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Food Crisis in the 21st Century: Specter or Reality?

by Liu-Hsiung Chuang

Food security is an issue as old as mankind. In spite of its importance to millions of poor people in low income countries, it has not been a key debating point in the GATT negotiation for the Uruguay Round. Earlier this year Mr. Dunkel, the Director-General of GATT, delivered a new proposal to all the contracting parties of GATT, hoping to revive the long-stalled negotiation on agricultural products in the Uruguay Round. The proposal is generally close to the United States' and CAIRNS countries' positions, which emphasize the lowering of all agricultural trade barriers and production subsidies. However, it does not deal with the food security issue in a far-sighted and comprehensive manner.

Malthus and World Population Growth

Since Malthus first wrote of war and famine as the consequences of unchecked population growth, he has been criticized as a mere doom-sayer. Modern demographic transition theory tells us that a population's fertility goes down as its standard of living increases and mortality rate declines. But when looking at the current dire food shortage in Russia, the chronic wars and famines in Ethiopia, Bangladesh, the Sahel, and other parts of Africa, Asia, and Latin America, one tends to ask: Are we pulling away from the Malthusian trap? or are we getting closer to it? The evidence leads me to the latter conclusion as we approach the 21st century.

Even with a gradually declining growth rate, world population in the year 2015 would reach 7.7 billion, with the annual addition that year slightly over 100 million. After passing the 10 billion mark in the year 2040, it would gradually stabilize at a time well beyond the middle of the century.

The serious questions are, how will 11 billion humans produce sufficient food or be able to buy their food needs in the 21st century when some already have problems doing so today?

Cereals Are Key Indicators

Food security means the availability and affordability of food, mainly cereal grains, to meet consumption needs of people in all countries. Cereal grains are spotlighted because they make up about 80 percent of total consumption. Cereal statistical data are sound, easily accessible and comparable. Cereals dominate international food trade, and they are the first choice for famine relief. It must be noted, however, that per capita consumption of cereals varies from about 400 pounds per year in less developed countries—slightly over 1 lb/day—to as much as 700 pounds or even 1 ton in the developed countries, because the latter figures include feed for livestock and many nonfood uses.

Current annual world cereal production and consumption are on

average not far apart: about 1.8 billion metric tons in recent years. Carryover stocks of cereals fluctuate but have maintained an average of over 300 million metric tons since 1982. Since 1961, world cereal production has averaged an annual growth rate of 2.4 percent, while consumption has grown a bit more slowly.

Until about 1950, the increase in agricultural production proceeded mainly from the mechanization of farming and the breaking of new lands for cultivation, including some which were less productive. Since the 1950s, other factors have brought about a yield increase per acre of farmland, associated with the increased use of fertilizers and pesticides, more irrigation, and the introduction and adoption of hybrid varieties of corn and high-yielding wheat and rice—the so-called “green revolution.” But are all these favorable factors sustainable through the 21st century?

Irrigated acreage—estimated at 40 million hectares in 1900—more than doubled to 94 million hectares in 1950 and again to 249 million hectares in 1980. But the expansion caused water shortages, overdrafts from aquifers, increased erosion in some areas, and salinization and pollution of some irrigated lands and downstream waters. Irrigation technology is still being refined, mainly for the benefit of high-value specialty crops. We may hope that the researchers will turn their attention to the great cereal crops, but we cannot hope for any substantial increase in availability of suitable lands or water supplies for irrigation.

Worldwide, fertilizer application averaged a growth rate of 11 percent from 1950 to 1984, reaching an annual total of 125 million metric tons. However, due to environmental concerns and better knowledge about the effectiveness of fertilizers and pesticides, their use has slowed down among the developed regions of the world. But for most of the less developed countries, especially the poorer ones, agricultural chemicals are too expensive to apply at rates which maximize yields, and modern application techniques are almost equally out of reach.

The widespread use of hybrid and high-yielding grain varieties has also increased production. For instance, rice yields rose from slightly over 1 ton to between 2 and 4 tons per hectare in the late 1980s; corn

> The world's population in the last half of the 21st century will be huge, likely double the current 5.5 billion, entailing a tremendous increase in food needs. However, due to past degradation of resources, unpredictability of technological progress, vicissitudes of climate, and inadequate incomes, many of these people may be hungry, especially in the less developed areas of the world where high population growth rates will still continue well into the coming century. Therefore, now is the time for a renewed concern about food security for all people. Major attention should particularly be directed to the currently food-short low income countries, which need to increase their food production and improve its distribution. And international negotiations like the current GATT negotiations should explicitly focus on the food security needs of these countries.

and wheat likewise rose from an average of over 1 ton to over 7 tons per hectare. However, in the less developed countries cost is again a factor, and so is climatic adaptation. Even with the emergence of the latest bio-engineered crop varieties, no dramatic gains in yield are expected soon.

Thus, there is no identifiable technology ready to lead a surge in land productivity such as we witnessed with the hybrid grains in the 1960s. In addition, much of the existing cultivated cropland has been subject to continuous soil erosion and productivity loss.

Weather

Weather also relates to food security. Past experience shows that major droughts or floods in some major agricultural regions can reduce world food production by 4 to 5 percent in one year. In addition to

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drought, flood, and other climatic catastrophes, world agriculture is now facing the looming threat of global warming, as well as the breakdown of the ozone layer. If the world's preindustrial carbon-dioxide level doubles by the year 2030 as predicted, the average temperature might increase by 1.5 to 4.5 degrees Celsius, with the greatest impact on the current world granary in the temperate zone. Even if no acreage is lost overall, the cost associated with autonomous adaptation and the shift of agricultural production to new areas would be substantial. Thus, I conclude that the human race is entering the 21st century with great uncertainty, and a key determinant of our fate is food security.

