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"If you're hungry you get angry quicker."

(WFP analyst,on Senegal's food riots)

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Special feature

Beyond the Food Crisis: Trade, Aid and Innovation in African Agriculture

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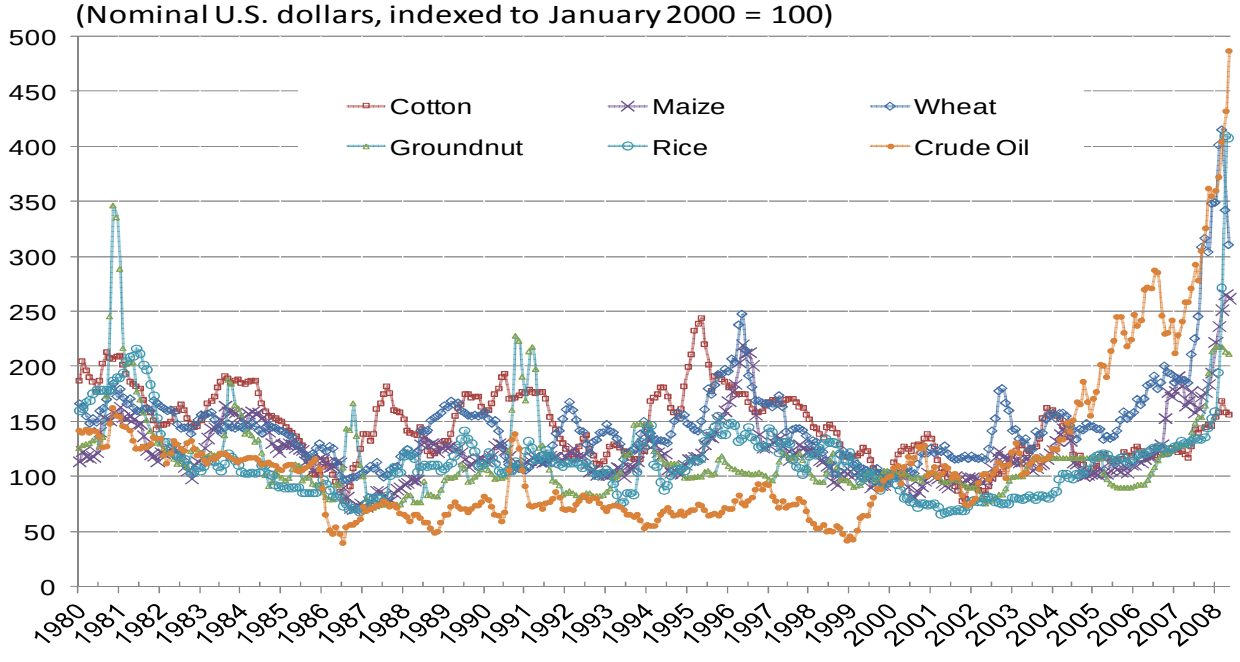
Abstract

The world food crisis of 2007-08 has hit hard in Africa, which is the region of largest cereal-grain imports per capita in the world. This paper helps document the crisis and the way forward with new data on food prices, production and trade at the aggregate and household level, focusing particularly on the influence of Africa's own agricultural policies and the role of foreign aid. Despite twenty years of steadily declining agricultural aid per capita in Africa, the continent's production of cereal grains per capita has grown rapidly and is now catching up to South Asian levels. The price rise plus continued improvements in trade policy could help accelerate this trend, particularly if combined with interventions to recognize and scale up the new technologies now being adopted by African farmers.

Beyond the Food Crisis: Trade, Aid and Innovation in African Agriculture

A rapid rise in food prices causes great hardship. Although many people are net food sellers who benefit from higher prices, on balance the world's poor are harmed: one estimate suggests that the price increases from 2005 to 2007 pushed about 100 million people below the dollar-a-day poverty line (Ivanic and Martin 2008). By June 2008, all major aid institutions had published preliminary analyses of the food crisis, such as FAO (2008), IFPRI (2008) and World Bank (2008). We will not repeat their arguments here, but focus on new data to document the unfolding tragedy in the aggregate (section 1) and at the household level (section 2), before turning to the role of African government policies (sections 3), foreign aid (section 4), and technological innovation (section 5).

Figure 1.
Monthly Prices of Select Commodities on World Markets, Jan. 1980 - May 2008
(Nominal U.S. dollars, indexed to January 2000 = 100)



Source: Author's computation, from IMF data (www.imf.org/external/data.htm).

Figure 1 shows the emergence of the crisis, month by month, in nominal U.S. dollar prices for key products on world markets. After the last commodity price spike in 1973-74, prices declined steadily for most of the 1980s. From about 1996 to 2001 food prices were generally falling, but in 2002 when oil prices started their meteoric rise food prices followed, particularly for rice and wheat but also for maize, groundnuts and cotton.

