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## Food demand in developing countries and the transition of world agriculture\*

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### *Summary*

*The food imbalances of developed and developing countries can provide mutually beneficial opportunities for each. The developing countries represent the only major growing market for agricultural exports from the developed countries. That potentially immense market can reduce the necessary pace of adjustment in the developed countries' agricultural sectors. Unfortunately, the failure of developed countries to recognize that their actions influence food demand in the developing countries results in grossly suboptimal policies. A more nearly optimal set of developed country policies would include price discrimination between elastic and inelastic food markets; technical assistance to developing countries in education and agricultural research; assistance in the development of infrastructure through increased support for food-for-work projects; stabilization of developing country access to food imports by expanding the IMF cereal financing facility; and improving developing countries' access to developed country markets for labour-intensive agricultural commodities.*

### **1. The context**

World agriculture is marked by large, growing supply-demand imbalances—supply shifting much faster than demand in developed countries and the converse in developing countries. It is the dynamics of (1) the supply shifters in developed countries, (2) the demand shifters in developing countries, and (3) the interaction of supply and demand shifters in developing countries that dominate the global imbalances and the comparative static effects of price changes.

While changing relative prices is an inefficient means of influencing the

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supply and demand shifters, the price message is a valuable one that governments should heed rather than mask (Mellor and Ahmed, 1988). Prices as an adjustment mechanism will influence the supply side relatively more in the developed than the developing countries, and the demand side relatively more in the developing than the developed countries. That is, developed countries tend to have more elastic aggregate supply than developing countries, and developing countries have far more elastic demand than developed countries. The effects of specific price and adjustment policies will be very different in these two circumstances.

It is anomalous, in a world of increasingly internationalized agriculture, that the adjustment policy debate in the developed countries focuses largely on supply, as though the demand conditions of the developed countries and global demand conditions are the same.

The food imbalances of the developed and developing countries represent, for each respectively, a potentially fortunate circumstance for the other. Developing-country food deficits ease the adjustment problems for the developed countries, and the surpluses of developed countries offer potential for accelerated growth for the developing countries. It is to the advantage of developed countries to ease their adjustment problems by fostering rapid growth in demand in developing countries.

To maximize the benefits from a global view of adjustment requires an understanding of the relation in developing countries between growth in agriculture, employment and demand for food. From that knowledge one can diagnose the optimal policies to be followed by developed countries, both generally and specifically, from the point of view of their agricultural exports. These optimal policies relate not only to domestic policies but to international agricultural price policies as well. Unfortunately, while the agricultural policies of developed countries are a major determinant of international prices, their failure to recognize important and potentially favourable interactions with developing countries results in grossly suboptimal policies. Optimal policies would result in much greater consumption of agricultural commodities in developing countries, more rapid agricultural growth and a greater impact of that growth on overall growth in developing countries. They would also result in reduced transfers of resources out of agriculture in developed countries and a consequent greater net domestic product in those countries.

The key elements of more nearly optimal developed-country policy would include price discrimination between elastic and inelastic food markets; stabilization of developing countries' access to agricultural imports through financial or stocking schemes; facilitation (through technical assistance and nondiscrimination) of access by developing countries to developed-country markets (including the Soviet bloc) for labour-intensive agricultural commodities, including directly competitive and tropical products; and direct assistance to the economic growth of developing nations. Such policies, by

expanding demand, allow a two-pronged approach to adjusting supply and demand. Policies for supply adjustment are largely agricultural sector policies. Policies for demand growth range across the full panoply of development policy.

## **2. Global imbalances**

In developed countries, technological change has been institutionalized so as to produce continual growth in agricultural productivity. However, in most developed countries the rate of food consumption growth has slowed to rates well below the productivity gains because of low rates of population increase and inelastic demand for food commodities (Table 1).<sup>1</sup> Demand may even be reduced by current concerns about the effect of high levels of livestock consumption on health.

