

# **From Hunger Amidst Abundance to Abundance Without Hunger**

**An overview of the policy findings of the Food and Agriculture Program  
of the International Institute for Applied Systems Analysis**

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*PREFACE*

Why study the hunger problem? It is one known to most people; a remote problem brought devastatingly close when the media focus on the latest famine or drought. The causes seem to persist, despite efforts in richer countries to provide food and other aid.

- (1) What can a study like the Food and Agriculture Program (FAP) at the International Institute for Applied Systems Analysis (IIASA) do to help reduce hunger?
- (2) Why do hunger and large food surpluses exist concurrently?
- (3) What prevents the redistribution of surplus food to the hungry?
- (4) Can we identify policies to eradicate hunger in our time?

Those who initiated and supported the FAP were motivated by a desire to answer the above questions, and to solve the moral and economic issues raised by them. If it is found possible to eradicate hunger through sensible management of resources, then the case is clear for immediate humanitarian action by all concerned, and particularly so if it can be achieved at reasonable cost.

Why was this study undertaken at IIASA?

- (1) Although hunger as a problem is regionally confined, the growing interdependence of the global food system requires an international approach.
- (2) Economic relations and policies are complex and require the development of new analytical tools.
- (3) The problem requires a multidisciplinary approach as it covers a number of different fields, from socioeconomic to agrobiological.

A survey in 1976 showed that no other study of this nature had been undertaken and that there was widespread interest in a comprehensive solution to the food problem. The study also suited IIASA's aspirations to contribute to the advancement of science and mankind's ability to deal with problems of international importance.

When the project began in 1976, the global food crisis of 1973–1974 and the World Food Conference of 1974 were vivid and immediate in people's memories. Today, food surpluses have grown and worldwide scarcity appears a thing of the past: but hunger persists. Despite the remarkable growth of the international food trade, the promise of 1974 has not been kept: that in ten years no human being will want for food. All the more reason for undertaking this study.

In the past ten years it has been commonly accepted that:

- (1) Increasing food production in food-deficit countries is inadequate as a means of reducing hunger. Measures are needed to promote consumption by deprived groups.
- (2) The hunger problem is not one of starvation alone, but of chronic undernutrition among diverse groups that share one characteristic – poverty

Realization of these facts renders this study even more relevant. For it is based on an analytical tool that is capable of evaluating production and consumption policies, and assessing costs and benefits of alternative policies to countries and groups within countries.

A study such as this is not, in the first place, set up to derive detailed prescriptive policy scenarios, but is concerned primarily with a better understanding of the effectiveness of

various policy instruments. The presentation follows these lines and demonstrates the consequences of alternative policies without judging their political feasibility. This is deemed appropriate, in particular, because in the actual policy debate a large role is played by fears of the consequences of policy changes and their costs, which stifle the decision-making process. By estimating these consequences as objectively as possible, even for rather radical policy changes, some of these fears may, in fact, be allayed and the actual decision-making process facilitated.

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## *ACKNOWLEDGMENTS*

FAP at IIASA has been a collaborative research effort since its inception, involving researchers from many countries and institutions around the world. The program involved methodological and algorithmic research, development of the Basic Linked System (BLS) of national agricultural policy models, exploration of national policy options using individual national models, and the use of BLS to conduct policy analyses.

As for any large project that has taken many years, it is virtually impossible to give individual credit to all those at IIASA and its network of collaborating institutions who have contributed to the development of the BLS, yet the major contributions should be noted. The program core consisted of the following:

Kirit Parikh, Program Leader 1980–1986  
Ferenc Rabar, Program Leader 1976–1980  
Günther Fischer  
Klaus Frohberg  
Michiel Keyzer

The members of the program core have been responsible for all aspects of model development and analysis. The system was conceived and the algorithms developed mainly by Michiel Keyzer.

Other program participants who have contributed to development of various aspects of the BLS are:

Michael Abkin, Csaba Csaki, Tom Christensen, Odd Gulbrandsen, Janos Hrabovszky, Gerhard Krömer, Bozena Lopuch, Douglas Maxwell, Donald Mitchell, Jan Morovic, Nanduri Narayana, Martha Neunteufel, Karl Ortner, Gerald Robertson, Mahendra Shah, Ulrike Sichra, Ralph Seeley, T.N. Srinivasan, Eric Wailes, David Watt, Chris Wolf, and Laszlo Zeold.

A large number of others were involved in the Program, particularly in the development of detailed national policy analysis models of specific countries. Though several of these models have been used in a number of countries, not all of them are currently available as part of the BLS. Naturally, the study has benefited from country-specific knowledge and evaluations made by many of these researchers.

We gratefully acknowledge our debt to all our colleagues, named and unnamed, who have contributed to this study. A great deal of credit goes to them; but the undersigned, who wrote this summary report, bear all the responsibility.

*Kirit Parikh*  
*Wouter Tims*



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## 1 *INTRODUCTION*

The Food and Agriculture Program (FAP) of the International Institute for Applied Systems Analysis (IIASA), initiated in 1976, is a large international collaborative research endeavor that has involved more than 200 person-years of effort at IIASA and its network of collaborating institutions. The main focus has been to explore policy options at national and international levels that deal with the problem of chronic hunger. For this increasingly interdependent world, policies for trade and capital flows were given special emphasis. The results are based on analyses with the help of a global modeling system, which consists of national (policy analysis) models linked through trade and capital transfers. The systems-analytic, quantitative, general equilibrium, and empirical approaches of the model make it a unique tool for policy analysis and provides results that can be examined from a variety of objective criteria. The main findings of the study are briefly summarized first.

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*THE MAIN RESULTS*

For a complex analysis, like the one reported here, the main results cannot be summed up in a few lines. Some of the highlights are:

- (1) Current national and international economic policies will not lead to significant alleviation of hunger and poverty, even if the world economy exhibits sustained growth over the coming decades. In fact, they will leave a large number of people still suffering from chronic hunger by the end of the century.
- (2) There are policy alternatives for developing countries that reduce hunger faster, but these either retard overall economic growth or require substantially larger external aid flows. Without such aid, progress in reducing hunger will remain small, even if the governments of poor countries were to give priority to meeting food needs.
- (3) More liberal agricultural trade policies by developed market-economy countries alone are of only marginal significance to the hunger problem and have mixed effects on developing countries, increasing hunger in many food-importing developing countries.
- (4) More liberal agricultural trade policies by the developing countries themselves will reduce hunger marginally, but harm the economies of some of those developing countries that export agricultural products.