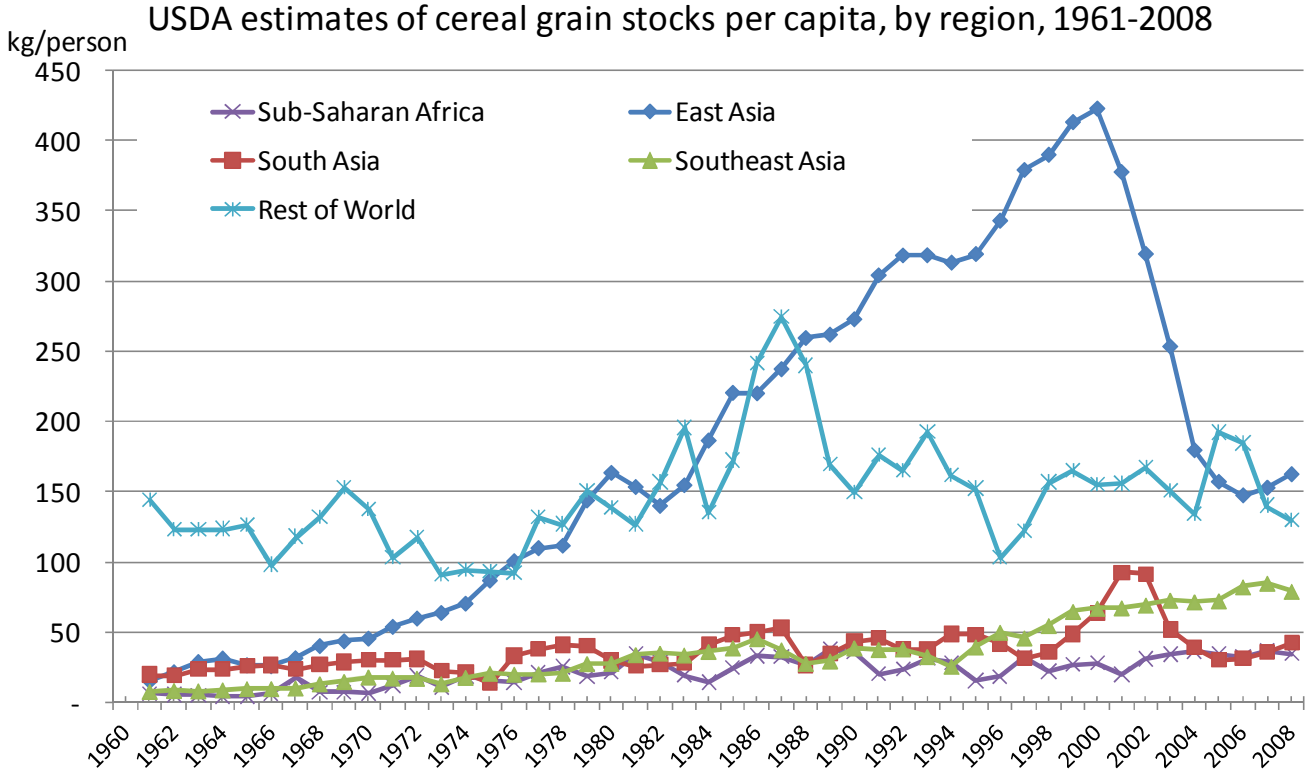
1. Behind the food crisis: stocks, production and trade

As shown in Figure 1, the food price spike of 2007-08 dramatically worsened a trend that began around 2002. But why did prices rise so fast? Normally, short-term shocks to supply and demand are absorbed by stocks, but as shown in Figure 2 a sharp draw-down of the previously massive stocks left the world with very little cushion from 2005 onwards.

Since 2005, world cereal grain markets have been operating with almost no shock absorber, in a state of unusual sensitivity to short-term changes in either supply or demand. Demand growth due to dietary changes and biofuels clearly played some role as argued elsewhere (e.g. Runge and Senauer 2008), but here we focus on the supply-side story illustrated in Figures 3 and 4: per-capita production of cereal grains fell sharply in South Asia in 2001, on top of earlier declines in East Asia since 1999. In the rest of the world, previously rapid output growth had ended around 1991, and after a rise in 2005 fell sharply in 2006 and 2007. This is primarily due to yield rather than area changes.

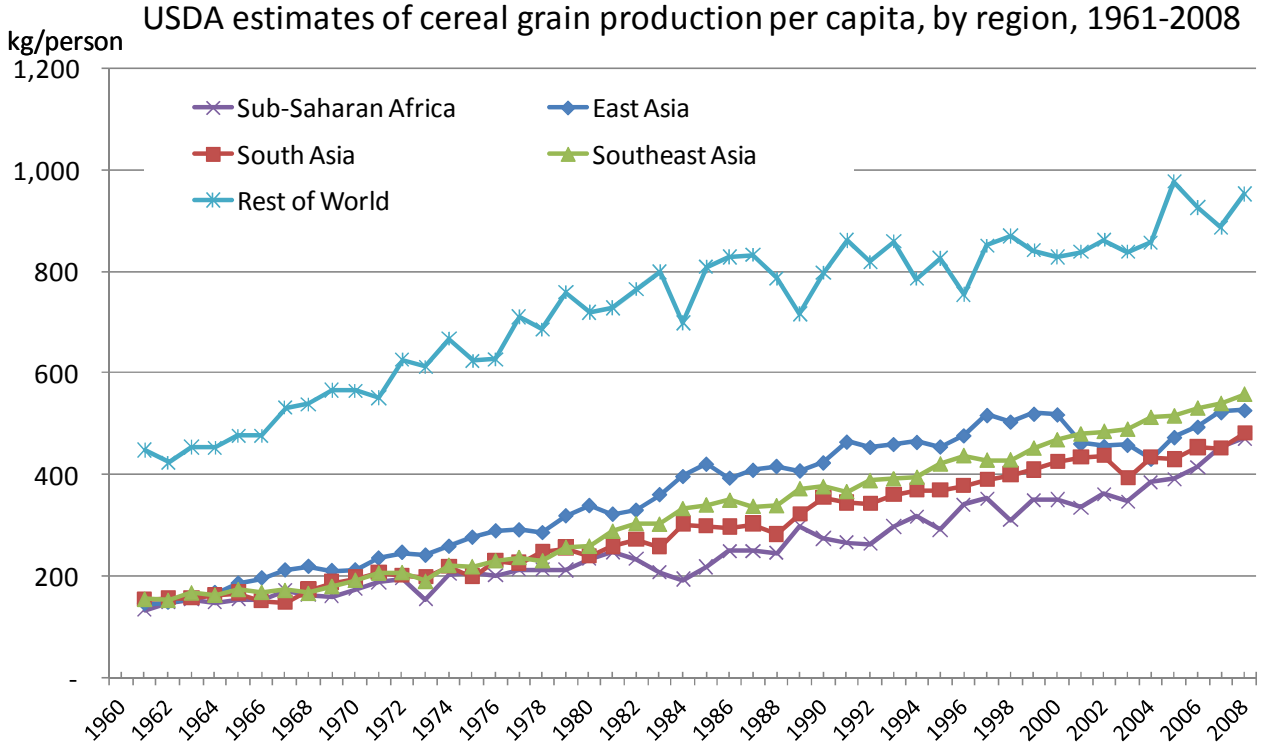
A remarkable aspect of the data shown in Figures 3 and 4 is the steady rise of cereal grain yields in Africa over the past decade, which combined with steady growth in cropped area has sustained 25 years of growth in cereals output per capita in Africa, catching up to South Asia

