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ESA Working Paper No. 03-18

November 2003

Agricultural and Development Economics Division

The Food and Agriculture Organization
of the United Nations

www.fao.org/es/esa

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Abstract

This paper reviews agricultural and food security performances of developing countries after the Uruguay Round. In particular, issues and trends relevant to the interests of the low income food deficit and the net food importing countries are examined as the world prepares for further trade negotiations. The paper attempts to answer several questions, including: How has food security in the low income countries been affected over the past ten years? Are agricultural policies evolving in ways that take advantage of emerging trade opportunities? Despite the gains in global and national food availability, food security remains an especially persistent and elusive development problem. The late 1990s food insecurity data are worrisome, with emerging signs of uneven and slowing progress. Most of the recent food security problems are due to food shortages caused by civil unrest, wars and drought – age old problems that endure today.

Key Words: Development, Agricultural Trade, Food Aid, Low Income Countries

JEL: Q17, O13, Q18

Thanks are due to Ali Gurkan, Hartwig DeHaen and Patrick Webb for comments and suggestions. Thanks also to Annelies Deuss and Stefano Trento for research assistance. Content and errors are exclusively the responsibility of the authors, and not the FAO.

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The post Uruguay Round food security picture is rather bleak for a large number of developing countries. FAO estimates the number of undernourished people in the developing countries at 800 million. Some two thirds of the total numbers of undernourished are found in Asia. The highest incidence is found in Sub-Saharan Africa, where an estimated 33 percent of the population to be undernourished. These are disturbing numbers given the global community's commitment to food security concerns, its capacity to produce more than enough food for every human being, and its power to use modern information systems to pinpoint exactly where food is needed and to mobilize rapid transport systems to move food quickly around the globe. The food security problem remains as formidable and deadly as ever.

From a longer term perspective, food security progress has been nothing short of remarkable. The proportion of people in developing countries living where average kcal/person/day is less than 2200 kcal fell from 57 percent in the early 1960s to just 10 percent by the end of the century. During this period, the average kcal/person/day increased by more than 70 percent in China and Indonesia; by more than 50 percent in Pakistan and the Republic of Korea; and by more than 30 percent in Brazil, Burkina Fasso, the Dominican Republic, Ecuador, El Salvador, Jamaica, Mauritania and the Philippines.

This paper reviews agricultural and food security performances of developing countries after the Uruguay Round. In particular, issues and trends relevant to the interests of the low income food deficit and the net food importing countries are examined as the world prepares for further trade negotiations. The paper attempts to answer several questions, including: What are the developing country's main concerns? How has food security in the low income countries been effected over the past ten year? Are agricultural policies evolving in ways that take advantage of emerging trade opportunities? What are the emerging policy issues facing the net food importing counties? What is the role of food imports, domestic production, export earnings and food aid?

What are the LIFDC seeking from special and differential treatment?

Before the Uruguay Round, agricultural trade policies were subject to few multilateral disciplines. In this situation, the interplay of special-interest pressures resulted in this sector becoming heavily distorted. In 1995, the average rate of protection faced by developing countries on their exports of agricultural products was 16.4 percent, more than twice the average rate of protection they faced on their exports of manufactures. On their exports to industrial countries, the average tariff they faced was 15.1 percent, close to five times as high as the tariff on their exports of manufactures to these countries (Hertel et al., 2002).

As the Uruguay Round negotiations on agriculture progressed, concerns and issues emerged over how the Agreement on Agriculture (AoA) would impact on food security and poverty issues in the least developed and the net food importing countries (Husain, 1993; FAO, 1999; Michalopoulos, 1999, 2000). During the 1980s, arguments against trade reforms in developing countries included that: (i) only minimal efficiency gains are possible from liberalizing trade as domestic producers are unable to reallocate resources to more efficient sectors due to weak institutions and poor infrastructure; (ii) commodity dependent countries are unlikely to increase export revenue due to inelastic world demand with simultaneous expansion of similar primary exports exacerbating the problem; (iii) protectionism in OECD countries would harm prospects for those countries able to diversify into non-traditional products; and (iv) import liberalization would widen trade deficits, undermining economic stability efforts.

Some developing countries expanded on these arguments and suggested new ones when proposing special and differential treatment (Whalley, 1999; Michalopoulos, 2000; Fukasaku, 2000; FAO 2003b; Mathews, 2003). For example, low income developing countries argued for preferential market access

as a way to overcome the ongoing decline in their terms of trade and encourage export diversification. Domestic discipline exemptions were defended as appropriate policies for low income countries while inappropriate for developed countries (Michalopoulos, 2000), and to recognize the much more limited capacity of low-income countries to offer concessions (Mathews, 2003). At times, the debate shifted from a focus on preferential access and exemptions from obligations to responding to special adjustment difficulties in developing countries stemming from the implementation of WTO decisions (Whalley, 1999).

The LIFDC continue to raise concerns over higher world prices and price volatility leading to upward price risk for importing countries, even though the long term trends in falling real food prices have continued in the post Uruguay Round period. More generally, the developing countries are pushing for improved market access to the developed countries, focusing on: tariff peaks on export products of interest to developing countries; tariff escalation; increased use of SPS measures and long delays in recognizing the equivalence of developing country SPS measures; trade preference issues; the need for larger TRQ volumes and more transparent administration of access; and the need to dismantle export subsidies (FAO, 2003b).

Mathews (2003) presents six categories of recent arguments which we synthesize below. These arguments do not necessarily stand up to the existing evidence on the relationship between trade and food security however they will continue to be stumbling blocks to future negotiation.

(1) Trade liberalisation damages food security because liberalisation benefits only the larger, and the more export-oriented farmers; leads to scale incentives and size concentration, marginalises small farmers, and creates unemployment and poverty.

(2) Agriculture plays a special role in developing countries contributing to employment, income, poverty reduction, export earnings in ways that other sectors do not. In addition, agriculture can provide a buffer or social safety net in times of economic shocks or natural disasters. Thus, agriculture deserves special treatment to protect the viability of rural economies and to protect its role as a social security system.

(3) Low income country agricultural sectors lack the necessary institutional and capital support to compete in a global market with better infrastructure, institutions and social capital. Solutions range from allowing some countries to promote production with price supports, input subsidies and border protection, to allowing longer transition periods, but not for exemptions.

(4) Food security is an important development need so increased domestic food production is essential to increasing food security. This argument has its roots in equating food security with national security and food security with food self-sufficiency, even though widespread evidence demonstrates that hunger coexists with abundant food supplies at regional, national and international levels.

(5) Low income producers in developing countries are too vulnerable to international price variations because of their limited capacity to respond, adjust and adapt. In particular, the possibility of import surges are used to justify border protection to limit the transmission of world market variability into the markets of developing but not developed countries.

(6) Special protection is justified because of the asymmetry of support. In essence, the AoA sanctioned the large levels of support for agriculture in the developed countries, while obstructing the developing countries from doing so in the future.

How serious is the food insecurity problem?

At the global level, the long term trends of many food security indicators have been positive. For example, the prevalence of undernourishment in developing countries fell from 28 percent of the total population in 1979-81 to 17 percent in 1998-2000. In addition, the global average kcal/person/day grew by 19 percent since the mid-1960 to reach 2800 kcal, with the developing country average expanding by more than 30 percent. As consumption increased, diets shifted towards more meat, milk, eggs, vegetables oils and away from roots and tubers. Livestock products, vegetables and sugars now

provide 28 percent of total food consumption in the developing countries, up from 20 percent in the mid 1960s (FAO, 2003a).