Under these conditions, the benefits of technological change must be realized through a continuous transfer of resources out of agriculture. Because of frictions to the outflow of labour in particular, the outflow of resources has lagged behind productivity increases in the developed countries, producing a combination of lower prices and increasing surpluses. Protectionist policies and domestic price support programmes have maintained prices higher than they would otherwise have been, certainly encouraging greater use of nonlabour inputs and perhaps slowing the exodus of labour and the abandonment of land.

The political weight of input-supplying institutions further reinforces the policies that encourage the use of nonlabour resources and place even greater pressure on the need to increase labour transfers. In addition, as public and private institutions acquire more expertise in fields like biotechnology research, the productivity of research resources is likely to increase, creating further pressure toward surplus production. Pressure to reduce expenditure on research is resisted by the research community; this resistance is supported by data indicating high social returns to such research.<sup>2</sup> Public action by any particular country to reduce the flow of new technology to the agricultural sector through, for example, reduced expenditure on research would reduce the international competitiveness of that country's agriculture. The increased privatization of agricultural research further limits the potential to reduce productivity-increasing research even if it were desirable on social account. It is research that makes the adjustment problem a dynamic one requiring constantly increasing (rather than once and for all) price reductions or other policies to reduce output to bring supply into balance with demand. Thus, it is difficult for developed countries to reduce their surplus production. Exportable surpluses are likely to grow and the quest for productive use of exports should increase.

The importance of structural demand forces as a dynamic determinant of

Table 1. *Difference in rates of growth population, production, and consumption of major food crops, 1961-63 to 1971-73 and 1971-73 to 1981-83*

Country Group	Population		Production		Consumption	
	61-63 to 71-73	71-73 to 81-83	61-63 to 71-73	71-73 to 81-83	61-63 to 71-73	71-73 to 81-83
World	1.9	1.9	3.0	1.8	3.0	1.8
Developed countries	1.0	0.8	3.3	1.2	3.0	0.9
Eastern Europe	1.0	0.8	3.8	-0.2	3.9	1.1
Western Europe	0.7	0.4	2.8	1.3	2.1	0.8
North America/Japan/Others	1.3	1.2	3.0	2.3	2.6	0.7
Developing countries						
(minus China)	2.5	2.4	2.5	2.8	2.9	3.1
Asia (minus China)	2.4	2.2	2.4	3.3	2.7	2.9
(India)	(2.3)	(2.1)	(2.3)	(2.6)	(2.1)	(2.4)
North Africa/Middle East	2.7	2.7	2.1	2.4	3.0	4.5
Sub-Saharan Africa	2.7	3.1	1.5	1.8	2.3	2.5
Latin America	2.7	2.4	3.7	2.7	4.0	3.0

Source: Updated from Paulino (1986) using FAO a and b (various years).

Note: Major food crops include cereals, roots and tubers, pulses, groundnuts, and bananas and plantains; rice is in husked form, and all noncereal components are expressed in cereal equivalents.

supply-demand balances is underlined by the record of Eastern Europe. In the 1970s and 1980s, Eastern Europe has been a major source of demand growth for food exports from developed countries. Between 1961-63 and 1981-83, the rate of food production growth in Eastern Europe was only slightly slower than in Western Europe (Table 1). However, within Eastern Europe, food consumption has grown at a rate 80% faster than that for Western Europe. That growth has brought about an explosive rise in the demand for imported cereals, especially cereals for livestock feed. Eventually, given relatively high levels of per capita income, that rate of growth in demand will level off, and Eastern Europe will cease to be a major cereal importer.

In the developing world, the high rate of food-demand growth is fueled by three main factors: high population growth rates, moderately rapid to rapid income growth, and relatively high elasticities of expenditure for food. Since expenditure elasticities for food in developing countries are sharply different across income groups, food-demand growth is particularly affected by changes in the incomes of the poor and hence by employment (Mellor, 1976 and 1978). As income grows, the demand for food in developing countries can easily outpace even the most rapid rates of food-production growth. From the early 1960s to the early 1980s, the cereal imports of developing countries have grown at an average annual rate of 5.6%. Their total share of world cereal imports has increased from 36 to 46% in that same period (USDA, 1987). In particular, food imports tend to grow rapidly in developing countries that are doing well in economic growth.