- (5) Liberalized international movements of labor could drastically reduce hunger, but this is obviously not a realistic alternative in today's world. High-income countries maintain higher wages by restricting labor movement, so the poor countries have a lower wage rate than would prevail were labor services to be freely traded in the world. This provides an argument for aid flows to compensate for restriction of the free trade of labor services.
- (6) Additional aid from the developed countries to finance domestic redistributive programs in poor developing countries can virtually eradicate hunger by the end of this century. The additional aid flows will not be a net loss to the developed countries if, at the same time, all market economies liberalize their agricultural trade. This is because liberal trade in agricultural commodities generates adequate economic gains for the developed countries to finance the needed aid flows. In fact, these gains are also enough to compensate those farmers in the developed countries whose incomes will decline due to liberalization of agricultural trade. Liberalization of agricultural trade without additional aid to poor countries does not generate as much additional income for the industrial economies as is generated with additional aid; if anything, it increases the level of hunger in the world.

These findings are robust and can be supported by detailed results of the study. They are pessimistic in the sense that the required policy changes, though not radical, are nevertheless difficult to obtain. They are optimistic in their conclusion that hunger can be eradicated. Contrary to the common view of policymakers, the costs of the proposed policies are small or even negligible. These findings are described in greater detail below and in the three books *Toward Free Trade in Agriculture*; *Hunger: Beyond the Reach of the Invisible Hand*; and *Linked National Models: A Tool for International Policy Analysis* (see Chapter 13, this report). However, for expository reasons they are not dealt with in the same sequence as above.

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*HUNGER AND ECONOMIC POLICIES*

The system of models used in this study is designed to reflect the major structural character of the world food system. Food and agricultural policies are mostly national policies initiated and pursued for domestic purposes. In most industrial countries their objective is to achieve some degree of parity between agricultural and nonagricultural incomes. As their farming sectors are relatively small and the overall income levels high, the costs of farm-income policies can be charged to domestic consumers and/or taxpayers. In developing countries balance-of-payments constraints suggest a drive to self-sufficiency. However, their limited scope for raising tax revenues from a small tax base and the desire to keep urban food prices low often leads to unfavorable prices for agricultural producers. This, in turn, restrains food production and increases the need for food imports.

The import needs of some developing countries coincide with the need of certain developed countries to export surpluses – surpluses that are a consequence of high domestic producer prices and often result in subsidized exports. These subsidized exports compete with agricultural exports from land-rich developed countries, which need to meet farm-income objectives at the smallest cost to their governments. The consequence is an increasing tension between competing food-exporting developed countries. Food-importing developing countries are exposed to the resulting prices on the

### Box 1

#### THE BLS OF NATIONAL AGRICULTURAL POLICY MODELS USED BY FAP AT IIASA

The national models of the BLS each cover the economy of an individual country or a group of countries; these models together cover the world economy. Of these models, 18 represent individual nations and two represent the EC and the CMEA. These 20 models [1] are specified in detail and trace interactions in the behavior of producers, consumers, and governments. Together they represent about 80% of the world's population, agricultural production and trade, and food consumption. The remaining 20% is covered by 14 somewhat simplified country-group models. These models, linked through international trade and capital flows, constitute the BLS.

The system uses an empirical general equilibrium approach, based on a ten-commodity classification [2], calibrated according to past trends, and specifically designed for policy analyses with multiple objectives and simultaneous changes in a number of policies by one or more countries. It is thus a tool for studying the impact of policy changes on the internal food situation of a country, as well as their repercussions in other nations. In its class, the model is among the most advanced currently available, and is unique in being empirically estimated.

Many variables are endogenously calculated: at the international level these are world market prices, net trade flows, and international transfers; at the national level these are production, human consumption, feed and intermediate consumption, stock changes, investment, and input use, as well as prices and other policy instruments. Population, labor force, and the savings rate are exogenously specified.

BLS ensures a consistent outcome in a number of ways, which is important but not normally realized in other analytical approaches. Not only is there consistency among physical flows of commodities, but also consistency in the financial accounts of economic agents is ensured:

- (1) Quantities produced, demanded, and traded balance at national and global levels.

(cont.)

### Box 1 (cont.)

- (2) For consumers and nations, expenditures and incomes balance.
- (3) Income earned is consistent with income generated by production and trade.
- (4) Prices for producers, consumers, and government taxes are consistent.
- (5) Government expenditures balance inflows.
- (6) Balance of trade is realized at national and global levels.

These consistencies and the global coverage ensure that secondary effects and adjustments, which may be quite important, are accounted for.

Yet, like all models, it is still a crude approximation of reality. Nonetheless, the BLS remains a tool of considerable potential, worth exploring and extending in the years ahead. It can form the basis for much further work.

#### Notes

- [1] These are for Argentina, Australia, Austria, Brazil, Canada, China, Egypt, India, Indonesia, Japan, Kenya, Mexico, New Zealand, Nigeria, Pakistan, Thailand, Turkey, USA, and two models for integrated regions: the CMEA and the EC.
- [2] These consist of nine agricultural commodities – wheat, rice, coarse grains, bovine and ovine meat, dairy products, other animal products, protein feeds, other foods, and nonfood agricultural products – and one category called nonagriculture.

international market, which may distort their own economic policies, harming their agriculturists.

Do the chronically hungry benefit from the situation? Increasingly, they are seen to be closely linked with the particular food and labor market conditions of their country, and subject to the impact made on their societies by changing technologies. A large segment of the undernourished is engaged in the production of food. How they are affected by competition



among food exporters on the world market depends on the policies of their own governments.

Governments face major dilemmas in meeting the food needs of the poor. Low prices to benefit consumers may act as a disincentive to farmers producing food for the market. Higher prices may accelerate economic growth and generate employment opportunities for the poor, but this is a long-term consequence. The immediate effect of higher prices is more hunger among the poor who purchase all or part of their food from the market. Government food subsidies help to alleviate hunger, but leave fewer resources for investment and thus may cut into economic growth. What should be the allocation of resources between growth-promoting investments and redistributive policies? What price policies should governments then adopt and how much attention should they pay to signals from a distorted world market?