The past progress in the developing country food security indicators is influenced decisively by the significant gains in food availability made by the most populated countries -- those countries with populations of more than 100 million, including Brazil, China, India, Indonesia, Nigeria and Pakistan (FAO, 2003a). Bangladesh is the only developing country with more than 100 million people where average kcal/person/day food availability remains very low. Brazil, China and Indonesia now have daily food consumption levels in the 2900 to 3000 kcal range. China reduced the number of undernourished by 74 million since 1990-92. Ghana, Nigeria, Peru, Thailand and Viet Nam have all achieved reductions of more than 3 million.

The increases in food availability resulted from a combination of economic growth, stable domestic food production, long term declines in food prices and strengthened import capacity. A considerable part of this gain is due to the rapid growth of food imports from the developed countries. Net cereal imports by the developing countries more than tripled during the 1970s, contributing to one-fifth of the increase in their food supplies (Alexandratos, 1995).

Food consumption data provides only a partial picture of food security. To provide a better understanding of post Uruguay Round food security trends, Table 1 presents nutritional indicator comparisons of the 1990-92 and 1998/00 periods for the share of starchy foods (cereals, roots and tubers) in the overall diet; life expectancy at birth; and under-five mortality rates. The last two indicators measure aspects of a more complex state of human wellbeing including nutritional status. The share of the total diet derived from starchy foods is an indicator of variety and quality of the average diet of a population. A satisfactory diet can be had with starchy staples ranging anywhere between 55 to 75 percent of total dietary energy supply (DES).

Food security remains an especially persistent and elusive development problem, despite consistent gains in global and national food availability. FAO's estimates for the 1998-2000 period indicate 840 million undernourished people in the world: 799 million in developing countries, 30 million in countries in transition countries and 11 million in developed market economies¹. More than half of the undernourished (508 million people; 60 percent of the total) live in Asia and the Pacific; Sub-Saharan Africa accounts for almost a quarter (196 million people; 23 percent of the total).

It is Sub-Saharan Africa, however, where the depth and intensity of the food security problem is most serious, where progress is lacking and where the majority of the low income food deficit countries are located. Of the 30 countries with daily food consumption under 2200 kcal, 25 are in Sub-Saharan Africa

The late 1990s food insecurity data are worrisome, with emerging signs of uneven and slowing progress. Data suggest an overall increase of 15 million undernourished people between the 1997/99 and 1998/2000 periods. FAO projects that 43 countries will have average food consumption levels of less than 2500 kcal/day in 2015, and the numbers of undernourished will actually increase by 9 million. Moreover, the numbers of undernourished in sub-Saharan Africa are projected to remain constant through 2030 (FAO, 2003a). Most of the recent food security problems are due to food shortages caused by civil unrest, wars and drought—age old problems that endure today.

In the first half of March 2003, some 38 countries in the world were experiencing serious food emergencies: 25 in Africa, 6 in Asia, 5 in Latin America and 2 in Europe. Internally displaced populations and refugees and returnees are forced to abandon their homes, disrupting their way of life and their income earning capacity and their ability to produce food. In 15 cases, droughts are responsible for reduced agricultural output. In 6 countries, economic constraints and sharp declines in commodity prices (mainly coffee) contributed to food emergencies. In many cases, the situation was

¹ FAO's primary indicator of food security is the number of people whose diet does not allow them to consume a sufficient number of calories for a healthy diet. This indicator is based on country-level estimates of the average per person dietary energy supply (DES) from local food production, trade and stocks; the number of calories needed by different age and gender groups; the proportion of the population represented by each group; and country-specific coefficients of income/expenditure distribution to take account of inequality of access to food.

exacerbated by the destabilizing impact of the HIV/AIDS pandemic. AIDS and famine are linked directly.

What are the Post Uruguay Round Food Security Trends in the Low Income Food Deficit Countries?

The food security and trade relationship remains an important economic, social and political concern in all FAO member countries, and particularly among the low income food deficit group (LIFDC)². In low-income countries, where people spend a high proportion of their income on food, even small food price increases can be detrimental to the well-being of the urban and rural poor. Many of the poorest people in low-income countries also depend on agriculture - directly or indirectly - for their livelihoods, and rising crop prices may actually increase their real incomes and food intake. A policy objective (and never ending source of debate) articulated by numerous LIFDCs is to minimize their food import exposure by producing an ever higher proportion of their food requirements. Their fear is that the more they open their borders, the more they expose poor food consumers to price shocks and small food producers to disincentives.

What has been the impact of the Uruguay Round on food prices, food imports, and food aid?

During the Uruguay Round negotiations there was significant concern that trade reform, particularly the removal of subsidies in the OECD countries would lead to higher cereal crop prices and hence higher food import bills and lower levels of food aid for developing countries.

Figure 1 shows the trends in real prices of rice, wheat and maize from 1990 to 2002. The long term declining trend in food prices that was observed since the mid 1980s was briefly reversed during the years immediately after the Uruguay Round was completed in 1995. Moderately higher cereal prices were observed through 1997, but they resumed their downward trend starting in 1998. By 2002, cereal prices were, in real terms, below the levels that were observed in 1990. The anticipated rise in cereal food prices did not occur because the fundamental factors that have been causing the long term decline in food prices have not changed in the post Uruguay Round years³. These are: (1) high cereal demand countries such as India and China are self sufficient in cereals and have become net exporters; (2) the growth in cereal demand has slowed down despite rising populations, due to the diversification of diets caused by increasing incomes and urbanization; (3) OECD subsidies for cereal crop production continue to be high, especially for rice, wheat and maize; (4) developing countries such as China and India continue to protect cereal production; (5) the persistence of chronic poverty in much of Africa depresses effective demand for cereals (ie poverty keeps demand lower than it otherwise would); and (6) no substantive reforms either in the CAP or US farm policy.

What has been happening to food import bills?

Food import bills for the LIFDCs (except India and China) have been rising steadily over the decade of the 1990s and through 2001. The rising trend in food import bills has more to do with increasing quantities imported rather than a post Uruguay Round price hike. Table 2 presents the total value of cereal and other food commodity imports into the developing world. LIFDC cereal imports have risen from 33.6 million tonnes in 1990/91 to 41.6 million tonnes in 1995/96 and 50.5 million tonnes in 2000/01 (FAO, 2003d). On a per tonne basis import bills rose during the immediate post UR period but then fell back to the early 1990 levels. China and India have graduated to cereal exporter status, since 1995 each of these countries have been exporting half to one billion dollars worth of cereals per

² FAO's Low Income Food Deficit Countries are based on three criteria: First, a country should have a per capita income below the "historical" ceiling used by the World Bank to determine eligibility for IDA assistance and for 20-year IBRD terms, applied to countries included in World Bank categories I and II. The historical ceiling of per capita GNP for 2000, based on the World Bank Atlas method, is US\$1,445, the same level as in 1999. The second criterion is based on the net (ie, gross imports less gross exports) food trade position of a country averaged over the preceding three years. Trade volumes for a broad basket of basic foodstuffs (cereals, roots and tubers, pulses, oilseeds and oils other than tree crop oils, meat and dairy products) are converted and aggregated by the calorie content of individual commodities. Third, the self-exclusion criterion is applied when countries that meet the above two criteria specifically request to be excluded from the LIFDC category.

³ In addition to the market fundamentals, during the last half of the 1990s, some countries released cereal inventories in significant quantities.

year (Table 2). During years of favorable weather the combined cereal exports of the two countries is around two billion US dollars.

India has made impressive gains in overall food exports during the decade of the nineties. Table 2 shows that India has been a net food exporter for all but three years in the period 1990-2001. In addition to cereals, exports of meat, dairy and sugar have been rising in the post Uruguay Round years. The most significant food import for India in the period 1990-2001 has been oilseeds, one to one and half billion dollars worth per year, this is a reflection of the growing numbers and incomes of the urban middle class. China on the other hand continues to be a net food importer, with dairy products, sugar, and oilseeds as its main food imports. As in India, the growth in non-cereal imports reflect the increasingly diversified diets of the increasingly numerous and affluent urban populations. The trend towards greater diversity in food imports can be observed in other LIFDCs (including commodity exporting LIFDCs) but cereals continue to command the predominant share of food imports in these countries.