Figure 2.
USDA estimates of cereal grain stocks per capita, by region, 1961-2008



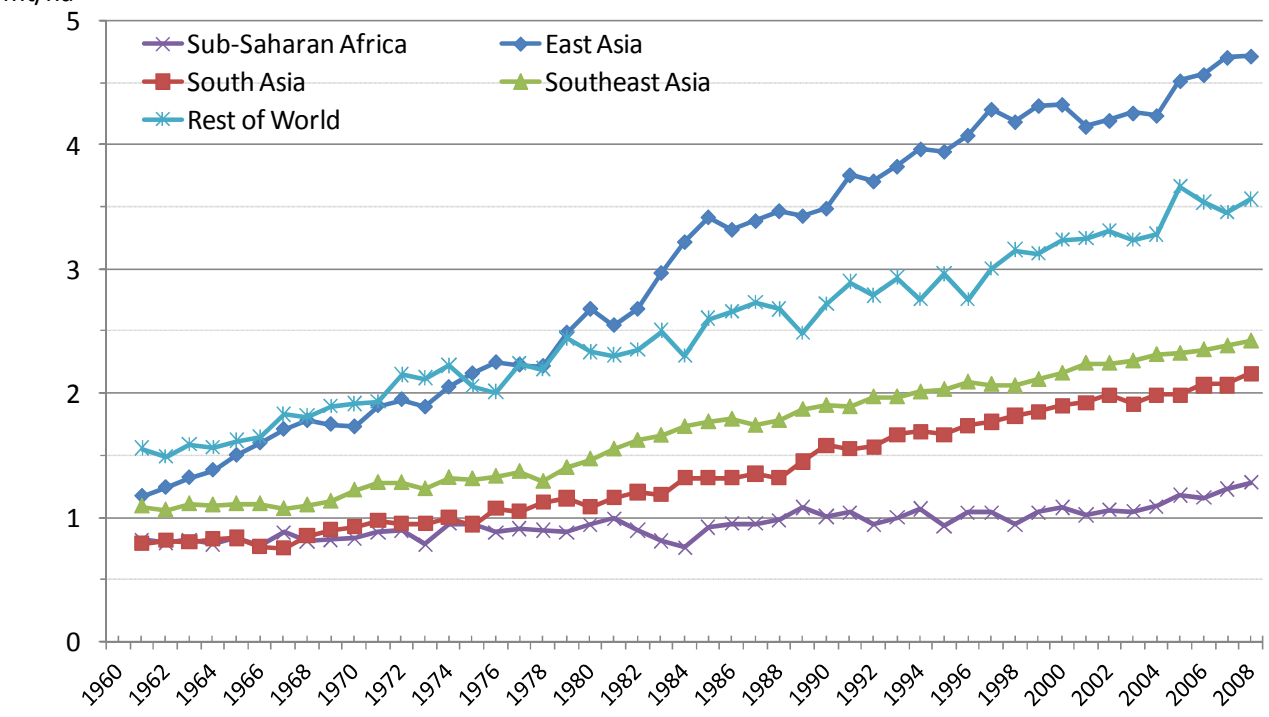
Source: Author's calculations. Grain stock estimates are for the end of the marketing season in the year shown, from USDA PS&D database (www.fas.usda.gov/psdonline), matched with mid-year population estimates from US Census Bureau, International Database (www.census.gov/ipc/www/idb).

Figure 3.
USDA estimates of cereal grain production per capita, by region, 1961-2008