The Basic Linked System (BLS) of national policy models was constructed to explore answers to these types of questions (see Box 1). The effects of various policy options need to be tested with an empirically estimated model and their effectiveness assessed in terms of the usual multiplicity of national objectives.



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*PERSISTENT HUNGER*

Freedom from hunger is perhaps the most fundamental human right embodied in the UN Charter. All signatories to the Charter, i.e., virtually every nation in the world, thus accept the right of all people to sufficient food. Yet widespread hunger still persists. Actual numbers are difficult to establish, because terms like hunger, starvation, and undernourishment are not precisely quantified. Most attempts at measurement suggest that, although the number of hungry people has increased over the past two decades, the increase was less than the rate of population growth of the developing countries. However, the problem is still sizeable and large numbers of people live with barely sufficient food – the slightest economic shock can send them back to chronic undernourishment.

Significant progress has been made in reducing poverty and hunger. In developing countries, life expectancy (at birth) has increased from less than 40 years to around 55 years over the past three decades. The abundance of food worldwide and the progress made through national and international efforts in coping with acute shortages make the question more pertinent: Why has more progress not been made in reducing chronic hunger?

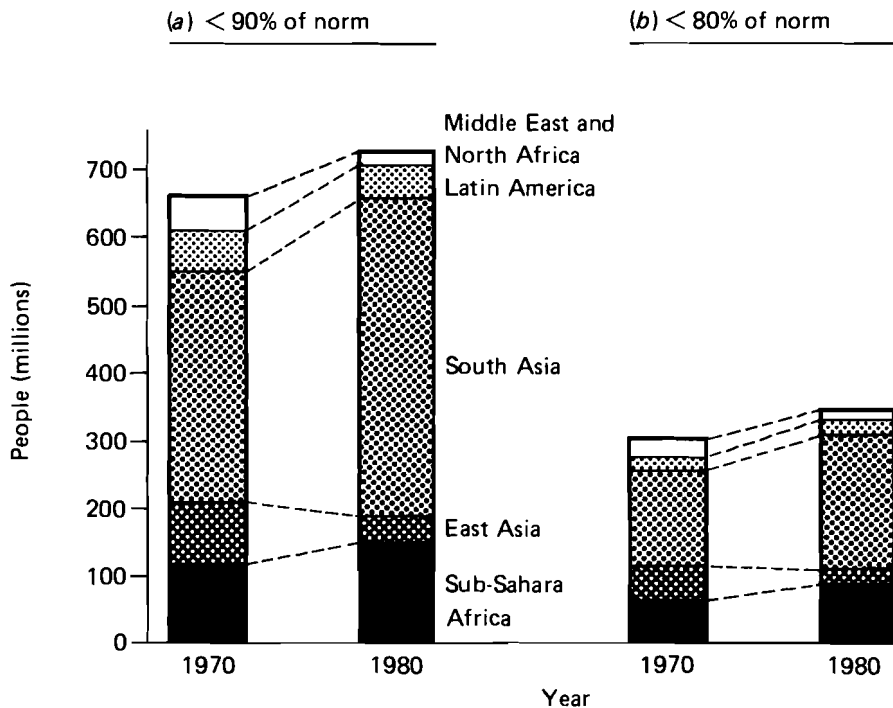
Famines are the most spectacular form that hunger takes and, in most cases, indicate a failure of national governments. The existence of chronic hunger indicates a failure of the

## Box 2

### HOW MANY HUNGRY AND WHERE ARE THEY?

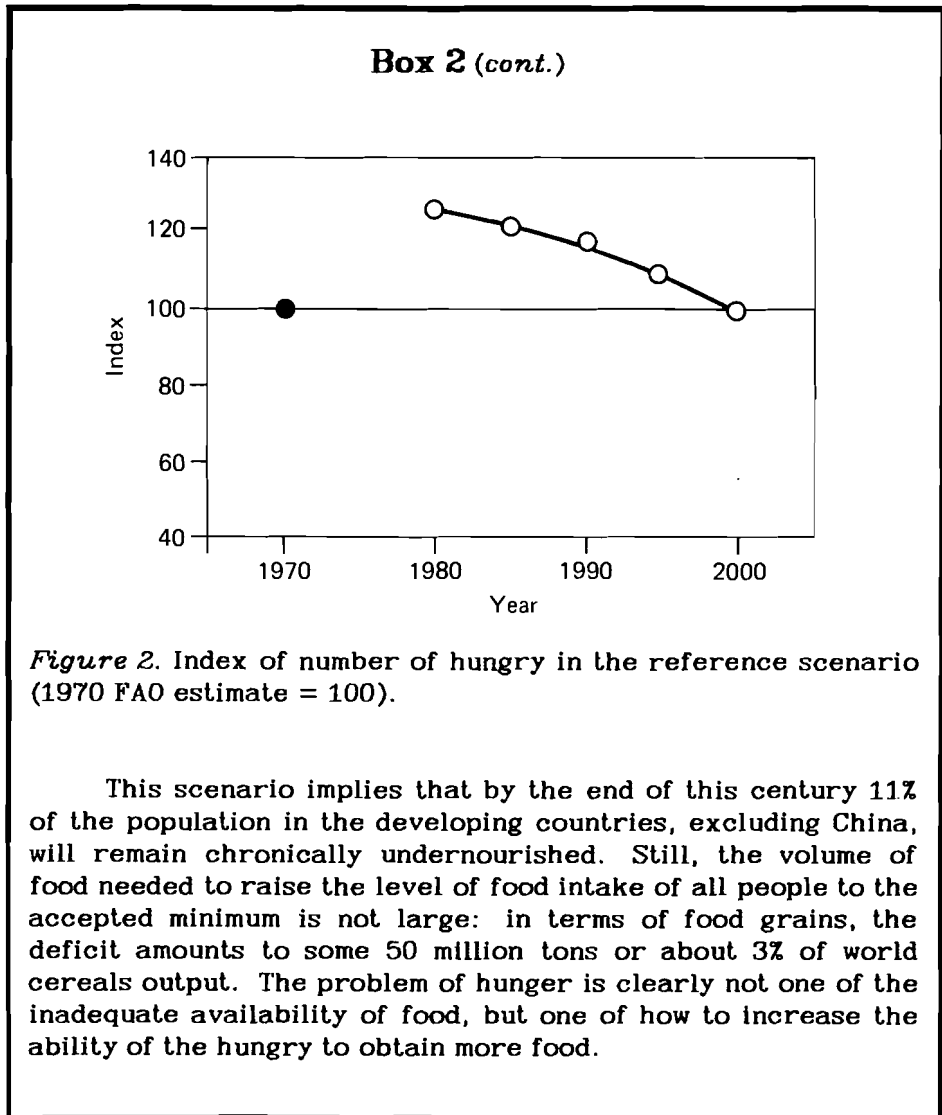
Widely different estimates exist. World Bank estimates, on the basis of calorie intake norms established jointly by the FAO and WHO, suggest that in 1970 around 660 million persons remained below 90% of the food norm, and almost half of these did not even reach 80%. By 1980, the number of persons below 90% of the food norm had increased to 730 million, while that below 80% remained at slightly less than half that number. The bulk of the hungry are in South Asia and Sub-Saharan Africa (*Figure 1*).