The bottom line on food import bills is that on a per unit basis there was a brief period after the UR years when import bills did rise but since then they have fallen back to the pre UR levels. More importantly overall cereal imports into LIFDCs (excluding India and China) have risen dramatically in the post UR years. Rising cereal imports in the post UR years can be attributed to: i) the rising capacity of LIFDCs to import food; and/or ii) the declining competitiveness of increasing domestic production relative to imports given declining world prices of cereals. It is also important to note that the quantities of non-cereal imports by the LIFDCs has risen through the decade of the 1990s. The perception that food import bills have risen drastically in the post UR years can also be partially attributed to the rise in non-cereal food imports.

What has been the experience with food aid since the Uruguay Round?

Over the years, food-deficit developing countries have benefited from subsidized exports, which were often linked to concessions granted under food aid programmes (UNCTAD, 2000). There was widespread concern during the Uruguay Round negotiation process that the AoA would have a negative effect on food aid deliveries due to the anticipated rise in cereal prices and increased disciplines on granting price concessions. Indeed, Figure 2 does show an inverse relationship between cereal prices and food aid donations. Food aid levels which were around 9 million tons in the early 1990s, plunged to 4.3 million tons in 1996, this was the year when cereals prices were at their highest level, but prices fell in the subsequent years and food aid donations rose (Figure 2). By 2000-02 food aid shipments were back at the level of 7.5 million tons per annum. In recent years, food aid shortfalls from traditional donor countries such as the USA and the EU have been augmented by supplies from new donors. In December 2002, India pledged one million tonnes of wheat to the United Nations World Food Programme. Besides India, a number of other non-regular donor countries had also stepped up their pledges, including China, Oman, the Republic of South Africa and the Russian Federation (FAO, 2003).

There are no signs that the overall allocations for food aid have changed significantly in the post Uruguay Round period. While a large portion of the aid goes for emergency relief, concessional food aid continues to be a very important component of aid supplies. After a decline in the 1994-97 period concessional food aid is back to the early 1990s level of two to two and half million tonnes. However, it is important to note that only a small part of the concessional aid goes to LIFDC countries, particularly those in sub-Saharan Africa (WFP, 2001).

What has been the post Uruguay Round food security experience in the LIFDC group?

A starting point to answering this question is recognizing that the LIFDC group includes a heterogeneous group of countries with diverse resource endowments and economies. Agricultural conditions, economic development levels, trading patterns vary widely both among and within countries. In an attempt to provide a slightly more nuanced assessment, the LIFDCs are discussed here in the five groups presented in Table 3. China and India are separated and presented individually due to their size (and the difficulty justifying why they are included in the LIFDC category). In addition, the Capri paper by Anderson (2003) focuses specifically on the experiences of these two countries in the

post Uruguay Round era. In addition to separating China and India, the LIFDC group is divided into two sub-groups: those countries which are highly dependent on a single agricultural export (Figure 3) and those countries that are not.⁴

Table 3 presents availability, access and stability indicators for each of the five groups. The availability indicator is food consumption in terms of kcal/person/day, FAO's key variable for measuring and evaluating the national and global level food situation. The access measure is estimates of the number of persons and the proportion of the populations undernourished. Finally, the stability measure is based on Valdés and Konandreas (1981) and developed further by Sadoulet and de Janvry (1995). They examine the probability of apparent consumption falling below some critical level using historical data and analysing the probability distribution of the random term associated with trend consumption⁵. The future 'riskiness' of stochastic consumption due to domestic production or imports is then measured as the probability that commodity availability falls below a given percentage of the trend value (Valdes, 2003). Table 3 presents the probability of actual consumption falling below 95% of trend during the 1980 to 2001 period.

Single commodity exporting LIFDC

The sub-group of LIFDC countries highly dependent on a single agricultural commodity export are characterized by low food consumption (2314 kcal/person/day), high prevalence of undernourishment (36 percent) and a relatively high probability that consumption will fall below 95 percent of trend (22 percent). Poverty and food insecurity in these countries is both broad and deep. Seasonal food production varies greatly, crop yields are low and their economies are undiversified, with little industry and manufacturing. However, in the pre Uruguay Round period, the prevalence of undernourishment was significantly higher than the most recent numbers -- 49 percent of the population undernourished in 1990/92 compared with the 36 percent in the 1999/00 period.

Figure 4 present the pre and post Uruguay Round picture for agricultural exports, imports and the shares of food imports and agricultural imports in total imports. These countries tend to be net agricultural exporters, but they are net food importers. Overall, agricultural exports have stagnated during the past decade and agricultural imports have risen slightly. The share of food imports in total imports has remained less than 15 percent since the early 1990s.

The dependency on a single agricultural commodity for export earnings creates a source of uncertainty because of the low income elasticity of demand and the declining and volatile terms of trade. The effects of primary commodity price instability is especially significant because the scope of the price shock. The falling real prices reduces the country's ability to finance investments, to spend on social programmes, and to import basic goods and services. Agriculture accounts for more than 70 percent of employment for this group of countries, so the falling commodity prices reduce agricultural wages and incomes, increasing poverty in rural and urban areas. Small coffee producers in those countries highly dependent on coffee exports, for example, have faced more than a 50 percent price decline in nominal terms during the post Uruguay Round period.

Most of the countries in this category have benefited from preferential market access provided by developed country importers, such as the Generalized System of Preferences (GSP) schemes, the commodity protocol or other tariff preferences under the Lome Convention between the EU and the African, Caribbean and Pacific (ACP) group of countries, the United States Caribbean Basin Initiative (UNCTAD, 2000). It is not clear what the future of these arrangements will be and what the impact of MFN liberalization on this group of countries. However, declining commodity prices and tariff escalation in OECD countries continue to be major hurdles for increasing incomes and sustaining food security in these countries.

Non-commodity dependent LIFDC

The food security situation in the non-commodity dependent sub-group of LIFDC presented in Table 3 is also characterized by extremely low food consumption levels (2285 kcal/person/day). Hunger in this

⁴ Annex 1 presents a full list of LIFDCs and the sub groupings.

⁵ See Annex 2 for methodology.

group appears to be deeper and less broad. The prevalence of hunger in the non-commodity dependent LIFDC group is 22 percent undernourished compared to 36 percent for the commodity dependent group. However, the non-commodity dependent LIFDC have made no real progress in reducing the prevalence of hunger, with the proportion of undernourished falling from 23 percent of the population in 1990/92 to 22 percent in 1998/00.

The stability of food consumption is a concern. The coefficient of variability is around 5 percent for the non-commodity dependent countries, so the probability of falling below 95 percent of the trend levels of consumption is 14.5 percent. This is a dangerously low level for such a flat trend. The kcal/person/day daily food consumption indicators are: 2219 for 1988/90; 2204 for 1996/98; and 2285 for 1999/01.

The majority of countries in this sub-group have been net importers of both food products and total agricultural products since the mid 1980s, with an ever widening gap during the 1990s (Figure 5). Population growth has been outpacing food production, so imports and food aid are required to make up the difference. Relative to other developing countries, basic food production in these LIFDC tends to be undercapitalized, uncompetitive and underperforming, especially staple agriculture production. Compared with other countries, the LIFDC tend to have a very low proportion of area irrigated, low value added per worker, low fertilizer levels, and slow or stagnant productivity growth in both food crops and livestock activities.