Because of high elasticities of demand by the poor (Table 2), and large-base consumption, food plays a critical role as a wage good in creating employment. This interaction between the food and labour markets suggests

Table 2. *Food expenditure elasticities for low-income families*

Country/Region	Urban	Rural
Sri Lanka	0.72	0.86
Thailand	0.62	0.65
Egypt	0.71	0.68
Sudan	0.74	0.84
Indonesia	0.88	0.98
Nigeria		
Funtua	n.a.	0.89
Gusau	n.a.	1.04
Malaysia		
Muda	n.a.	0.88
Brazil	0.83	0.83
Bangladesh	1.06	1.06

Source: Alderman (1986).

Note: Low income is defined as the average income of families that consume 1,750-2,000 calories per capita per day.

that there is an important interrelationship in the supply and demand for food. Increases in the supply of food increase the real wage rate, the supply of labour available for increased production, and the level of employment. Conversely, food supplies can—and do—act as a constraint to increased employment growth (Lele and Mellor, 1981).

The same distorted investment policies that have tended to suppress the growth rate in many developing countries also suppress the rate of food-demand growth and weaken the relationship between food supply and employment (Mellor and Johnston, 1984). It is the misallocation of capital away from agriculture and small-scale industry into large-scale, capital-intensive industry that results in only a small proportion of the labour force working at high productivity and high wage rates. The bulk of the labour force remains poor, undercapitalized at low productivity and low wages, and with little growth in demand for food. The combination of the resultant poor performance in agriculture, the political pressure to provide a small slice of the urban labour force with cheap food, and the costs of ameliorating poverty that arise from slow employment growth works in concert with other policies—for example, overvalued exchange rates and export taxes—to further bias the flow of domestic resources toward capital-intensive sectors. This diversion of resources away from agriculture eventually limits the accumulation of sufficient foreign exchange to fuel the development process (Lele, 1985). Ultimately, growth in incomes is choked off, and with it, the incipient demand for food. Choice of development strategy is very important in its effect on demand for food.

The best and most practical way to achieve widespread growth in food demand—and incomes—is through a broad-based strategy of agriculture-led, employment-oriented growth. In the short term, such a strategy provides the capacity to boost employment and food-demand growth. And, in the long term, it helps produce the type of small- and medium-scale, labour-intensive industrial sector that is capable of competing on the world market (Mellor, 1976 and 1986). A good example of the effectiveness of this type of development strategy is Taiwan. As late as 1960, Taiwan earned 60% of its foreign exchange from agricultural exports, but by 1980 that figure had declined to only 10% (Fei et al., 1979; ADB, 1983).

As developing countries are in the early stage of institutionalizing the process of technological change in agriculture, rates of growth in agricultural output may accelerate rapidly in a catching-up process. During such periods, food-production growth rates may temporarily exceed long-term rates of growth of demand. This is particularly likely if poor macro policies restrain employment growth. Although not universally applicable, both Indonesia in the late 1970s (Rosegrant et al., 1987) and China in the 1980s (Stone, 1987) experienced such temporarily accelerated rates of production growth.

It is one of the paradoxes of Third World development that, as the rate of technological change in food production increases, many developing coun-

tries find demand increasing even more rapidly, with consequent increases in food imports. Bachman and Paulino (1979) show that rapid rates of Third World agricultural growth are associated with increased food imports. Data updated from that study reveal that, between 1961–65 and 1979–83, the 24 countries with the fastest growth rates in basic food staples production collectively increased their net imports of food staples at an annual rate of 9.6%. This tremendous rate of increase was necessary despite a 4.3% average annual rate of food-production growth. A number of more recent studies have confirmed the results of Bachman and Paulino, adding important insights (Lee and Shane, 1985; Kellogg, 1985; Kodl, 1985; Houck, 1986; and de Janvry and Sadoulet, 1986a,b). In particular, the work by de Janvry and Sadoulet emphasizes the importance of broad-based, labour-intensive patterns of growth in accelerating these trade effects.