In the reference scenario, with basically unchanged policies worldwide, the number of hungry continues to rise through 1990, thereafter starting a slow decline (*Figure 2*).



*Figure 1.* Population with calorie deficiency, 1970 and 1980 (based on World Bank estimates).

(cont.)



political and social system, but in a far less dramatic fashion. The steps needed to prevent death from famine are obvious; those needed to prevent chronic hunger are less so.

The FAP study shows that the level of hunger will persist if previous economic trends are extended into the future and if the continuation of present policies is assumed. By the end of the century the number of hungry people will be the same as today (see Box 2). On the positive side, this will be a smaller proportion of the world population; more people will be

productively employed. However, increases in food prices will reduce the purchasing power of these incomes. Food prices will rise because the scope for expansion of cultivable land is limited, and production increases can only come from the increased use of purchased inputs that raise the cost of production.



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*MARKET SOLUTIONS*

The various scenarios that deal with alternative international measures to change the mechanisms of the world food system clearly illustrate the problem. Any attempt to operate through national and world food markets fails for the simple reason that, lacking purchasing power, the hungry are only marginal participants in those markets. Attempts to reach them through the markets leads to adjustments elsewhere, and in the new equilibrium the poor usually remain as badly off as before.

In short, the market mechanism creates a world food system that is resilient for the rich, but intractable for the starving. Chronic hunger is a stubbornly persistent feature of a market-oriented food system.

# 6

## *FOOD SUPPLY INCREASES*

### GLOBAL FOOD SUPPLY INCREASES

Policy interventions specifically designed to improve global food supplies do not increase adequately the food consumed by the poor. The system adjusts to provide food at reasonable cost to those who have the money to buy it, but does not increase adequately the food consumed by the hungry. This finding applies to a number of popular notions about the ways to improve food intake of the poor, as demonstrated by a set of scenarios that increase agricultural supplies in the world market. These include scenarios that assume:

- (1) Increased production in the developed countries, thus letting farmers in those countries take care of the hungry.
- (2) Reduced waste and overconsumption (the rich have one meal less).
- (3) Reduced meat consumption to save on food grains and so increase the availability of cereals for human consumption.

Why are measures to increase global supplies not effective? Model simulations show (see Box 3) that:

### Box 3

#### THE MARKET IS RESILIENT

How little is achieved by market-oriented policies in terms of reaching the hungry is expressed by the numbers obtained from scenarios that change supplies and prices (*Table 1*).

**Table 1.** Scenarios that change supplies and prices.

<i>Scenarios</i>	<i>Persons Hungry</i>	
	<i>1990</i>	<i>2000</i>
(1) Reference (millions of persons)	470	400
	Percentage change over reference scenario	
(2) Higher supply on the world market:		
50 million tons more wheat on the world market	-3	-2
50% less meat consumption in the OECD countries	-7	-1
(3) Better producer prices in developing countries:		
25% less production in OECD countries	+11	+9
Agricultural trade liberalization:		
By all market economies	+1	+1
By developing countries	-5	-5
By OECD countries	+3	+4

Obviously, the market mechanism is stubborn in adjusting to the needs of the hungry. Trade liberalization by the OECD countries appears even to add to the number of hungry. Liberalization by the developing countries reduces the number, but this effect is overcompensated for by the negative effects of OECD liberalization if both country groups were to undertake the removal of border protection jointly.



- (1) Additional food supplies on the world market are absorbed through adjustments in the behavior of producers, consumers, and governments endowed with purchasing power; the hungry do not improve their incomes and consequently do not eat more food.
- (2) Consumption reductions in the rich countries lead to adjustments in prices, trade, and production, which together nullify any additional food supplies to the poor.

#### DOMESTIC FOOD SUPPLY INCREASES IN DEVELOPING COUNTRIES

If increasing the global supply of food is not effective, will the situation improve when domestic supplies in the developing countries are raised?

In this respect, one can consider producer price increases to farmers, thus providing incentives to produce more, as is recommended widely. Relatively low prices paid to farmers have been singled out in many countries as a major reason for unsatisfactory production. Higher prices can be obtained directly, by offering higher government intervention prices; they can be obtained indirectly by measures that raise world market prices. Among the latter is the suggestion that protection should be removed, forcing developed countries to reduce surpluses and developing countries to set internal prices in accordance with world market prices. Beyond this, policies to reduce agricultural production in the developed countries even further may be justified for environmental reasons.

Again, in these cases the results of additional incentives to farmers in developing countries are disappointing or even negative (see Box 3). Simulations show that:

- (1) Production in the developing countries is, indeed, raised, but partly to give additional exports, whereas consumers are worse off due to higher prices.

- (2) Trade liberalization in the industrial countries only has negligible effects on the poor.
- (3) Trade liberalization by the developing countries has larger beneficial effects, though they are still marginal.

This is not surprising, since poverty and hunger relate to limited resource endowments, which are not effectively changed by price policies alone. Price policies may, in fact, increase the value of the resources not in the hands of the poor relative to those – mainly labor – that they do have.