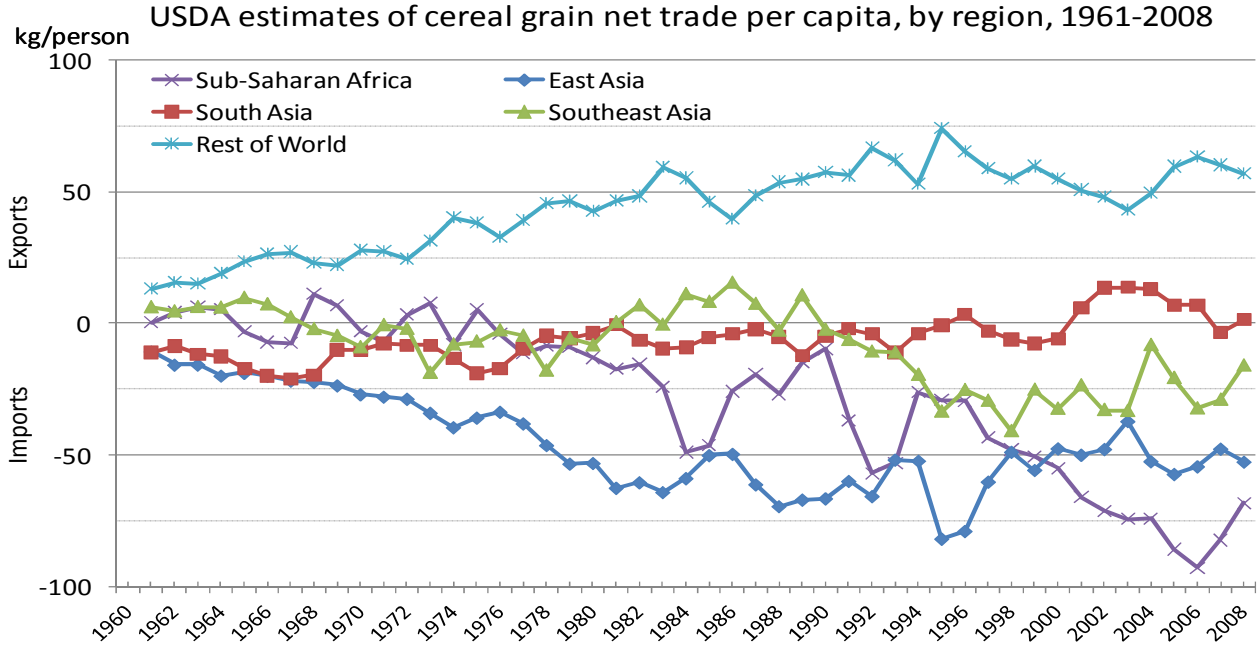
Source: Author's calculations. Grain production estimates are for the country's harvest in the year shown, from USDA PS&D database (www.fas.usda.gov/psdonline), matched with mid-year population estimates from US Census Bureau, International Database (www.census.gov/ipc/www/idb).

Figure 4.
USDA estimates of cereal grain average yield, by region, 1961-2008



Source: Author's calculations, from grain production and area estimates for harvests in the year shown, from USDA PS&D database (www.fas.usda.gov/psdonline), matched with mid-year population estimates from US Census Bureau, International Database (www.census.gov/ipc/www/idb).

Figure 5.
USDA estimates of cereal grain net trade per capita, by region, 1961-2008



Source: Author's calculations. Data are for standard trade years over a 12-month season ending in the year shown, from USDA PS&D database (www.fas.usda.gov/psdonline), matched with mid-year population estimates from US Census Bureau, International Database (www.census.gov/ipc/www/idb).

in 2007 at a level of about 450 kg per person. Despite these increases in African production, consumption has increased even more and Africa has been an increasingly large net importer of cereal grains since the 1970s. As shown in Figure 5, Africa's imports per capita have grown sharply since 1990, and since 2001 Africa has imported more cereal grain per capita than any other region.

The large net imports shown in Figure 5 make price increases for cereal grains especially costly for Africa. As detailed by Ng and Aksoy (2008), Africa is a net exporter of other agricultural commodities and of farm products generally, but the increasing prices of imported cereal grains relative to cotton, groundnuts and other exports as illustrated in Figure 1 is clearly unfavorable for Africa as a whole.

2. Household-level impacts of price changes

There is surprisingly little data on vulnerability to higher food prices at the individual level. The Ivanic and Martin (2008) paper cited at the start of this paper aims to take account of changes in both food expenditure and household income. The three African cases they examined were Madagascar, Malawi and Zambia, where they estimate that the 2005-07 increase in prices of major foods caused increases in the population under dollar-a-day poverty of 3.6%, 4.0% and 4.9% respectively (Ivanic and Martin 2008, Table 5). This is consistent with the incidence of food price changes found by crop-specific studies such as Levinsohn and McMillan (2005) for wheat in Ethiopia or McMillan et al. (2005) for maize in Mexico.

Price increases may worsen poverty, but some poor people do benefit from them. After all, most Africans are farmers. Table 1 provides data from three major surveys on how many Africans actually participate in food production and sales, thus potentially gaining from higher prices. A large majority of people in all three countries produce some food, but a smaller share produce the staple food and less than half are net sellers.

Comparing the third and fourth rows of the total-population columns in Table 1 reveals that the poor are generally more likely to be net sellers of food, mainly because they are more likely to be farmers. Among farmers, however, poorer households tend to be those with

less land and other productive resources per person, and so have relatively little to sell. Production also varies significantly from year to year, further clouding the picture. Figure 6 summarizes the data from consecutive surveys in the Kagera region of Tanzania, where most farmers are net sellers, showing a clear positive correlation between the magnitude of net sales and the household's real income, as measured by consumption expenditure per capita in that year. Poorer farmers sell less, and the poorest are sometimes net buyers – particularly in a year of unfavorable weather, such as 1992-93, when the whole curve shifts down as people produce and sell less.

3. African governments' agricultural policies

The prices received by farmers depend on government policies as well as market conditions. Here, we present results of a remarkable new study of policy choices across 16 African countries from 1960 through 2004, conducted as part of a worldwide project on agricultural incentives led by Kym Anderson and others at the World Bank. The full dataset is forthcoming as Anderson et al. (2008a), and follows a methodology detailed in Anderson et al. (2008b). Details on the results for Africa are forthcoming in Anderson and Masters (2008). Here, we provide only the simplest summary of the data, with government intervention measured as the tariff-equivalent difference between domestic prices and international opportunity costs, after adjusting for transaction costs. National consultants were employed to obtain these estimates, often from unpublished file data, for each of a country's major agricultural commodities by year. The project produced more than 6,000 observations of this Nominal Rate of Assistance (NRA) in Africa.

