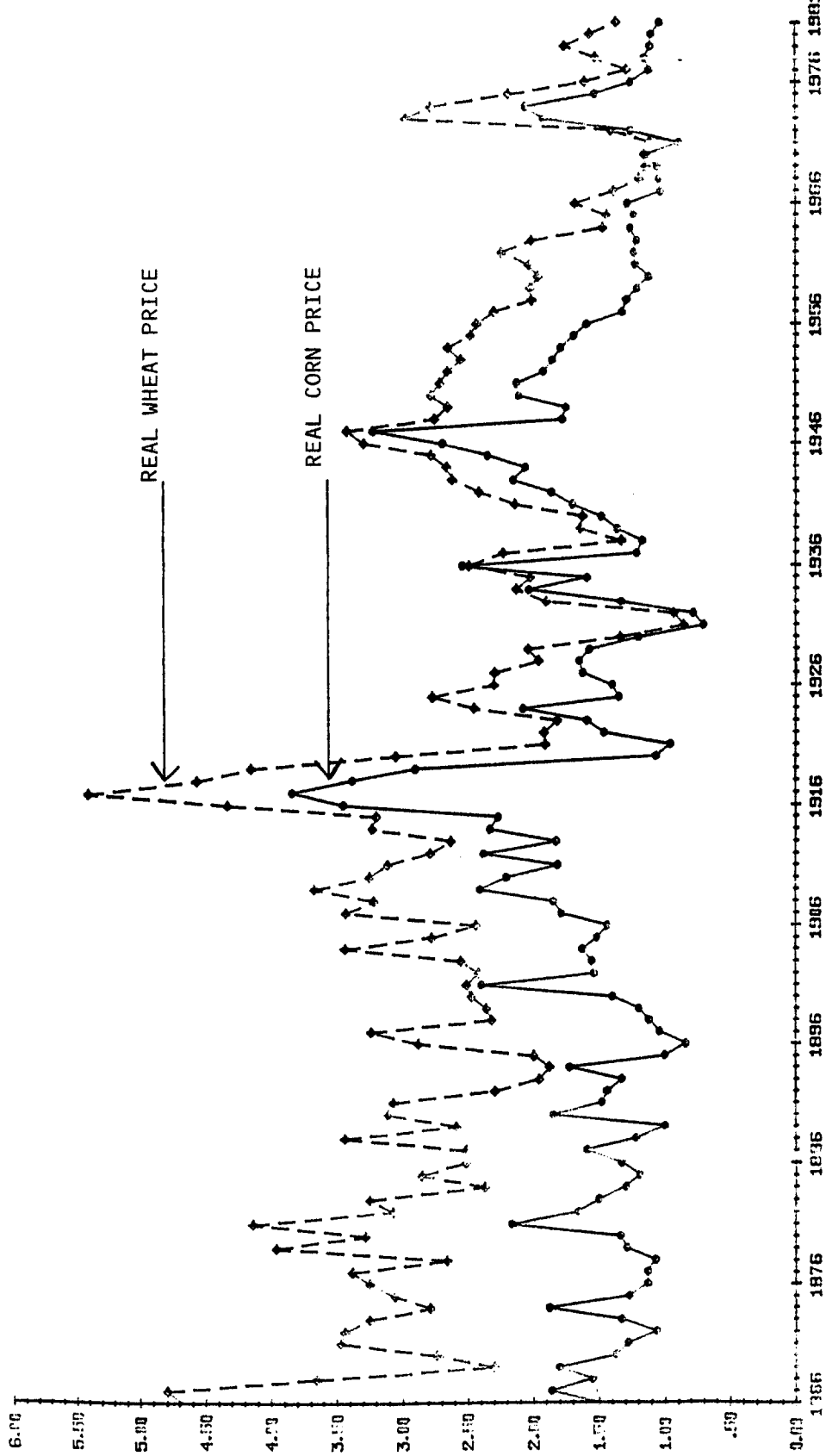
Price Structure for Selected Agricultural Products
(1980 in L.E. per metric tons)

	L.E. Equivalent 1/ of International Price at "Market" Exchange Rate	L.E. Equivalent 1/ of International Price at Official Exchange Rate (GASC Price)	Farmgate Price	Consumer Price
Rice	320	269	75.00	50.00
Wheat	133	112	76.50	41.20
Sugar	436	366	176.80	100.00
Beans	243	204	161.29	100.00
Lentils	441	370	250.00	110.00
Cotton	959	806	229.50	333.00

Source: USAID Mission, "CDSS Policy Issues Facing Egypt," USAID/Cairo, February 1982.

1/Market exchange rate: L.E. .84 = U.S. $1; official exchange rate: L.E. .70 = U.S. $1.

Figure 1.



Source: Martin, M.V., and R.F. Brokken, "Grain Prices in Historical Prospective", Department of Agricultural and Applied Economics, University of Minnesota. (mimeographed), 1982).