## 7

### *NONMARKET MEASURES*

#### NONMARKET MEASURES BY DEVELOPING COUNTRIES

Why cannot developing countries deal with the hunger problem themselves? Subsidized food rations, rural works programs, or other schemes to benefit unemployed labor can give the poor more income and better access to food markets.

It is obvious that the problem is the constraint on resources. Both finance and managerial ability are scarce resources, and their diversion to programs that alleviate poverty retards the overall economic growth. Explorations with some national models of developing countries show that the trade-off between growth and redistribution is significant. Redistribution that can significantly reduce hunger would result in a drastic fall in growth, and is unlikely to be politically acceptable in the developing countries.

#### NONMARKET MEASURES WITH EXTERNAL ASSISTANCE

The next question is whether interventions to meet the food needs of the poor can be financed from external resources. How much additional aid is required? The emphasis is on aid, not on commercial capital flows, as the latter follow opportunities for economic and financial returns, which the poorest countries hardly appear to offer. Thus the question is: How

much aid should be given to finance nonmarket interventions in the food and labor markets for the benefit of the hungry?

The analysis provides the following results (see Box 4):

- (1) Additional aid, equivalent to 0.5% of the GDP of the richer countries, given in inverse proportion to per capita incomes, but not specifically tied to spending on behalf of the poorest groups, will reduce the number of hungry by 32% in the year 2000.
- (2) If additional aid is solely dedicated to investment, there is initially only a small reduction in hunger, but by the year 2000 the number reaches the same level as in (1), namely 32% fewer hungry people. This reduction in hunger persists even if aid is discontinued after 15 years.
- (3) When additional aid is given, as in the first case, without being tied to specific spending, hunger is immediately reduced but is very sensitive to the discontinuation of aid.
- (4) If additional aid can be fully used for meeting the food needs of the poor, with additional aid at half the levels in the other scenarios, eradication of hunger is possible before 2000 without reducing economic growth.

In summary: a combination of targeted aid and targeted food programs can eradicate hunger at small financial cost and without reducing overall economic progress in the developing countries.

How realistic are these findings? From a purely economic viewpoint there is little doubt that the estimates indicate well the orders of magnitude. Raising food intake of the poor above some minimum is a small problem in terms of the quantities of food concerned and the financial costs, particularly when compared with global food and financial resources. One should therefore expect to need rather small additional resources when a targeted nonmarket approach is taken (see Box 5). This raises other issues of a noneconomic kind and questions as to the efficiency with which such programs can be implemented. Poor Asian countries may, in this respect, be better equipped to administer such programs than the poor countries of Africa. Still, it appears that additional aid, equivalent to 0.3% of the

## Box 4

### AID SCENARIOS

Suppose that all the rich countries add 0.5% of their GDP to their aid budgets – above the present 0.35% – and that this additional aid is distributed inversely to the per capita incomes of the recipient countries. Suppose, further, that this aid is either added entirely to savings and investment (A-Cap scenario, *Table 2*) or given as balance-of-payments support (A-Bop scenario, *Table 2*) to which the marginal expenditure propensities of the recipient country apply. Hunger is then reduced significantly.

**Table 2.** Addition of 0.5% of GDP to aid budgets: results in 2000.

<i>Country groups</i>	<i>Hungry persons, reference scenario (10<sup>6</sup>)</i>	<i>Percent change over reference scenario</i>	
		<i>A-Cap</i>	<i>A-Bop</i>
All developing countries <sup>a</sup>	400	-32	-32
Middle income	30	0	+4
Low-middle income	60	-13	-8
Low income <sup>a</sup>	310	-40	-40
of which India	155	-54	-56

<sup>a</sup>Excluding China.

Even without any redistributive policies in the developing countries the effect on hunger is sizeable. India shows very large reductions because of its low per capita income and therefore relatively large share of aid receipts.

Aid for development has not been a very popular topic in past years, when the need to contain government expenditures has dominated policies in developed market economies. Uneasiness about the effectiveness of aid adds to the reluctance to expand it. The scenario presented here may, for these reasons, seem naive and too far from political realities. It should, however, be considered in conjunction with other policies that generate or free resources: trade liberalization can provide additional resources. FAP has also explored scenarios in which arms expenditures are reduced.

## Box 5

### AID WITH REDISTRIBUTION IN INDIA

Massive rural works programs can raise the income of the poor in India to levels sufficient for them to purchase adequate food. In the detailed India model, 100 kg of wheat per person-year is assumed to be distributed to all the poor from 1980 onward. Complementary costs of administration and inputs are included and the extreme assumption is made that the program creates no productive assets.

Without extra aid, this retards growth to an unacceptably low level. With aid to maintain growth in the reference scenario, India remains dependent on substantial additional aid flows to sustain the program. The most attractive option is to start with additional aid in the early years to raise economic growth to a higher level, which then permits termination of the extra aid in the late 1990s without disrupting the financing of the rural works programs (*Table 3*).

**Table 3.** The effect of aid on per capita income, cost of rural works programs, and trade deficit changes (in 1970 US \$  $\times 10^9$ , except per capita income, which is in 1970 US \$).

	Year	Scenario		
		Without extra aid	Aid to maintain growth	More aid, terminated by 1996
Per capita income	1985	111	117 <sup>a</sup>	121
	2000	155	182 <sup>a</sup>	195
Cost of rural works programs	1985	3.6	3.6	3.6
	2000	3.2	3.1	3.1
Change in trade deficit (=aid) from the reference run	1985	-0.1	5.4	9.6
	2000	-0.4	3.9	0

<sup>a</sup>Equal to the reference scenario.

Note that in the aid scenarios presented earlier, India receives 14 billion US dollars of additional aid, but the lower amount (shown in the last column of *Table 3*, being targeted, goes much further in reducing hunger.

developed countries' GDP and designed to reach the poor, could eradicate hunger even if one third of it does not reach the poor and instead is added to the income growth of the not-so-poor.

#### AID-GIVERS BENEFIT

Countries receiving aid will use the foreign exchange to buy more imports, a large part of which will be obtained from the aid-giving countries. The positive effects on the growth of the developed countries are significant. To put these into perspective:

- (1) When the developed market-economy countries liberalize their trade – which has negligible impact on hunger – they register a GDP increase of 0.48% above the reference scenario in the year 2000.
- (2) When all the market-economy countries, developed and developing, liberalize their agricultural trade *and* the developed countries provide an additional 0.5% of their GDP as aid to the poor countries, the GDP of the developed market economies as a group rises by 0.75% above the reference scenario in the year 2000.