Figure 7 shows the evolution over time of product-level NRAs, first for all products (left panel) and then separately for importable and exportable products (right panel). An NRA of zero implies that government allows competitive pricing; an NRA below zero implies farmers are taxed to benefit consumers and/or taxpayers, whereas an NRA above zero implies that farmers are

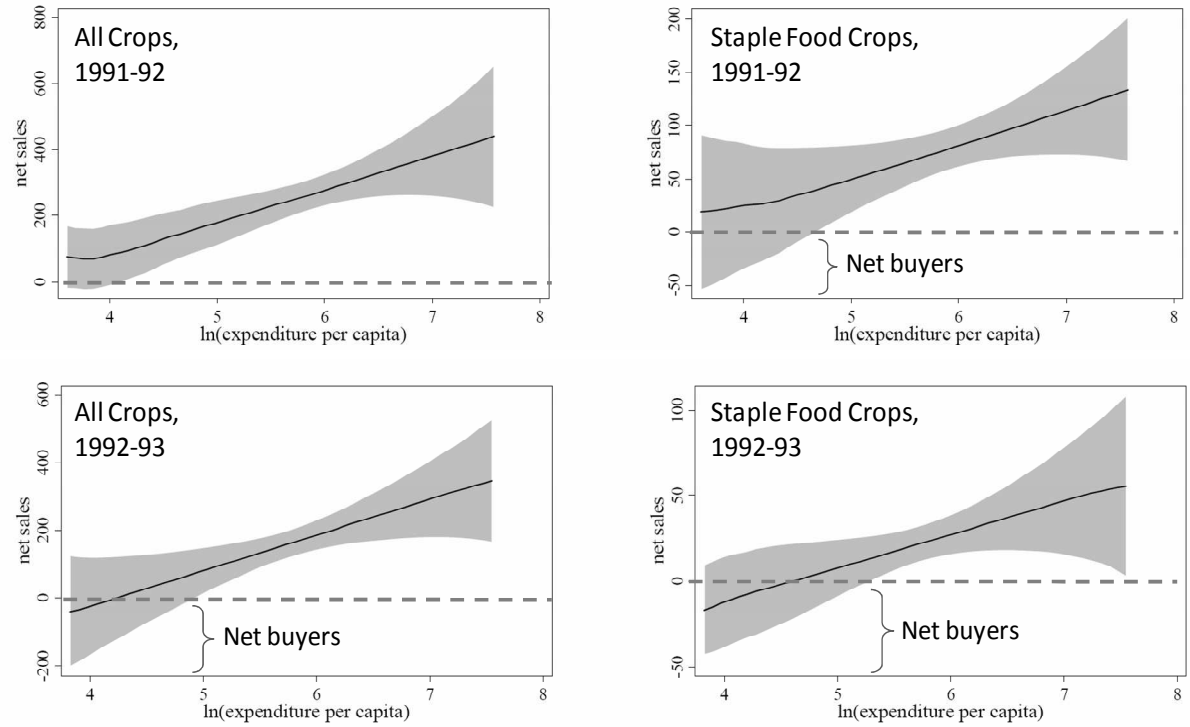
Table 1. Proportion of households who produce, sell or are net sellers of food, 1998-2001

		Ethiopia (2000)		Madagascar (2001)		Zambia (1998)	
		Total	Rural	Total	Rural	Total	Rural
Rural population (% of total)		50.7		75.8		47.8	
All foods							
producers	(% of all hhlds)	78.1	97.0	71.2	83.1	66.5	89.4
sellers	(% of all hhlds)	68.4	87.9	58.1	68.5	36.7	53.9
net sellers	(% of all hhlds)	40.6	53.2	41.4	49.1	7.9	12.6
net sellers	(% of poor hhlds)	44.3	51.5	54.5	56.2	10.6	12.5
Main staple foods							
producers	(% of all hhlds)	55.4	71.5	64.4	75.7	47.5	69.5
sellers	(% of all hhlds)	28.5	36.9	35.1	41.7	28.8	42.5
net sellers	(% of all hhlds)	23.1	27.3	31.7	37.6	19.1	29.6
net sellers	(% of poor hhlds)	21.8	24.3	41.0	42.7	23.9	28.1

Note: Poor households are defined as the lowest 40% of income per capita; staple crops are wheat and maize (Ethiopia), rice, maize, groundnut and beans (Zambia) and rice and maize (Madagascar).

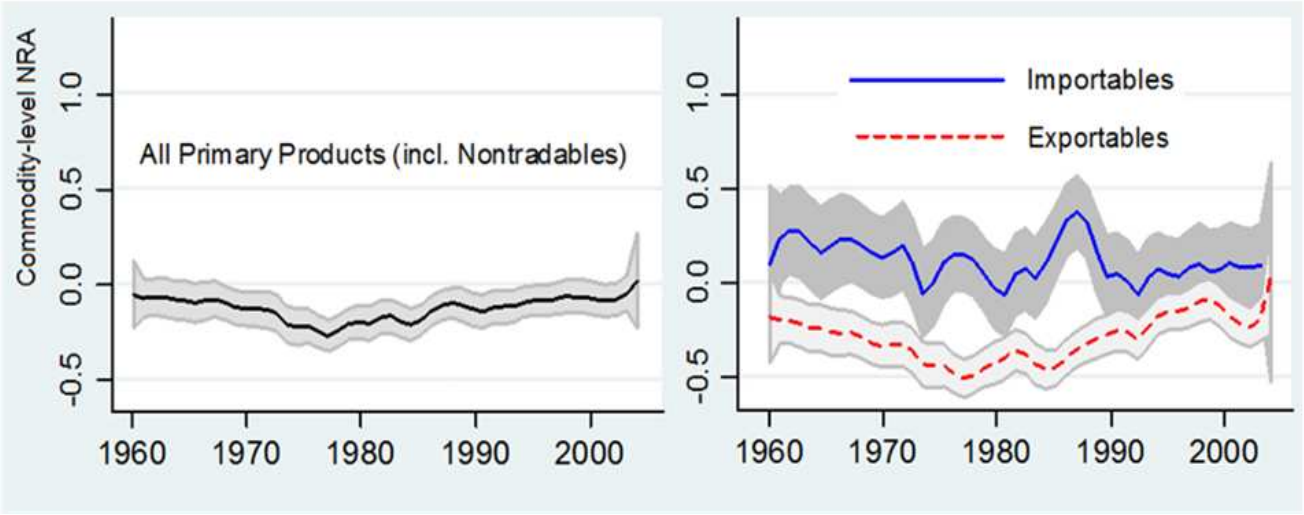
Source: Data shown are compiled from M.A. Aksoy and A.Isik-Dikmelik (2008), "Are Low Food Prices Pro-Poor? Net Food Buyers and Sellers in Low-Income Countries" Policy Research Working Paper 4642. Washington, DC: The World Bank, June 2008 (30 pages).