It is appropriate to emphasize food production in this discussion because the agriculture of most developing countries is dominated by the food sector. Of course, in countries such as Kenya, where increments in agricultural output come substantially from agricultural commodities produced for export, the effect in increasing food imports is greater.

As the poor begin to earn more, they not only increase their total food consumption but, along with higher-income people, also begin to demand more preferred cereals and livestock goods. As a result, many developing countries have experienced a rapidly increasing rate of meat consumption; between 1961–65 and 1973–77 meat consumption in the Third World grew at an average annual rate of 3.4% and in fast-growth countries, at more than 6% (Sarma and Yeung, 1985). To meet these needs, developing countries have been rapidly expanding their imports of livestock products. Between 1961–65 and 1973–77 imports of meat products by developing countries increased by 79% (Sarma and Yeung, 1985). However, since livestock production in developing countries is optimally a labour-intensive undertaking, many developing countries begin to replace imports with domestic supplies. Even range beef production in low rainfall areas has a high factor share of labour. The demand for food staples as feed for livestock subsequently increased even more rapidly, leading to greater increases in cereal imports. Thus, imports of feed grains are increasing much more rapidly than food grains (Paulino, 1986). By the year 2000, given increasing incomes and the role of livestock in demand, net imports of basic food staples by developing countries are projected to grow by 80–120 million metric tons from an average 1976–80 base of 36 million tons.<sup>3</sup>

### **3. Food demand and development strategy**

It is clear from the foregoing that rapid growth in effective demand for food, and hence complementarity with developed country surpluses, hinges on the

choice of growth strategy in developing countries. That in turn sets the stage for diagnosis of effective developed-country policies to foster a strategy appropriate to current global realities.

Raising the incomes of the small farmers through a broad-based pattern of agricultural growth generates demand for labour-intensive goods and services that are typically produced in the countryside. For example, small farmers in Bangladesh and Malaysia spend 35 and 40%, respectively, of increments to income on locally produced, nonagricultural goods and services, creating extensive employment opportunities (Ahmed and Hossain, 1987; and Hazell and Röell, 1983). It is the capital widening through the demand structure that lies at the root of the favourable employment and food-consumption effects of an agriculture-led strategy. However, if there is a high concentration of landholding among very wealthy landowners, as has been common in Central and South America, increased income will go much more to imports and capital-intensive goods, and hence will not induce the necessary multiplier and linkage effects from agriculture to promote employment in other sectors. Fortunately, most areas of Asia and Africa have smallholder-dominated rural sectors.

The primary means of accelerating small-farm production growth in the Third World is technological change. This is because the agricultural sector is particularly subject to Ricardian diminishing returns (Mellor, 1985). If attempts are made to stimulate production through higher prices alone, the inelastic supply of land eventually causes the productivity of other inputs to gradually decline and costs to rise. However, in the context of broad-based technological change in agriculture, production becomes more responsive to price changes (Ranade et al., 1988), and the relative importance of price policy increases.

Throughout the Third World, improved rural infrastructure, particularly for roads, is essential to broad participation in agricultural development and hence to large employment multipliers. In Bangladesh, areas with good infrastructure use 4% more labour per hectare and 92% more fertilizer than areas with poor infrastructure. The linkage effects of the consequent growth produce a level of nonagricultural employment that is 30% higher than in the poor infrastructure areas, and wage rates that are 12% higher (Ahmed and Hossain, 1987). However, much of the Third World's agricultural area is currently so ill-served by infrastructure as to be left out of the agricultural development processes. This topic is addressed below in the context of food aid policies of developed countries.