Two things follow from these findings. Not only does the combination of free trade with additional aid enhance the growth of industrial economies, but it allows them to recapture more than half of the additional aid. But for the hungry the combination is less desirable, since their number is reduced by only 27% as compared with 32% in the case of additional aid only. Higher food prices through trade liberalization are the main reason for this effect. However, it has already been shown that the effectiveness of aid in reducing hunger is considerably enhanced when combined with redistributive policies in the developing countries. In this setting, the amounts of additional aid suggested here are found to be adequate to eradicate hunger. This remains the case when trade liberalization is pursued at the same time.

## 8

### *CONSTRAINTS ON MOBILITY AND THE CASE FOR AID*

Compared with the migration opportunities for surplus labor in Europe in the nineteenth century and the early part of the twentieth, the international movement of labor is a marginal feature of today's world. There is no doubt that this option, if it were available to the people in developing countries, would result in large migration flows today.

Nor can it be doubted – and estimates with the model system confirm – that these movements could lead to substantial gains in world income. The protection of labor markets by national governments is a major means of maintaining large income disparities between developed and developing countries. But they have other uses as well. They preserve national cultures and identities and preclude social tensions that might result from large labor movements. It would be quite unrealistic to assume that restrictions on the movement of labor will be reduced significantly.

Neoclassical economists have traditionally argued that, in a world where labor and capital are the only two factors of production, free trade of commodities would equalize wages among countries without any movement of labor. Unfortunately, however, in the real world countries have locational advantages and limited access to nonrenewable resources, such as land, which contribute to production. In such a world free trade does not equalize wages; nor does free movement of capital. Capital services will, if they move freely, simply not go to



countries with limited land resources. Thus, unless one has miraculous developments in the field of transportation, so that locational advantages lose their importance, free trade can *reduce* inequality in wages, but cannot *equalize* them without allowing people to work abroad and, possibly, repatriate their earnings.

In economic terms, there is a purpose served in calculating those incomes foregone through maintaining fences around labor markets; in other words, to estimate the rents of the fences, who is earning these rents, and who is most hurt by them. On this basis, one can justify substantial compensation payments from rent earners in developed countries to income losers in developing ones.

The findings suggest that this argument can, even under restrictive and conservative assumptions, justify aid flows that are greater than the current ones and, even, than the higher ones proposed in the preceding analysis. They therefore strengthen the argument for aid to eradicate hunger and even justify aid at a level adequate enough to achieve full employment in developing countries within one generation.



## *AGRICULTURAL TRADE AND PRODUCTION DISTORTIONS*

The preceding chapters occasionally referred to agricultural trade policies and some brief statements were made about the limited impact of market-oriented policies – including trade liberalization – on the hunger problem. These effects were invariably found to be small. It would, however, be incorrect to conclude from this passing treatment that trade issues are not important for developing and developed countries. An improved trade climate could provide additional resources to the developing countries and thus reduce the need for aid. These resources could in turn be used, as with aid, to support domestic programs designed to reduce hunger. Therefore, it is important to quantify the benefits from changes in trade regimes and to look at their distribution by countries.

The question becomes even more pertinent when a survey is made of current agricultural production and trade policies, and of existing distortions and dislocations. In a number of respects, the trade issues are a mirror image of the hunger problem discussed in the preceding chapters.

Instead of one well-functioning food system, there appear to be two loosely connected malfunctioning ones (see Box 6). How can these systems be integrated?

It has already been noted that governments in developing countries face difficult dilemmas in deciding on appropriate price policies to stimulate food production and maintain stable, preferably low, prices for poor consumers. Governments in developed countries face similar difficult decisions. Although

### Box 6

**Table 4.** Two aspects of global food systems.

<i>Hunger</i>	<i>Food Surpluses</i>
On the margin of the economic system	Created by the economic system
Lack of effective demand	Saturation of food demand
Lack of appropriate food production technology	Little control of technological trends
Liberal trade not of much help	Liberal trade can reduce surpluses
Dependent on world markets	Determining world markets
Inadequate resources for government policies to eliminate hunger	Abundant resources to protect farm incomes thus causing surpluses
External assistance essential	Resources permit aggressive export policies

the majority of their consumers can afford high food prices, the governments are called upon to give income guarantees to farmers whose incomes are unstable, because of supply fluctuations, and relatively low when compared with those in the nonagricultural sector. When these guarantees are provided by setting minimum prices, the result is a tendency to move up or away from prevailing world market prices while improving farm incomes.

High prices are mainly passed on to domestic consumers and make new investments and the application of new technologies more attractive than world prices warrant. A process is thus set in motion in which technological innovation attains a momentum of its own, in turn requiring price policies that maintain the rates of return.

Surpluses are disposed of with subsidies on domestic markets or on the international market. Price competition then reduces the market share of other exporters, even if they are efficient producers, unless they are willing to engage also in subsidy competition. This lowers the export earnings, farm incomes, and public resources of developing countries

that export competing products. Retaliatory measures have led to frictions and further distortions of world prices.

Quite a few developing countries, on the other hand, are benefiting from this situation, at least in terms of their balance of payments. For example, their food import costs are kept artificially low by the subsidized disposal of surplus cereals on the world market. This, however, might be a short-term gain. Low prices are a disincentive to their own producers and lead, in the long run, to an unsustainable dependence on imports, as appears to be the case in large parts of Africa.

Also, some developing countries have found outlets for new exports that would not have arisen in a less distorted situation. High food-grain prices in the EC have attracted large trade flows of grain substitutes. An example is cassava from Thailand, which is not covered by the EC's border protection of food-grains and is therefore competitively priced. But these advantages carry considerable risk, since they are dependent on the whim of agricultural policy administrators in industrial countries. Also, these benefits may not offset the loss of markets and the negative effects of very low world prices. An example of the latter case is the sugar market, which is important to a large number of developing countries.