Figure 6.
Farm household net crop sales in Tanzania, by income level



Note: Lines shown summarize the value-weighted NRA for all agriculture in 16 African countries and 52 other countries, observed in each year from 1960 through 2005 and smoothed over per-capita income with 95% confidence intervals around a local polynomial regression.
Source: Author's computation from preliminary file data collected for the World Bank. Final data will be available in late 2008 at www.worldbank.org/agdistortions, and forthcoming in K. Anderson and W.A. Masters (2008), *Distortions to Agricultural Incentives in Africa*. Washington, DC: World Bank.

Figure 7.
Average NRA by type of product in Africa over time, 1960-2005



subsidized at the expense of consumers and/or taxpayers. Clearly, African government policies imposed an increasingly heavy burden on farmers from 1960 to the late 1970s, particularly through taxation of exportable products. After 1985 that tax burden was gradually lifted, and the domestic prices of these products rose and has been at nearly free-trade levels since the late 1990s.

The historical increase and then decrease in African governments' taxation of exportable crops coincided with stagnation and then recovery in cereal-grains production. It may be that farmers' earnings from exportables helped them finance input purchases for food products – future research using these data is needed to investigate whether one caused the other, when controlling for other factors. Here, we note only that African governments' agricultural trade policies are not chosen arbitrarily: governments in countries that are poor for whatever reason generally impose heavy taxes on farmers, as a result rather than a cause of their poverty.

Figure 8 illustrates the link between agricultural policy and national income, using 95% confidence intervals to show variation in the data around a local polynomial regression. Governments in countries whose income falls below about $1,000 in PPP terms tend to tax their farmers, while governments in countries above about $7,000 in PPP terms provide increasingly large subsidies. The data show slightly more taxation of farmers in Africa than elsewhere at intermediate income levels, which Masters and Garcia (2008) explain in terms of factors such as land abundance and alternative targets for taxation.

4. Foreign aid to Africa

Local governments, business enterprises, farmers and consumers drive the evolution of African agriculture, but foreign aid donors also have a role to play. Figure 9 shows the magnitude and allocation of official development assistance (ODA) from all donors to all African countries, as compiled by the OECD's Development Assistance Committee (DAC), per person in Africa. The top line on the right axis shows total ODA per capita, which more than doubled in real terms from 1973 to 1990, before falling back during the 1994-2001 period and then more than doubling again from 2002 to 2006. The sectoral allocation of this aid is shown on the left axis: agriculture was an increasingly important target

Figure 8.
Average country-level NRAs in Africa and the rest of the world, by income level