#### **4.1 Developed-country policies to facilitate growth in the demand for food**

From the preceding exposition, the kind of developed-country policies that can facilitate growth in effective demand for food and hence food imports in

developing countries can be derived. Clearly, such policies are favourable to growth in developing countries and to the poor of those countries. The first because of the role of food in releasing the key constraint to mobilization of labour for growth; the second because food imports facilitate even faster growth in food consumption and hence in real incomes of the poor than is possible from domestic food production alone. The appropriate policies for developed countries fall into four categories: (1) food production; (2) food aid; (3) food supply stability; and (4) agricultural trade.

### *Food production*

If they are to produce the kind of widespread growth in incomes that produces increased demand for food imports, developing countries need to increase their investment in generating and applying new agricultural technology, in building rural infrastructure, and in agricultural policy analysis. Developed countries can assist greatly in each.

Technology generation and application require an immense expansion of human capital. Developed countries can provide technical assistance for research and educational institutions, particularly at the higher levels, and for the range of support institutions needed for technological change. Food aid, treated in the next section, and the other resources for infrastructure investment can be provided. And developed countries can also assist in increasing the human and institutional capital needed for the increasingly complex and dynamic process of effective policy formation.

### *Food aid*

Food surpluses present an important opportunity for developed countries to influence the rate of income and food-demand growth in the Third World. When provided as food aid, these surpluses can be used both to meet the more immediate food needs of poor people and to provide the basis for creation of much-needed rural infrastructure.

The wide differences in elasticities of demand for food between wealthy and poor countries and between wealthy and poor consumers allow food producers to practice price discrimination (as is effectively done through food aid) in these different markets. By supplying price-discounted food to the Third World's poor, developed-country exporters can create additional demand without significantly depressing incentives to production in developing countries. The reduction in supply remaining for the higher income markets will lead to higher prices than would otherwise be the case and greater overall gross revenue for producers in both developed and developing countries (Mellor, 1983; and Srinivasan, in press). Seen as foreign aid, such food aid represents an effective form due to the costs of adjustment in developed countries and the initial condition of sub-optimal input of labour in developing countries (Mellor and Johnston, 1984).

In the developing world, food aid provided through food-for-work programmes is usually highly effective in targeting supplies to the poor in rural areas. While food-for-work sometimes misses certain classes of the poor (such as women and the infirm), it is attractive because it helps create the rural infrastructure—roads, irrigation and communications networks—needed for broad-based growth.

However, if food-for-work programmes are to make an effective contribution to growth, they must be complemented by other resources such as materials for road surfacing and culverts. For example, Ahmed and Hossain (1987) demonstrate for Bangladesh that roads without a hard surface are of little value, while paved roads produce a high rate of return. Ezkiel (1988) estimates that in Africa, food comprises only 15–40% of the cost of public works. A number of means are available to provide complementary financing for food-for-work efforts, such as providing additional food aid for monetization and allocating counterpart funds to cover nonfood costs. More generally, institutional ties should be developed between the food aid and the nonfood aid institutions in both the bilateral and multilateral aid structures.

Food aid may be looked upon as a bridging resource for the interim period when wage goods are critical to growth and before commercial exports are adequate to pay for commercial food imports.

If food aid is to become an effective development tool in developing countries, they must be able to secure reasonable assurances of its stability. Stability of adequate levels of aid is critical not only for encouraging developing countries to tackle more ambitious long-term development projects, but also for improving the responsiveness of such aid to short-term food shortages (Ezekiel, 1988).

### *Food supply stability*

During the past few decades fluctuations in both food production and international prices have increased markedly (Table 3). Increased production fluctuations are partially due to changes in weather and to the volatility associated with improved food-production technology in developing countries (Anderson and Hazell, 1988). Policies of developed countries further exacerbate fluctuations in world food prices. Food supply and price instability are particularly deleterious to an agriculture- and employment-based development strategy because of the increased commitment to food production and to wage goods. Further, as Third World agriculture becomes more commercialized, farmers purchase more inputs and sell more output, and so tend to become increasingly vulnerable to fluctuations. Thus, developed-country policies that increase instability are inimical to food-market development for their exports.