Food crops cover up to 60 percent of total arable area in most LIFDC. The rural poor and food insecure derive the bulk of their income from the production of staples, or from activities related to staple production. In the pre and post Uruguay Round period, annual per caput production of cereals has fluctuated between 140 kg and 175 kg during the 1990s -- far below the global average of 358 kg. These data suggest a weather dependent agricultural sector. To a large extent, irregular and unreliable rainfall determines yield levels and the state of food security for the vast majority of the poor in LIFDC. The unpredictable production leads to volatile price changes from season to season, sending confusing signals to both producers and consumers.

Not surprisingly, it is the LIFDC, where food consumption accounts for a large share of total household expenditure in both urban and rural areas that the food security and trade linkages remains an important economic, social and political issue. A stated policy objective (and never ending source of debate) by numerous LIFDC is their desire to be able to produce an ever higher proportion of their food requirements rather than import from international markets. FAO (1999) argues that trade contributes to food security by helping countries to meet consumption which displays less variability than production levels; by reducing the supply variability (although not necessarily the price instability); and by fostering economic growth and making more efficient use of resources.

The benefits from freer trade do not come automatically, however. Many developing countries need companion policies and programmes that help increase agricultural productivity and product quality in order to raise competitiveness in domestic and international markets. Examples of companion policies include institutional and market reforms, investments in roads, market information systems and related service industries, and policy measures to promote appropriate technological innovations. Above all, countries need to ensure that those vulnerable individuals, households and groups disadvantaged by the initial impacts of trade reforms are identified and cushioned through well designed measures and safety nets. The international community must accept responsibility to assist those countries unable to provide adequate safety nets mechanisms.

India and China

We had mentioned earlier that China and India have graduated from the LIFDC status, both countries have made tremendous progress in improving per capita food consumption and both have become significant food exporters. In fact, the export performance of the two countries has improved significantly in the post Uruguay Round period (Table 2). Both countries net food imports are primarily in commodities that have high income elasticities of demand, such as oilseeds, sugar and dairy products (the latter two for China). These countries are well integrated into the global trading system and seem to have benefited over all from the opening up of their markets. We ought to also note

that domestic economic policy reforms, as well as non-agricultural growth, were also a significant contributory factor to the positive performance of both countries.

Equitable access to food continues to be an intractable problem, particularly for India, where 233 million people or 24percent of the population are still undernourished. India also faces serious problems of ensuring stable access to food, the probability of a consumption shortfall below trend is still at high level of 8.3percent. Improving this situation will require more than trade reforms at the border, further reforms of the domestic economy as well as institutional change and investments in physical and human capital are a pre-requisite for further improvement in food security.

What can we conclude about post Uruguay Round impacts on trade and food security?

FAO's Commodities and Trade Division is attempting to assess the impact of the AoA on agricultural trade and food security through a set of 23 case studies (FAO, 2003b). The studies aim to answer four questions: (1) Have the AoA commitments led to any changes in domestic agricultural policy in developing countries? (2) Did the AoA commitments have any impact on trade flows (imports and exports of developing countries)? (3) Has implementing the AoA commitments had any impact of food security? and (4) What are the priorities and main concerns of the case study countries in the negotiations?

The methodological issues related to isolating the AoA impacts on trade flows and food security are daunting and making it difficult to reach conclusions from for the case studies and the work continues. The study does suggest that despite the general growth of agricultural exports in most countries, few of the cases reviewed are able to make a link between improved market access under the AoA. In many cases studied, export expansion was attributed more to improved domestic conditions or world market conditions unrelated to the AoA. For example, Brazil removed its export tax on soybeans in 1996, providing better domestic conditions. And Ugandan exports of coffee improved because of the increased coffee prices. Where market access has improved, regional trade or preferential trading arrangements may have had a larger influence.

The positive or negative impacts of the Uruguay Round on food security are similarly difficult to analyze. In a background report for the State of Food Insecurity (FAO, 2003c), Stamoulis and Broca raise a fundamental question about how to address the widely expressed concern that increased engagement in agricultural trade may jeopardise food security in developing countries. They argue that this strong statement cannot be supported by demonstrating that engaging in agricultural trade is not, in general, associated with more hunger, however measured. This is not to say that particular groups may lose out and their food security may be compromised. Hence domestic policy reform and must accompany trade reforms to enhance the positive effects of trade and to cushion any negative impacts on the hungry.

Stamoulis and Broca explore the relationship between agricultural trade and food security using two measures of hunger: (i) the proportion of the population that is undernourished and (ii) underweight prevalence in children under 5 years of age. These two hunger indicators are plotted against a measure of trade openness -- agricultural trade as a proportion of agricultural GDP. The statistical relationship is shown by the line going through the data in Figure 6. Since changes in trade volumes impact food security with a lag, the trade openness measure is lagged by a 3-year period.

If it is true that engaging in agricultural trade is harmful to food security, then one would expect to find that countries where agricultural trade is relatively important to also have high proportions of their populations undernourished. Figure 6 suggests that this expectation is not borne out. Countries where agricultural trade is "important" tend to have lower levels of undernourishment. Likewise, Figure 7 suggests that in countries where agricultural trade is large in proportion to agricultural GDP, the proportion of underweight children tends to be lower. It is also possible that those countries most open to agricultural trade have implemented safety nets and policies to address potentially harmful impacts.

The variables are negatively correlated and the expansion of trade does not, in general, harm food security. However, this does not imply that increasing agricultural trade will necessarily cause an improvement in underweight prevalence in a particular country. There is also the possibility that both measures are driven by a common factor such economic development and the level of per-caput GDP.

The graphs present the correlation of hunger in one three year period with trade “importance” in the preceding three-year period because it is unlikely that undernourishment in one three-year period influences trade importance in the preceding three-year period and also to all for lags in the relationship between trade importance and hunger.

With food consumption continuing to account for a large share of total household expenditure in both urban and rural areas of LIFDC, the food security and trade linkages will remain high on the development agenda. To obtain benefits from more open domestic markets and greater access to international markets, companion policies, programmes and investments are needed to increase agricultural productivity, to improve product quality, and to raise competitiveness. Most importantly, the international development community and domestic policies need to ensure that those vulnerable individuals, households and groups disadvantaged by the initial impacts of trade reforms are identified and cushioned through well designed measures and safety nets. The international community must accept responsibility to assist those countries unable to provide adequate safety nets mechanisms.

References

- Anderson, K. (1995), 'Agricultural Competitiveness After the Uruguay Round', *Review of Marketing and Agricultural Economics*, **63**(3), 351-362.
- Anderson, K. (2003), 'Agricultural Trade Reform and Poverty Reduction in Developing Countries', *CIES Discussion Paper 0234*, Adelaide: CIES.
- Alexandratos, N. (1995), *World Agriculture Towards 2010, An FAO Study*, New York: John Wiley and Sons.
- Bautista, R. and A. Valdes (1993), *The Bias Against Agriculture*, San Francisco: ICS Press.
- FAO (2003a), *World Agriculture towards 2015/2030: an FAO Perspective*, J. Bruinsma ed., Rome: FAO.
- FAO (2003b), *WTO Agreement on Agriculture: The implementation experience, Developing country studies*, Rome: FAO.
- FAO (2003c), *State of Food Insecurity in the World*, Rome: FAO.
- FAO (2003d), *FAOSTAT Statistics on-line database*, Rome:FAO.
- Fukasaku, K. (2000), 'Special and differential treatment for developing countries: does it help those who help themselves?' *Working Paper No. 197*, Helsinki, UNU World Institute for Development Economics Research.
- Gersovitz, M. and C. H. Paxon (1990), *The Economies of Africa and the Prices of Their Exports*, Princeton: Studies in International Finance.
- Hertel, T.W., K. Anderson, J.F. Francois and W. Martin (2002), *Agriculture and Non-agricultural Liberalization in the Millennium Round*, in *Agriculture and the New Trade Agenda From a Development Perspective*, edited by M. D. Ingco and L. A. Winters, Cambridge and New York: Cambridge University Press, 2002.
- Husain, I. (1993), 'Trade, Aid and Investment In sub-Saharan Africa', *Policy Research Working Paper 1214*, Washington, D.C.: World Bank.
- Islam, N. (1995), *Population and Food in the Early Twenty-First Century: Meeting Future Food Demands of an Increasing Population*, Washington, D.C.: IFPRI.
- Johnson, D.G. (1973), *World Agriculture in Disarray*, London: Macmillan Press Ltd.
- Mathews, A. (2003), *A Review of Special and Differential Treatment in the WTO Agricultural Negotiations*, COM/AGTR/TD/WP(2003)3, Paris: OECD.
- Michalopoulos, C. (1999), Developing Country Goals and Strategies for the Millennium Round, *Policy Research paper 2147*, Washington, DC: World Bank.
- Michalopoulos, C. (2000), *Trade and development in the GATT and WTO: The Role of Special and Differential Treatment for Developing Countries*, Washington, DC: World Bank.
- Pinstrup-Anderson, P., R. Pandya-Lorch, and M. W. Rosegrant (1997), *The World Food Situation: Recent Developments, Emerging Issues, and Long-Term Prospects*, Washington, DC: IFPRI.
- Rosegrant, M. and C. Ringler (1997), Environmental and Resource Policies: Implications for Global Food Markets, *Paper presented at the 41st Annual Conference of the Australian Agricultural and Resource Economics Society*, January 20-24, 1997, Pan Pacific Hotel Gold Coast.