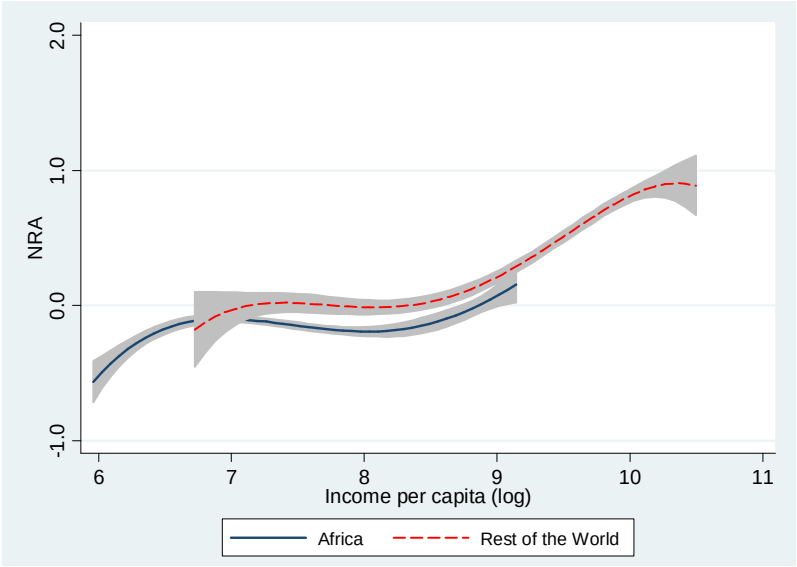
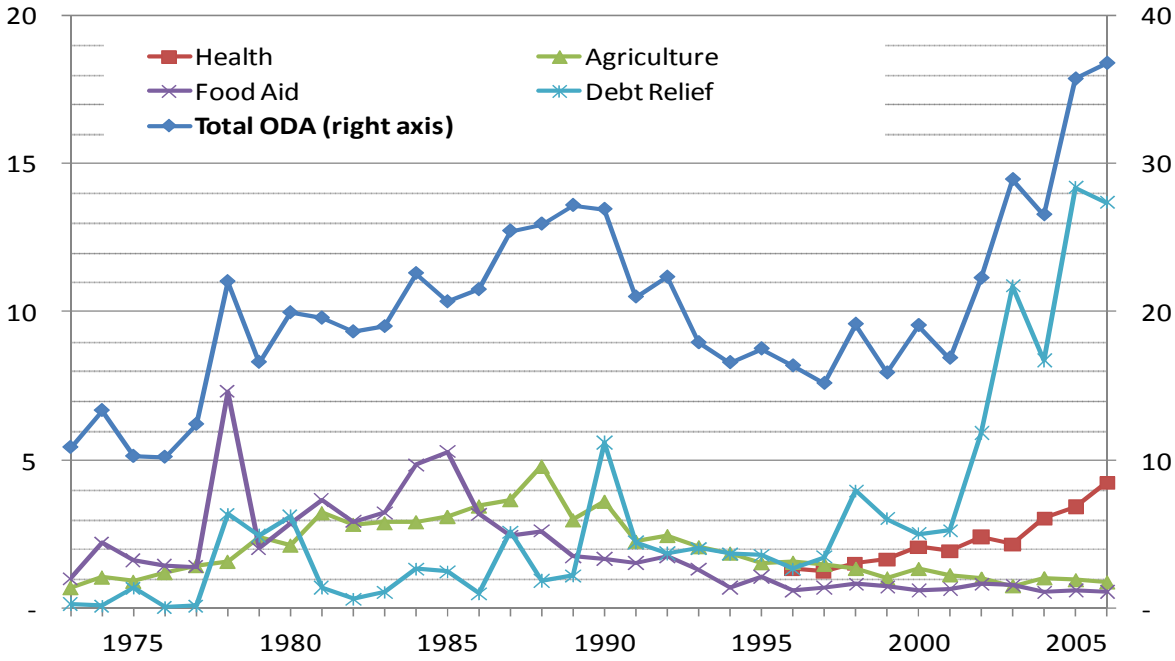


Figure 9.
ODA commitments to Africa in selected sectors and total, 1973-2006
(real US dollars per capita)



Source: Author's calculations, from OECD Development Assistance Committee (2008), *Bilateral ODA commitments by Purpose* (www.oecd.org/dac), deflated by OECD deflator (2005=100) and divided by midyear population estimates for Sub-Saharan Africa from the U.S. Census Bureau, International Database.

from 1973 to 1988, but then declined sharply in importance and has not been a significant recipient of the post-2001 increase, which went to health, debt relief and other goals.

5. Technology and innovation

The data presented above show that well before the current rise in world food prices, there were substantial and sustained increases in African production and yields of cereal grains per capita, despite steady declines in per-capita foreign aid for the sector. Reduced taxation of farmers played an important role, as did farmers' adoption of new crop varieties and other innovations developed by public R&D programs.

The impact of R&D and new technology adoption was first identified through case studies of particular programs (e.g. Masters et al., 1998). Econometric studies linking aggregate output to R&D activity include Evenson and Gollin (2003), who showed that Africa benefited from international crop breeding both later and to a lesser degree than other regions. Africa's lower level of R&D impacts was due primarily to lower spending: the proportional return on investment has been similar in Africa as elsewhere (Alston et al., 2000) while poverty reduction per dollar of investment has actually been greater (Thirtle et al., 2003).

The role of agricultural R&D in Africa is surveyed by Masters (2005), concluding that much higher levels of investment are needed but are politically very difficult to achieve and maintain. One fundamental cause of low investment is that the gains from agricultural R&D are hard to predict *ex-ante* or even to observe *ex-post*, making it particularly difficult to mobilize political support. In this context, a useful intervention to help investors identify and replicate the most successful innovations is to offer prize-type awards, so as to recognize approaches that can then be scaled up using grants and contracts, intellectual property rights (IPRs), or hybrid public-private partnerships that combine those two instruments.

Masters and Delbecq (2008) describe how prize contests have worked for other sectors in the past, and pro-

vide details on how a new kind of prize reward program could help accelerate innovation in African agriculture. The goal of this new program would be to identify any and all innovations that have successfully met farmers' needs, so that observers could compare their impacts and replicate them elsewhere. Offering prize funds would entice innovators to assemble the required data and submit them to a prize secretariat, who would audit each submission and compare the results. A key innovation in the proposal is to disburse prize funds proportionally to measured impact, and thereby align the value of winning with the gains actually achieved by farmers.

Figure 10 shows how the new "prize reward" concept differs from traditional prizes. Traditional approaches rely either on purely subjective criteria (in the top-right corner), or a discrete criterion for awarding fixed sums such as the X Prizes for civilian space flight (in the middle-left cell). The bottom-left cell offers an example of prizes that reward incremental achievements with incremental payments, as advocated for example by Kremer and Glennerster (2004) in their proposal for an Advance Market Commitment (AMC) to purchase vaccines for otherwise-neglected diseases. Kremer and Zwane (2005) propose this type of incentive for African agriculture, but its design is appropriate for a "one problem, one solution" kind of technology. In agriculture, appropriate technologies solve a bundle of problems simultaneously, to varying degrees in different locations. To fit this situation, we need a "prize reward" type program that would fit in the bottom-right cell, paying out a fixed sum in proportion to value creation, thus combining the flexibility to reward all kinds of new technology with the objectivity of a fixed criterion for success.