Models of trade liberalization generally indicate that reduced trade barriers in developed countries will improve price stability in international

Table 3. *Changes in the variability of cereal prices and production*

(A) Changes in the coefficients of variation of world and national cereal prices,<sup>a</sup> 1961-71 to 1974-81

	Wheat		Rice		Maize	
	1961-71	1974-81	1961-71	1974-81	1961-71	1974-81
	(percent)					
World	4.05	20.50	17.76	28.16	7.37	12.35
France	3.02	2.41			2.51	4.27
United States	15.03	20.20	2.56	20.29	7.98	16.77
Mexico	2.92	5.47			7.60	10.03
India	9.89	7.20	22.36	11.10		
Japan	3.37	8.39	13.50	4.24		
Canada	7.37	20.06				
Turkey	2.67	25.48				
F R Germany	2.92	3.00				
United Kingdom	2.68	4.78				
Italy	2.53	3.43				
Pakistan	7.84	8.11				
Argentina	24.58	50.17			23.15	33.05
Brazil			13.75	18.69	5.04	26.07
Yugoslavia					18.07	14.00
Kenya					10.91	10.00
Burma			2.54	0.66		
Philippines			12.57	4.17		
Colombia			14.05	9.32		

(B) Changes in the coefficients of variation of world cereal production, 1960/61-1970/71 to 1971/72-1982/83<sup>b</sup>

Cereal	Coefficient of Variation of Production		
	First Period	Second Period	Change
	(%)		
Wheat	5.46	4.83	- 11.5
Maize	3.29	4.41	34.0
Rice	3.97	3.80	4.3
Barley	4.81	7.50	55.9
Millets	7.78	7.66	1.5
Sorghum	4.75	5.70	20.0
Oats	11.30	5.35	- 52.6
Other cereals	4.57	9.33	104.2
Total cereals	2.76	3.06	21.7

Source: Hazell (1988)

<sup>a</sup> Variation represented by fluctuations in prices around trend for the periods indicated.

<sup>b</sup> Does not include China.

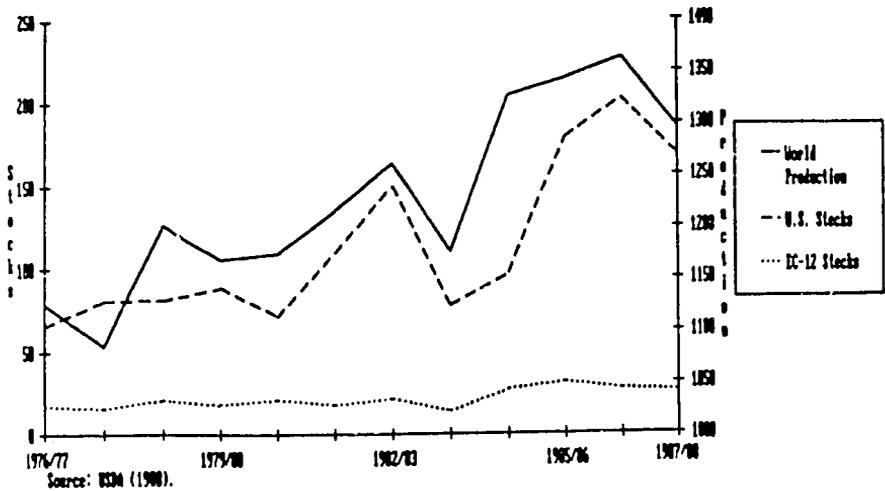


Figure 1. *Responsiveness of U.S. and EC-12 wheat and coarse grain stocks to world production, 1976/77 to 1987/88. (million metric tons)*