Against this background it is important to assess the consequences of agricultural trade liberalization, which should increase efficiency at the global level as countries adjust their production to be more in line with their comparative advantages. However, in the absence of compensating transfers some countries may lose under liberalization. An assessment of efficiency gains at the global level and the gains and losses of individual countries can provide some insight into the degree to which each country's production and trade has become distorted and how large the adjustment costs may be. Several scenarios are relevant to this analysis: What if the developed market economies remove border protection? But also: What consequences can be expected from the removal of border protection by developing countries alone? This is an issue that can be usefully analyzed, since it belongs to the regular package of adjustment policies recommended by the World Bank and the IMF. Simultaneous liberalization by all market economies is an obvious third option to be considered.

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*LIBERALIZATION SCENARIOS***LIBERALIZATION BY DEVELOPED MARKET ECONOMIES**

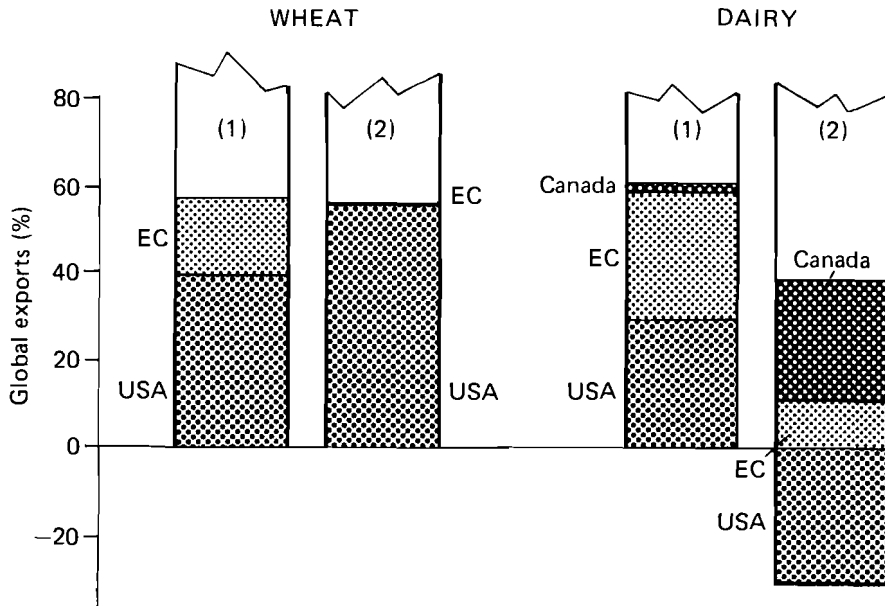
A move toward agricultural trade liberalization by countries with developed market economies would raise, by the year 2000, world agricultural prices to about 9% above those of the reference scenario. Prices of products that are important to developing countries' food imports would rise significantly and export prices would lag, causing a significant terms-of-trade loss for the developing countries. The total world production changes only marginally, but it is reallocated between countries, together with substantial changes in the pattern of trade (see Box 7). The GDP of the developing countries falls slightly, suggesting that as a group they are currently marginal beneficiaries of the prevailing protectionist policies of developed market economies.

A closer look at the developing countries suggests that this scenario leads to significant losses for a number of them. Higher cereal prices reduce their capacity to import and marginally increase the level of hunger in the world. Egypt, a large wheat importer, obviously loses; but so also do Brazil and Turkey. Argentina and Kenya gain, and Thailand gains marginally; they are agricultural surplus countries and benefit from improvements in terms of trade. In all, there seems little reason for developing countries as a group to press for overall agricultural trade liberalization by the developed market economies. Their interests may be more directly served by focusing on specific commodities whose prices are depressed

### Box 7

#### TRADE SHIFTS BETWEEN INDUSTRIAL COUNTRIES

Whereas the USA claims that EC policies remove a share of the global wheat market, Canada could claim that US policies deprive Canadian producers of potential dairy exports (*Figure 3*).



*Figure 3.* Market shares in 2000. Column (1) is the reference scenario and column (2) the OECD trade liberalization scenario.

US farmers roughly maintain their incomes; in the EC, farm incomes are reduced by only 8% due to high world market prices, restructuring of production patterns, and somewhat larger movement of labor out of agriculture. Total GDP gains exceed farm income losses.

due to surplus production in the developed countries. Though the developing countries lose, agricultural trade liberalization by the developed market economies is beneficial to themselves (see Box 8).

## Box 8

### GAINS FOR DEVELOPED MARKET ECONOMIES FROM AGRICULTURAL TRADE LIBERALIZATION

When the developed market economies (OECD countries) liberalize agricultural trade, their GDP in the year 2000 improves by almost 0.5%, and the world GDP increases by 0.25%, but that of developing countries falls slightly.

Though the increase in global GDP, measured at 1970 world prices, is small in percentage terms it still amounts to 30 billion US \$ at 1970 prices, and is *larger* than the level of aid given to developing countries today. As a percentage of the GDP for the agricultural sector of OECD countries, from which distortions have been removed, the global gain is more than 20%.

#### Income Parity Falls – But Modestly

US farmers as a group maintain their income despite removal of protection. The EC farmers as a group, who at present receive around 40% of their income from protection, would lose income. However, the loss in their income is relatively small. Higher world prices and the restructuring of production patterns in the EC account for the small loss in farm incomes. The loss in farm income is much smaller than the gain in GDP of the EC, so that even after further compensation payments to farmers the EC would gain (similar is the case for farm incomes and GDP gains in Japan). Income parity in the EC falls by only 4% as labor migrates out of agriculture (*Table 5*). Though this labor is productively absorbed in the nonagricultural sector in these scenarios, the social and political problems of increased labor migration need to be recognized.

Since agricultural trade liberalization by the OECD countries is beneficial to both the EC and the USA, should not these countries liberalize unilaterally? Though unilateral trade liberalization by either the EC or the USA benefits consumers in the country liberalizing, it reduces farm incomes much more than in a simultaneous move by all OECD countries. A simultaneous move would involve smaller adjustment problems for OECD farmers and thus more easily permit alternative nondistorting mechanisms to protect farmers' incomes.

(cont.)