Sadoulet, E. and A. de Janvry (1995), *Quantitative Development Policy Analysis*, Baltimore: Johns Hopkins University Press.

Stamoulis, K. (1995), *Agricultural Development in the Economy-wide Context: Approaches to Policies and Strategies*, in N. Alexandratos, ed., *World Agriculture Towards 2010, An FAO Study*. New York: John Wiley and Sons.

Valdes, A. (2003), Supply-Based Food Security At The National Level, *Draft report for ROA Project, Module 4*, Rome: FAO.

Valdes, A. and P. Konandreas (1981), *Assessing Food Security Based on National Aggregates in Developing Countries*, in *Food Security for Developing Countries*, edited by A. Valdes. Boulder: Westview Press.

Whalley, J. (1999), Special and differential treatment in the Millenium Round, *World Economy*, **22**(8), 1065-1093.

World Bank (1992), *Price Prospects for Major Primary Commodities*, Washington, DC: The World Bank.

World Bank (2000), *World Development Indicators 2000 on CD-Rom*, Washington DC: The World Bank.

World Bank (2002), *World Development Indicators 2002 on CD-Rom*, Washington DC: The World Bank.

Table 1: Food Security Indicators by Developing Region

Region	East & S. East Asia	Latin America & Caribbean	Near East & North Africa	South Asia	Sub- Saharan Africa	All developing regions
Number undernourished (millions)						
1990-92	292	59	26	276	166	818
1998-2000	193	55	40	315	196	799
Percentage undernourished						
1990-92	16	13	8	26	35	20
1998-2000	10	11	10	24	33	17
DES (Kcal/day/person)						
1990-92	2656	2710	3010	2330	2120	2540
1998-2000	2930	2820	2940	2390	2210	2670
Share of starchy food in total DES (Percentage)						
1990-92	74	45	62	68	70	67
1998-2000	67	44	61	65	69	63
Life expectancy at birth in years, female/male						
1990-92	69/66	71/65	66/64	60/59	52/49	65/62 ⁶
1996-98	71/67	73/67	69/66	63/62	52/49	67/63
Under 5 mortality rate, per 1,000						
1990-92	55	49	72	121	155	91 ⁷
2000	45	37	54	96	162	84

Source: FAO, 2003d; World Bank, 2000 and 2002.

⁶ Average for low and middle income countries (World Bank definition)

⁷ Average for low and middle income countries (World Bank definition)

Table 2: Net food imports value (million US\$)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CHINA												
cereal	1799	554	194	-507	-270	3461	2223	-395	-857	-666	-1100	-468
meat	-732	-847	-508	-585	-803	-1253	-1262	-1156	-1009	-597	-674	-927
dairy	26	11	4	-6	23	-1	-20	-21	9	88	132	141
sugar	149	136	-365	-485	87	710	145	96	16	7	32	257
oils, fats and oilseeds	246	-136	-42	-100	717	1753	1180	1607	2108	2386	3427	3418
total	1488	-283	-716	-1682	-245	4671	2266	132	267	1218	1817	2421
INDIA												
cereal	-243	-368	-81	-366	-420	-1634	-1131	-652	-1228	-514	-781	-1070
meat	-78	-93	-97	-110	-127	-192	-195	-215	-186	-187	-324	-262
dairy	0	2	9	-1	-5	6	-31	-23	-10	17	-34	-68
sugar	-7	-50	-129	-54	711	-55	-235	62	263	254	-89	-375
oils, fats and oilseeds	-14	-7	50	-113	0	338	479	356	1649	1529	966	1189
total	-343	-515	-248	-644	161	-1537	-1113	-472	487	1099	-263	-587
LIFDC COMM												
cereal	993	1054	1132	1191	1374	1283	1387	1493	1759	1450	1573	1896
meat	64	110	91	9	-30	28	50	95	111	147	128	115
dairy	275	346	305	302	240	280	269	277	334	326	316	345
sugar	-4365	-2423	-1335	-835	-739	-730	-1088	-1011	-675	-470	-521	-694
oils, fats and oilseeds	291	257	232	183	227	326	235	212	299	399	240	232
total	-2742	-657	425	850	1071	1188	853	1066	1829	1851	1736	1894
LIFDC NET												
cereal	4924	4207	5030	4948	4854	7337	8267	6299	7412	7560	7172	5796
meat	415	400	454	450	503	543	593	590	573	621	712	501
dairy	1226	1141	1291	1355	1219	1791	1723	1608	1514	1701	1682	1539
sugar	1065	969	813	744	789	1392	1864	1727	1410	1319	1768	1576
oils, fats and oilseeds	844	925	912	1153	429	1185	1468	102	1080	1441	1131	759
total	8475	7642	8500	8650	7794	12249	13916	10325	11990	12642	12465	10171
LIFDC TOTAL												
cereal	7474	5448	6275	5266	5539	10447	10746	6745	7086	7829	6865	6154
meat	-331	-429	-60	-235	-457	-874	-813	-686	-511	-17	-158	-573
dairy	1527	1500	1610	1651	1478	2075	1942	1841	1847	2132	2096	1956
sugar	-3159	-1369	-1016	-631	847	1317	686	874	1015	1110	1189	764
oils, fats and oilseeds	1366	1038	1152	1123	1374	3603	3362	2277	5136	5755	5764	5597
total	6877	6187	7961	7174	8781	16569	15922	11050	14573	16810	15756	13899

Source: FAO, 2003d.

Notes: LIFDC COMM stands for LIFDCs which are single commodity exporters.

LIFDC NET includes LIFDCs not belonging to LIFDC COMM nor being China and India.

LIFDC TOTAL comprises LIFDC COMM, LIFDC NET, China and India.