markets (Tyers and Anderson, 1987; Schmitz, 1984). However, the process by which countries choose to adjust to open markets will directly affect the degree of market stability. In addition to trade barriers themselves, the domestic storage policies of developed countries have an important influence on price stability. As shown in Fig. 1, the storage policies of the United States have tended to stabilize world cereal prices. In the face of increasing world production, the United States increased its own stocks, limiting the potential decline in international prices. On the other hand, analysis suggests that the European Community's storage policies have actually exacerbated market instability (Josling, 1980; Koester, 1982; Koester and Valdes, 1984). It is likely, though, that liberalization in the United States would lead to reduced domestic stocks, creating unstable international prices, at least in the short run. The analysis by Tyers and Anderson (1987), incorporating domestic storage policies endogenously, gives evidence to support this contention. In fact, the United States has recently begun to reduce domestic storage of agricultural goods in an attempt to reduce the cost of domestic farm support, a move that threatens market stability and, therefore, the interests of developing countries and of food-market development. The issue then is who is to bear the cost of instability, in what form and for what purpose.

Food aid could be used to stabilize food supplies to developing countries. However, bilateral food aid is not very responsive to short-term fluctuations in developing countries' import requirements (Huddleston, 1984). Because of its political nature, bilateral aid is notoriously unstable. In their study, von Braun and Huddleston (1988) show that bilateral aid actually tends to

decrease precisely when low-income countries need it most—when world prices rise. More generally, bilateral foreign assistance has been a major source of instability to developing countries (Lele and Nabi, in press). Greater multilateral coordination of food aid through an international organization such as the World Food Programme would be an important response to stabilize aid. Increased and reliable supplies of food aid would allow developing countries to utilize this resource more effectively to increase long-term employment growth and demand for food. Coordinated aid of this type is already being used successfully to back structural adjustment programmes in parts of Africa. A multilateral agreement would also effectively eliminate free-rider problems associated with bilateral aid and could potentially reduce arguments over unfair dumping of food supplies by major exporters.

Most importantly, the International Monetary Fund's cereal import facility could be revised and expanded to help stabilize food supplies. Although conceptually a good idea, this facility has been little used since its creation in 1981. This lack of use is primarily due to the various constraints imposed on drawings under the scheme, including those arising from integration with the Compensatory Financing Facility dealing with export fluctuations (Ezekiel, 1985). Significant modification of the present IMF cereal-import facility is necessary to encourage developing countries to make full use of this resource. Specifically, foreign exchange for food should be separate from other foreign exchange needs and recognized as a special commodity in low-income countries. This is because of the central role of food in determining the extent of poverty and, as a wage good, in determining the extent of mobilization of underemployed labour (Mellor, 1976). Modifications of the IMF cereal-import facility must also allow for circumstances in which a country's food aid is suddenly reduced, increasing its need for hard currencies to import food.

### *Agricultural trade*

There are two critical aspects to trade policies from the point of view of market development in developing countries; first, the impact on the major net imports of cereals, and second, the impact on their exports of labour-intensive commodities. Current trade policies in the developed countries reduce incentives to Third World agriculture by limiting market access, particularly for labour-intensive agricultural commodities. They encourage employment-oriented policies by providing low-cost food and discourage employment by increasing instability in cereal supplies and prices.

A number of studies in recent years have attempted to predict the impact of adjustments in these trade policies on agricultural markets (Valdes and Zietz, 1990; Koester, 1982; Schmitz, 1984; Parikh and Tims, 1986; OECD, 1987; Tyers and Anderson, 1987). Most deal primarily with some degree of

trade liberalization—the removal of both tariff and nontariff barriers—in developed countries. These studies tend to produce similar results: with liberalization, prices are likely to rise and stabilize; production of agricultural commodities should decline in heavily protected countries; trade flows should increase; and greater efficiency through adherence to comparative advantage should produce an overall gain in economic welfare.