**Box 8 (cont.)****Table 5.** Impact in the year 2000 of agricultural trade liberalization by OECD.

<i>Country</i>	<i>Degree of protection in reference scenario</i>	<i>Relative price of agriculture</i>	<i>Agricultural production volume</i>	<i>Agricultural labor</i>	<i>Income parity<sup>a</sup></i>
		<i>(% change over reference scenario)</i>			
EC	23	-9	-8	-12	-4
Japan	82	-35	1	-5	-35
USA	14	-2	2	-	0

<sup>a</sup>Agriculture/nonagriculture.

## LIBERALIZATION BY DEVELOPING COUNTRIES

When only developing countries alone (excluding China) liberalize agricultural trade, most of them appear to become better off. Also, the level of hunger in the world is reduced somewhat, but there are a few developing countries who lose. Among these are some agricultural exporting countries – world market prices for their products decline in relative terms. These negative price effects are not offset by increases in exports volume as long as the industrial countries maintain their protective stance. Others lose because rigidities in the movement of labor and capital between sectors lead to a less efficient use of production factors under liberalization. But many other countries appear to gain, despite terms-of-trade losses and larger deficits in their agricultural trade balance.

Trade effects, even if significantly negative, thus appear to be overcompensated for by adjustments in production and consumption that are more aligned to the prevailing world market prices and to a comparative advantage at those prices. From the preceding discussion of the removal of protective



barriers in the developed market economies, it should be recalled that those world market prices remain seriously distorted. The gains registered in this scenario can therefore easily be undone when the developed countries also liberalize.

#### AGRICULTURAL TRADE LIBERALIZATION BY ALL MARKET ECONOMIES

The level of hunger in the world hardly changes in this scenario, since food becomes more expensive. Many developing countries thus lose, including some countries who gain when only developing countries liberalize. As in the case of liberalization by the developed market economies – to which this scenario is rather akin – agricultural exporters tend to gain. The mix of results, and the apparent inability of some developing countries to make full use of opportunities for trade expansion in a more liberal environment, do not make this a major option for developing countries. However, the gains to developed market economies from trade liberalization are greater than from liberalization by themselves alone.

Though a number of the developing countries who gain when only the developing countries liberalize actually lose in this scenario, their losses are smaller than when the developed market economies alone liberalize their agricultural trade. Thus, for these developing countries agricultural trade liberalization is still a desirable policy.



## *CONCLUSIONS*

The scenarios described in Chapter 10 show that agricultural trade liberalization does, indeed, lead to efficiency gains at the global level; however, the gain amounts to less than 0.3% of the global GDP. Also, the direct impact of agricultural trade liberalization on hunger is marginal with changes of less than 5% in the number of hungry people; nor does it lead to much larger foreign exchange earnings from agricultural trade. When only the developing countries liberalize agricultural trade, their agricultural trade balances deteriorate by 16%; the alternative of developed country liberalization more than doubles the agricultural trade balance of developing countries, the increase amounting to some 7 billion US \$ in current prices. The increase is lower but comparable when all countries liberalize. These are significant amounts, but still relatively small when compared with the resources needed to finance the eradication of hunger. And only a part of the additional foreign exchange earnings can be transformed into savings or government income that can be used to help the poor.

As pointed out earlier, if agricultural trade is liberalized by the market economy countries while additional aid is given to developing countries, i.e., if instead of protecting domestic farmers, the developed countries were to use their resources to give aid to poor countries, both will be better off. Hunger will be reduced (or eliminated if poor countries also redistribute internally), consumers in some of the developed countries

will gain, the income in developed market economies as a group will increase (even after accounting for additional aid as well as transfers to farmers to protect their incomes), and the problem of surplus milk and butter mountains will disappear. The world will then move from its current paradoxical state of hunger in abundance to a more sensible state of abundance without hunger.

What is often not done, and what has been done here, is to assess quantitatively the size of all the efforts combined that are needed to virtually eliminate chronic hunger in the world by the turn of the century. If the magnitude of the required efforts is considered infeasible, even when it has been sweetened by suggesting ways to raise the needed resources at no cost, then one might as well give up and accept that the world will live with chronic hunger for a long time to come.

The sweeping changes in policies that are analyzed and presented here are not chosen because the authors think that these can be easily adopted and implemented. Moving toward the set of policies described here will, in any case, be a difficult process, since considerable reluctance and resistance will have to be overcome. The contribution of this analysis is that it shows how effective measures can be taken and that the benefits can exceed the costs, the latter being considerably less than often is presumed. If the discussion of policy changes is made to move again toward actual measures to be taken, then the analysis has served its purpose.

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*ABOUT THE BOOKS*

**Toward Free Trade in Agriculture**

*K. Parikh, G. Fischer, K. Frohberg, and O. Gulbrandsen*

In press (Martinus Nijhoff)

What are the possible impacts of a more liberal international trade in agriculture? What would happen to production, consumption, international trade, prices, farm incomes, government budgets, and hunger levels in different countries if protective agricultural policies were removed? The authors first identify and quantify the most important protective measures used to restrict agricultural trade. They then discuss the results of various policy scenarios in terms of their impact on both developed and developing countries – specifically, who gains and who loses, and in terms of which measures? Global efficiency gains that could result from trade liberalization are highlighted, and relevant policy conclusions are drawn.

**Hunger: Beyond the Reach of the Invisible Hand**

*K. Parikh, G. Fischer, K. Frohberg, and F. Rabar*

In preparation

This book explains why hunger cannot be alleviated through market mechanisms alone. It presents the results of various

simulations, carried out with the FAP models at IIASA, which reveal the nature of national and international food and agriculture systems. The authors attempt to answer such questions as: Why does chronic hunger persist in the midst of a globally adequate food supply? Would hunger disappear by the end of this century if no special measures were taken? What national and international policies could promote growth with equity and rapidly reduce hunger?

### **Linked National Models: A Tool for International Policy Analysis**

*K. Parikh, G. Fischer, K. Frohberg, and M. Keyzer*

In preparation

This volume introduces Applied General Equilibrium (AGE) analysis and uses its concepts to construct a set of empirically estimated national models in the field of food and agriculture. The first chapters give the theoretical background of the FAP modeling exercise at IIASA. Requirements for and formulation of the AGE national model are discussed, the innovative methodology developed to link various national models through trade and financial flows is described, and possible uses of the modeling system for welfare analysis are indicated. These theoretical chapters are followed by a detailed presentation of the national model components. Emphasis is given to the empirical work done by FAP, the parameter estimates, and model validation.