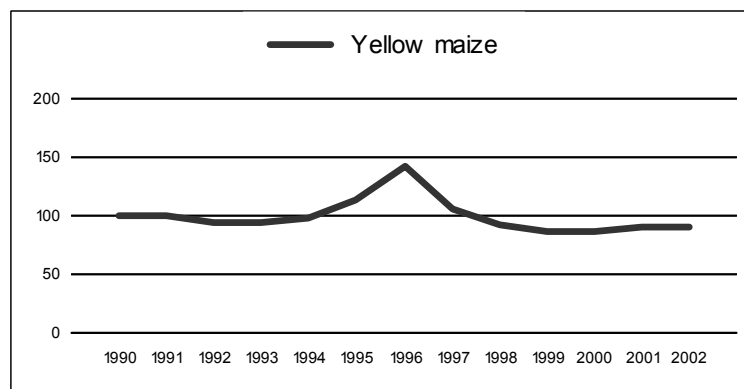
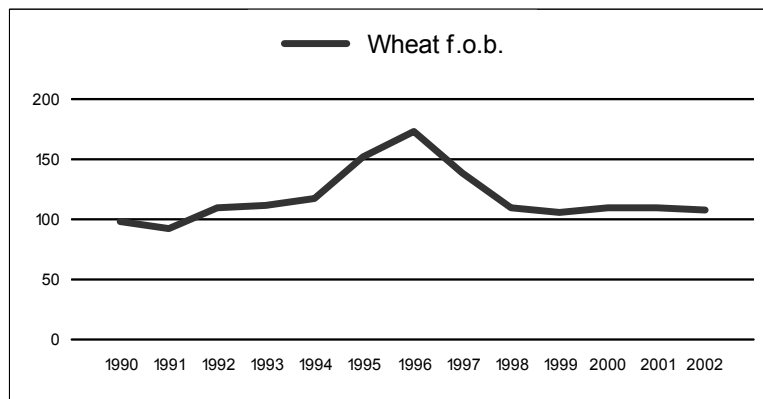
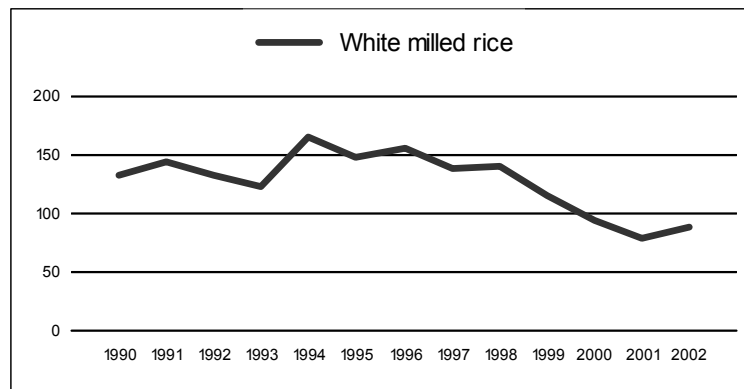
Table 3 Food Security Status Assessment of LIFDC

LIFDC group	Availability			Access	Stability	
	Per capita food consumption 1999-01 kcal/person/day	Percentage change in per capita food consumption 1988/91 to 1999/01	Percentage change in per capita food consumption 1996/98 to 1999/01	Incidence of undernourishment	Coefficient of variation of food consumption*	Probability of a shortfall in consumption below 95% of trend for 1980-2001
Single commodity dependent exporters (23 countries)	2314	2.7	1.7	36% 106 million persons	8.5	21.9%
Non-commodity dependent LIFDC (49 countries)	2285	3.0	3.1	22% 249 million persons	5.2	14.5%
China	2972	12	0.8	9% 119 million persons	2.2	1.0%
India	2493	7.6	1.2	24% 233 million persons	3.6	8.3%
All LIFDC	2317	3.0	2.1	19% 709 million persons	6.1	16.6%

Source: Calculations based on FAO data (FAO, 2003d).

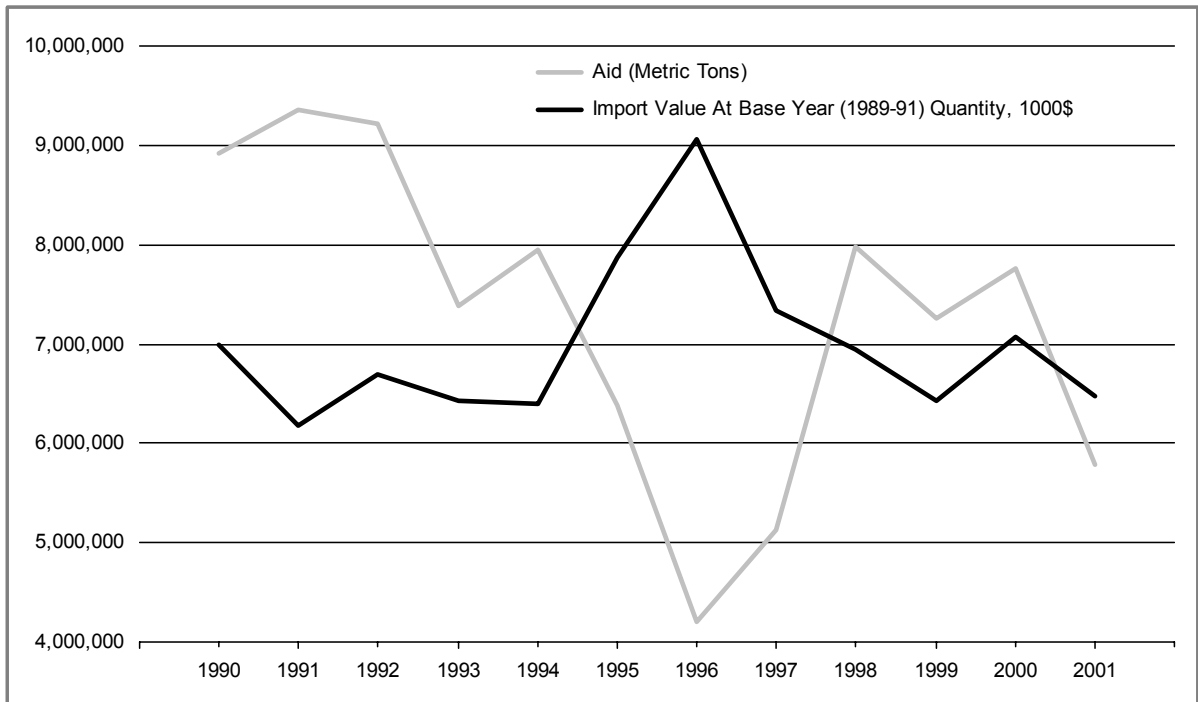
* Standard deviation of the variable $100 * (C(t) - C(t)_{trend}) / C(t)_{trend}$.

Figure 1: Real Prices Trends for Rice, Wheat and Maize



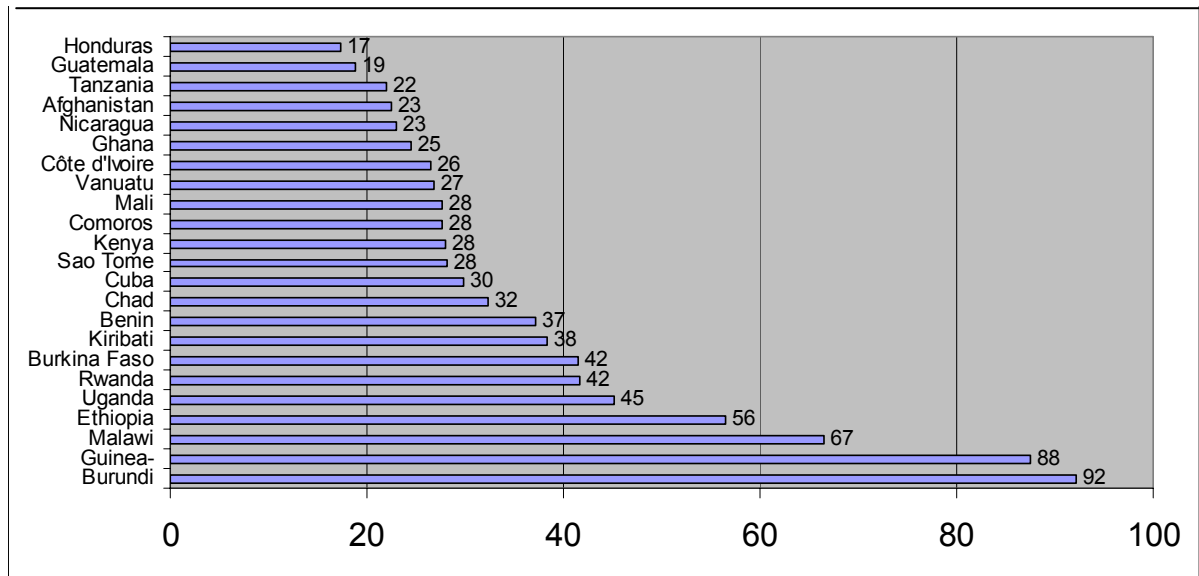
Source: FAO, 2003d.