It is important, however, to take considerable care in interpreting the results of these studies. For the most part, these studies use static, partial equilibrium models that cannot capture the dynamic process of market adjustments. For example, in the case of the price impact of liberalization, these models describe changes from one steady state to another, indicating only what prices would be in the absence of barriers. Given the dynamic processes of technology, it may be that prices will continue to fall, even after the liberalization process is completed.

In one of the few dynamic models presented, Tyers and Anderson (1987) suggest that prices will fall in the short run as countries draw down their levels of domestic storage. While their model predicts rising prices over the long run, they do not allow for increases in factor productivity that create negative pressures on prices. Of course, wide fluctuations in prices make it difficult to determine long-term trends, thus creating difficulties in predicting incentives to agricultural production. Ultimately, the level of price depends on relative changes in supply and demand; therefore, it depends on the relative imbalances between developed- and developing-country agriculture.

The key point is that development processes are forwarded by a growing supply of basic food staple exports. It is not in the interests of either developed or developing countries that adjustment processes stand in the way of such a growth.

Argentina and Thailand are the only major exceptions to the rule that developing countries are net importers of basic food staples. Of the developing countries that are net exporters of food staples, these two countries account for 80% of these net exports (FAOa). They, too, are benefited by policies, including price discrimination policies, that accelerate growth in effective demand for basic food staples, and policies that reduce fluctuations around the trend line of exports and prices.

Developing countries have great scope on the supply side to expand exports of labour-intensive agricultural commodities such as horticultural products. These points are illustrated by the work of von Braun and his colleagues on Guatemala. In Guatemala, vegetable crops appear to have negative returns to scale in production and management, and were adopted rapidly by small farmers under a government programme. Returns per unit of family labour were between 60 and 100% higher than for more traditional crops. Overall, agricultural employment increased by 21% (von Braun et al., 1988).

In fact, developing countries have been increasing market share in horticultural trade and experiencing high growth rates in exports of those commodities, thus illustrating how large the potentials are, even under current restrictionist policies (Islam, 1988). The current round of GATT negotiations needs to give particular attention to these commodities in which developing countries have a comparative advantage and at least to see that 'most-favoured nation' practices are followed.

### **Conclusion**

Western Europe has, in recent years, shifted rapidly from its previous role as a major basic food staple importer. For similar reasons, Eastern Europe has ceased to grow as an importer and can be expected to gradually reduce its imports. Therefore, the developing countries represent the only major growing market for agricultural exports from developed countries. It is a potentially immense market that can reduce the current breakneck pace at which structural adjustment must occur in developed countries. But the extent to which that market develops depends in significant part on the agricultural policies of developed countries. For market development, they must facilitate agricultural growth in developing countries by bilateral and multilateral assistance; facilitate use of labour in production with food aid, particularly to build rural infrastructure; reduce the instability of world food markets; and increase their imports of labour-intensive agricultural products. If developed-country adjustment processes reduce production by set-aside and quota programmes, they must be prepared to quickly reverse those policies in years of scarcity. They must avoid increasing instability by reducing stocks without improved means to finance food imports in periods of scarcity. And, they must not close markets to developing countries' labour-intensive output. Such policies serve the interests of both developed and developing countries, and most of all, those of developed-country farmers and the developing-country poor.

### **NOTES**

1. See an early exposition of these imbalances in Mellor (1966: 57--80).
2. Griliches (1958), in one of the first studies to do so, estimated the annual rate of return on investment in hybrid corn research in the United States to be between 35 and 40% from 1940 to 1955. More recently, Davis (1979) estimated aggregate returns to US agricultural research between 1964 and 1974 at 37% annually.
3. Data from Paulino (1986) and discussions with J.S. Sarma of the International Food Policy Research Institute. Imports are assumed to equal the expected shortfall in developing country production given assumptions of trend growth in production and consumption, and modestly increasing livestock production.

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