A Gloomier Outlook

The global picture does not reveal the regional disparities in food security, which present a gloomier outlook for people in the poorer regions of the world.

Food-deficit regions are those which must import food to meet their needs. From 1980 to 90, the major food-deficit regions were North Africa and the Near East, which had a growth rate of 3 percent in production versus 3.8 percent in consumption; sub-Saharan Africa, which had 1.4 percent in production versus 3.1 percent in consumption; and Latin America, which had 1.3 percent in production versus 2.7 percent in consumption. The worst is that the population growth rate in all three food-deficit regions was larger than that of food production. The implications of comparing these growth rates are twofold: since the population is outstripping food production, the future food security of these regions will be continuously threatened; to assure their food security, these food-deficit regions have been relying on commercial food imports and aid. Their ability to maintain even modest consumption levels in the future will depend on their potential economic growth and increase in export earnings, as well as the goodwill and capability of the donors in the world community. In sub-Saharan Africa, per-capita food consumption actually declined. This is a case of a chronic famine, or a community already in the Malthusian trap.

Prospective Import Needs

The Food and Agriculture Organization (FAO) of the United Nations estimated that somewhere between 340 million and 730 million people in the late 1970s suffered from undernourishment, according to its standards of adequate calorie intake. One study of India in 1988 estimated that about 20 percent of India's rural population lived below the ultra poverty line and could not receive adequate food throughout all the months in a year. Using India as an example: Assuming that 60 percent of India's population is still rural in the 21st century (currently 70%), and that 20 percent of those would be under the ultra poverty line, 122 million people in India will be suffering from chronic food insecurity in the year 2000, and to 195 million by 2050.

Sub-Saharan Africa, the Near East and North Africa, and Latin America will have a combined population close to 4 billion in the year 2050. If we assume per capita consumption of only 400 pounds of grains per year, grain requirements would be 800 million tons in the year 2050. If we use the 1990 average net food import rate (21 percent) of the three food deficit regions in 1990 (population weighted), the minimum required net import of these three regions would be 168 million tons in the year 2050 — an amount almost twice the U.S. 1990 net exports and much larger than the total net exports of 119 million tons from all developed countries. If we factor in the potential food imports for the Commonwealth of Independent Republics, China, Japan, India, and other areas in the middle of the 21st century, the potential food import requirements would be several times larger than what we have already calculated and could be much more than the United States and other current major exporting countries could provide.

These countries have three alternatives—increase domestic food production and improve its distribution, increase commercial imports of food, or depend on food aid. Food aid, which amounted to about 12 million tons in 1991, is only a short-run solution. Commercial food imports depend on the purchasing power of a country, which in turn is

conditioned by net foreign exchange earnings and financing capability, or national income. However, using cash or capital resources for food imports tends to reduce investment in food production and distribution and in overall economic development. And heavy reliance on imports competes with and may depress prices of domestic foodstuffs, creating disincentives to produce domestically grown food. This only impairs a country's food security in the long run, especially if it finances these imports through loans.

Food Security as Common GATT Denominator

Thus, concern for food security in the less developed countries, especially where food shortage is accompanied by financing difficulty, calls for a more comprehensive GATT proposal. We may recall the policy stands GATT has taken in the past, allowing less developed countries to protect and nurture their infant industries, and granting exceptions for agricultural protection to all countries. A FAO study in 1984 documents that an average of 9.3 percent of public expenditures was spent for agriculture in 34 less developed countries, and the average ratio of national agricultural gross output to these public expenditures was about 2.6, which is larger than those of a lot of developed countries, including Japan and the United States. This study reveals that there is great potential in agricultural growth if more resources are invested in agriculture in the less developed countries. Therefore, while the current GATT-proposed articles (part A, 15 and 16) to provide for special and differential treatment including net food-importing countries deserve full support, they also need to be more fully and consistently developed to except the poorer less developed countries to protect and nurture their infant agriculture.

This policy would help the long-term welfare of the developed world. First, providing exception articles for food security in the GATT proposal would make the less developed countries better off in the long run; thus a more prosperous developing world could afford to purchase more food from exporting countries. If the estimated future populations — even at the lower end of the range — in the developing regions were endowed with increased purchasing power, the potential agricultural markets would be so large as to provide ample opportunities for any interested exporting party. The great increase in agricultural imports in the newly industrialized countries such as Taiwan and South Korea tends to substantiate this point. Second, the increasing production in the food-short countries would help reduce their import requirements, thus also reducing the incentive for the food-exporting countries to raise crops on marginal or environmentally fragile lands. Lastly, even the slow population growth of currently food-exporting countries will lead to larger populations in the 21st century, and food surpluses might dwindle to a level which could not meet the potential import need of the food-short regions at an affordable price.

Therefore, it is imperative to improve food security for all peoples in the world, and major efforts should particularly be directed to assist the currently food-short countries to increase their food production and improve their distribution. GATT-proposed food security articles excepting less developed countries for protection and nurture of their food production and distribution system should be fully supported and food security for the entire population of the world should be made the fundamental denominator in the current GATT negotiation.

Recommendations

Finally, to reduce the risk of food insecurity—or its perpetuity in some less developed countries—several actions must be taken. First, donor countries should press for commitments by the food-receiving countries to develop plans for reducing population growth. The achievement of reducing population growth over a given period, evaluated by representatives from the United Nations, should be used as a basis for food donations. Second, the priority objective of any technical and financial assistance to a food-short country should be food security, with a key focus on improving their domestic food production and distribution as well as family planning. 