Figure 2: Cereal Aid and Prices



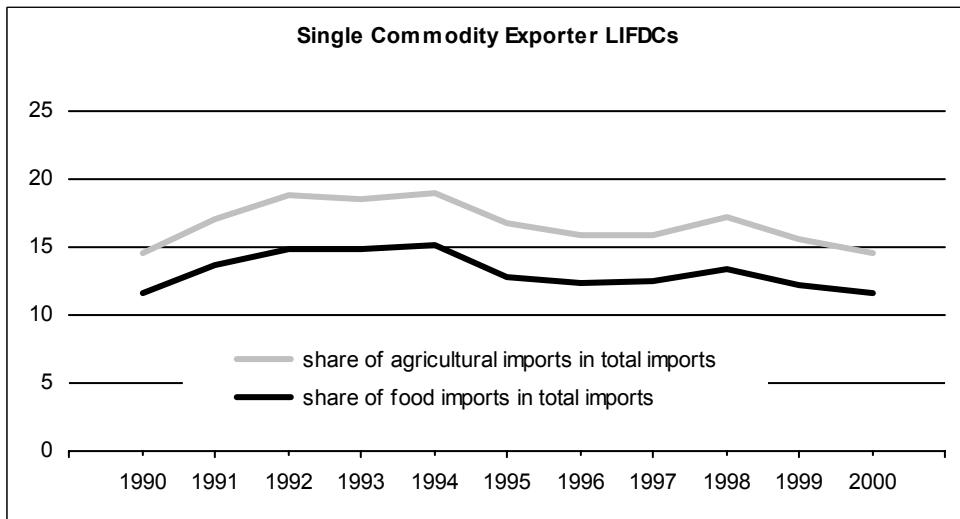
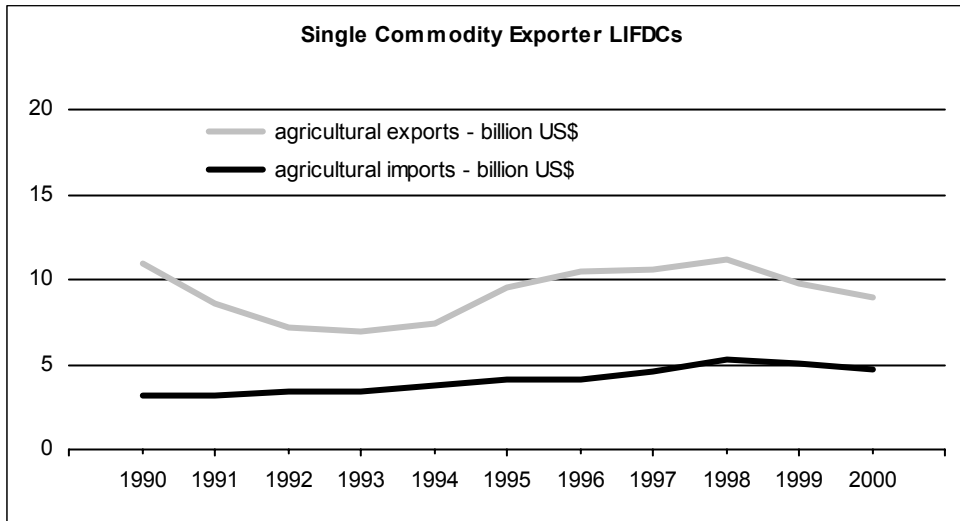
Source: FAO, 2003d

Figure 3: Dependence on a single agricultural export product 1999-2001: percentage of merchandise export earnings



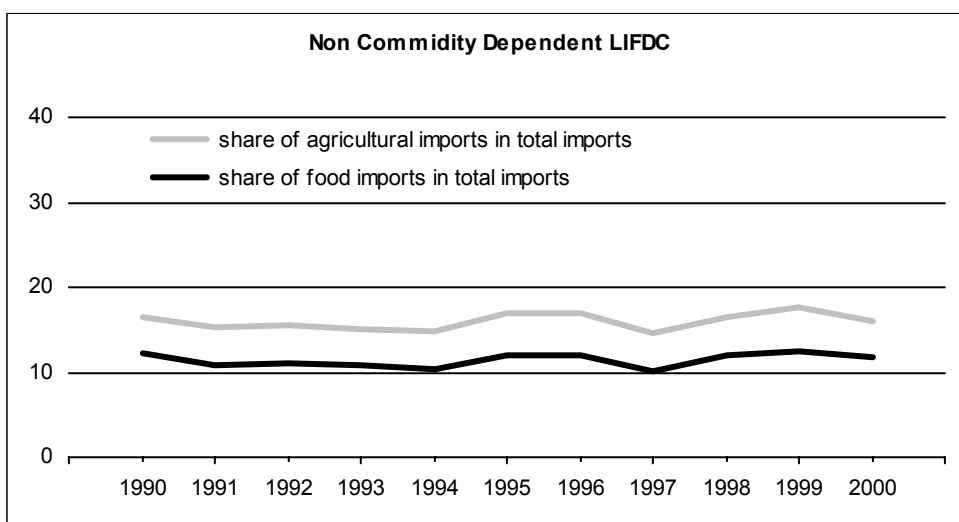
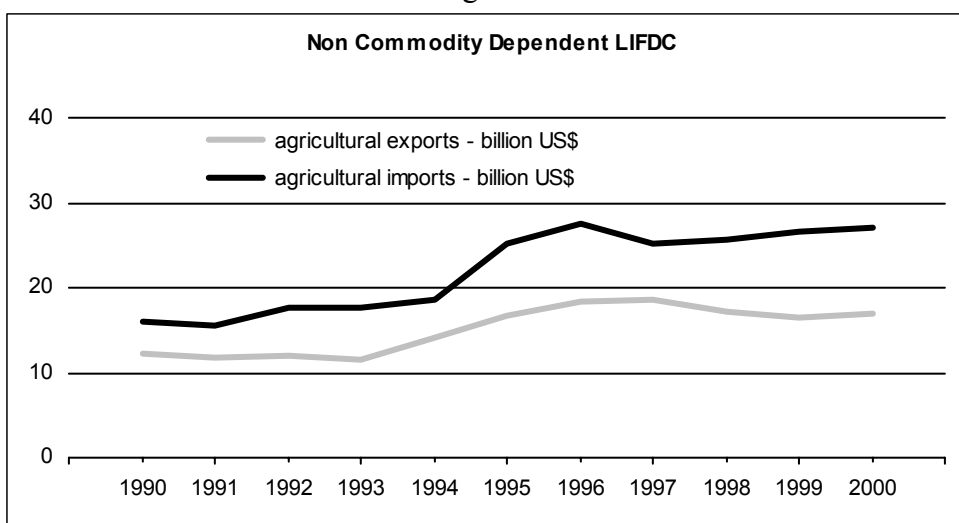
Source: FAO, 2003d.

Figure 4



source: FAO, 2003d.

Figure 5



source: FAO, 2003d.

Figure 6

Percentage undernourished plotted against ratio of agricultural trade to agricultural GDP

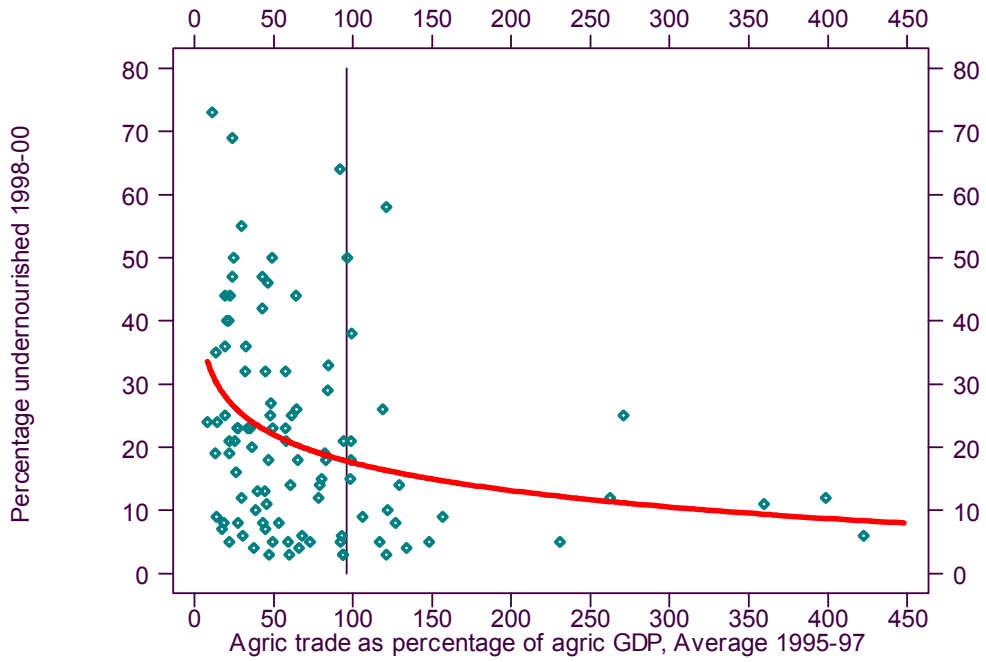
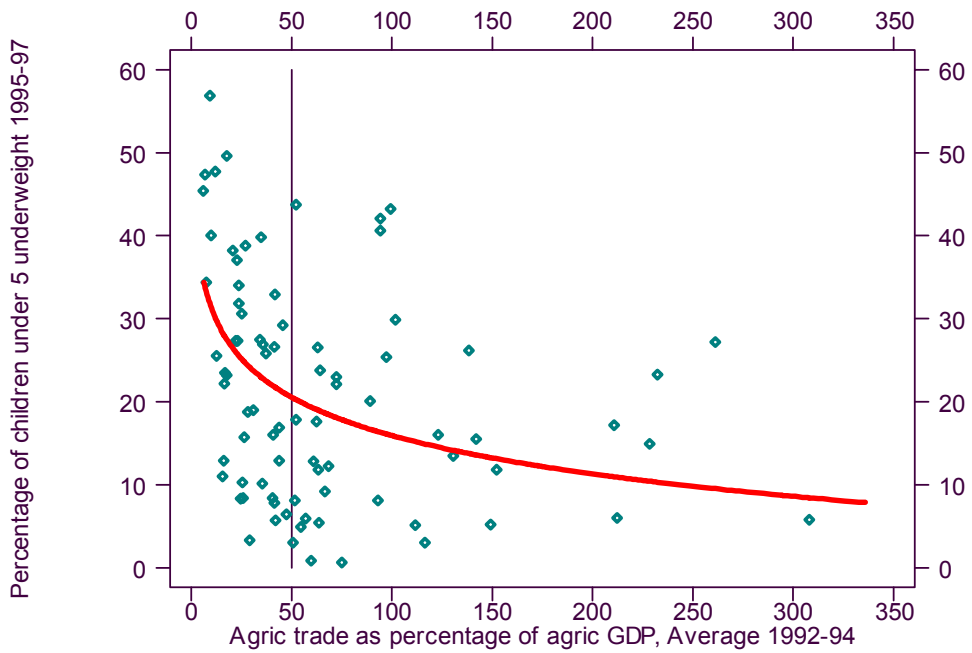


Figure 7

Underweight prevalence plotted against ratio of agricultural trade to agricultural GDP



Source: FAO, 2003d.

Annex 1: The Low Income Food Deficit Countries

Group	Country
	China
	India
<i>Single Commodity Dependent</i>	Afghanistan, Benin, Burkina Faso, Burundi, Chad, Comoros, Côte d'Ivoire, Cuba, Ethiopia, Ghana, Guatemala, Guinea-Bissau, Honduras, Kenya, Kiribati, Malawi, Mali, Nicaragua, Rwanda, Sao Tome and Principe, Tanzania, Uganda, Vanuatu
<i>Non-Commodity Dependent</i>	Angola, Bangladesh, Bhutan, Bolivia, Cambodia, Cameroon, Cape Verde, Central African Republic, Congo, Dem Republic of, Congo, Republic of, Djibouti, Ecuador, Egypt, Equatorial Guinea, Eritrea, Gambia, Guinea, Haiti, Indonesia, Korea, Dem People's Rep, Laos, Lesotho, Liberia, Madagascar, Maldives, Mauritania, Mongolia, Morocco, Mozambique, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Senegal, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Togo, Tuvalu, Yemen, Zambia

WTO's Net Food-Importing Developing Countries – NFIDCs

Barbados, Botswana, Côte d'Ivoire, Cuba, Dominican Republic, Egypt, Honduras, Jamaica, Kenya, Mauritius, Morocco, Pakistan, Peru, Saint Lucia, Senegal, Sri Lanka, Trinidad and Tobago, Tunisia, Venezuela

Annex 2: Methodology for determining the probability of apparent consumption falling below some critical level

Following Sadoulet and De Janvry (1995) the probability that national consumption falls below a certain percentage α (in our case: $\alpha = 95\%$) of its long term trend is: $\Pr(C < \alpha \hat{C}_t)$ where \hat{C}_t is the estimated trend consumption. This probability can be estimated by historical data assuming that the error term u_t is normally distributed around the regression line. Under this hypothesis:

$$\Pr(C < \alpha \hat{C}_t) = \Pr\left[\frac{C - \bar{C}}{\sigma_c} < -\left(\frac{\bar{C} - \alpha \hat{C}_t}{\sigma_c}\right)\right] = \Pr\left[u = \frac{C - \hat{C}_t}{\hat{C}_t} < -(1 - \alpha)\right] = \Pr\left[\frac{u}{\mathbf{I}_c} < \frac{-(1 - \alpha)}{\mathbf{I}_c}\right] = 1 - F_{(1-\alpha)/\mathbf{I}_c}$$

where: $\mathbf{I}_c = \frac{\sigma_c}{\bar{C}}$ and $\mathbf{F}(\cdot)$ is the standard normal distribution.

Specifically we regress apparent consumption on a non-linear time trend:

$$C_t = a_0 + a_1 t + a_2 t^2 + u_t$$

We bootstrapped both the coefficients a_0 and a_1 . Then we worked on the estimated residuals:

$$\hat{u}_t = \begin{cases} = C_t - \hat{a}_0 - \hat{a}_1 t - \hat{a}_2 t^2 & \text{if both the estimated coefficients were statistically different from zero at 5\% level} \\ = C_t - \bar{C} & \text{otherwise} \end{cases}$$

where \bar{C} represents mean apparent consumption over the time horizon. The assumption of normal distribution for residuals means that we are working on a presumption of symmetry. This implies that for example a 10% probability of shortfall on one side is accompanied by a 10% probability of consumption in excess of 105% of trend.

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