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6. Conclusions

This paper surveys some of the background, impacts and possible responses in Africa to the current world food crisis. Numerous official reports have attempted a comprehensive view, so we are more selective and focus on new data and results of recent research regarding Africa as a whole, the impacts of price changes at the household level, changes in African governments' price policies, and the role of technological innovation in raising output.

Figure 10. A new typology of prize designs

	New technology's characteristics are pre-specified	New technology's characteristics are to be discovered
Success is a matter of opinion		*Achievement awards (e.g. Nobel Prizes, etc.)*
Success is a discrete, yes/no achievement	*Traditional prizes (e.g. X Prizes)*	
Increments of success can be measured	***AMC for medicines (fixed price per dose times no. of doses)***	***Prize Reward (fixed sum divided in proportion to impact)***

Our main findings are that, at the aggregate level, despite twenty years of steadily declining in agricultural aid per capita in Africa, the continent's production of cereal grains per capita has grown steadily over the past decade and is now catching up to South Asian levels. Thanks to economic growth and a variety of policy reforms, however, consumption has grown even faster and the continent now imports more cereal grains per capita than any other region. Higher food prices are therefore costly for Africa as a whole, and on average are particularly harmful for Africa's poorest people, who often grow some food but have no surplus to sell. It is higher-income farmers who benefit most from high grain prices – but their experience offers valuable lessons regarding what technologies are most useful for increasing agricultural production in these environments.

In response to the extreme challenge posed by the world food crisis, African agriculture can build on its recent successes and accelerate total output growth by spreading the use of successful innovations. That process could be facilitated by a program of prize rewards

paid to innovators, in proportion to the measured impact of their new technologies after adoption. Such prize rewards would identify the most successful innovations recently adopted by some African farmers, and help others scale up those achievements across the continent. The dramatic food price increases of recent years call for equally dramatic measures to raise productivity, particularly among the lowest-income farmers who cannot benefit and are often harmed by higher food prices.

About the author

Will Masters is a Professor and Associate Head of the Department of Agricultural Economics at Purdue University. He is co-editor of the journal *Agricultural Economics*, and author or co-author of several books including *Economics of Agricultural Development* (Routledge, 2006) as well as many scholarly articles. Links to his work are available at http://ww.agecon.purdue.edu/staff/masters.

References

Aksoy, M.A. and A.Isik-Dikmelik (2008), "Are Low Food Prices Pro-Poor? Net Food Buyers and Sellers in Low-Income Countries" Policy Research Working Paper 4642. Washington, DC: The World Bank, June 2008 (30 pages). (http://go.worldbank.org/QNNNTUJWN0.)

Anderson, K., E. Jara, M. Kurzweil, D. Sandri and E. Valenzuela (2008a). "Estimates of Distortions to Agricultural Incentives, 1955 to 2005", World Bank, Washington DC, pre-release October 2007 (public release to be downloadable from July 2008, at www.worldbank.org/agdistortions).

Anderson, K., M. Kurzweil, W. Martin, D. Sandri and E. Valenzuela (2008b), "Methodology for Measuring Distortions to Agricultural Incentives", Appendix 2 in Anderson, K. (ed.), "Distortions to Agricultural Incentives: Global Perspective", London: Palgrave Macmillan and Washington DC: World Bank, forthcoming. (For details, see www.worldbank.org/agdistortions.)

Anderson, K. and W. A. Masters, eds. (2008), *Distortions to Agricultural Incentives in Africa*. Washington, DC: The World Bank, forthcoming. (See also www.worldbank.org/agdistortions.)

FAO (2008), "Soaring Food Prices: Facts, Perspectives, Impacts and Actions Required." Prepared for the High-Level Conference on World Food Security, 3-5 June 2008. Rome: FAO, April (50 pages). Available online, at ftp://ftp.fao.org/docrep/fao/meeting/013/k2414e.pdf.

IFPRI (2008), "High Food Prices: The What, Who, and How of Proposed Policy Actions." Washington, DC: IFPRI, May (12 pages). Available online, at http://www.ifpri.org/PUBS/ib/FoodPricesPolicyAction.pdf.

Ivanic, Maros and Will Martin (2008), "Implications of higher global food prices for poverty in low-income countries." Policy Research Working Paper 4594. Washington, DC: The World Bank, April (54 pages). (http://go.worldbank.org/441YBMPJB0.)

Kremer, Michael and Rachel Glennerster (2004), *Strong Medicine: Creating Incentives for Pharmaceutical Research on Neglected Diseases*. Princeton: Princeton University Press. (http://press.princeton.edu/titles/7830.html.)

Levinsohn, James and Margaret McMillan (2005), "Does Food Aid Harm the Poor? Household Evidence from Ethiopia." NBER Working Paper 11048. Cambridge, MA: NBER (http://www.nber.org/papers/w1104).

Masters, William A. (2005), "Paying for Prosperity: How and Why to Invest in Agricultural R&D for Development in Africa." *Journal of International Affairs* 58(2, Spring): 35-64. (http://jia.sipa.columbia.edu.)

Masters, William A., Touba Bedingar and James F. Oehmke (1996), "The impact of agricultural research in Africa: aggregate and case study evidence." *Agricultural Economics* 19(1-2): 81-86. (http://dx.doi.org/10.1016/S0169-5150(98)00023-1.)

Masters,William A. and Benoit Delbecq (2008), "Accelerating Innovation with Prize Rewards." Washington, DC: IFPRI, forthcoming. Available online at www.agecon.purdue.edu/prizes.

Masters, William A. and Andres Garcia (2008), "Food and Agricultural Policy: Stylized Facts and Explanations". Working Paper available online at www.agecon.purdue.edu/staff/masters.

Masters, William A. and Samba Ly (2002), "INSAH-Purdue Workshops on the Economic Impact of Agricultural Research in the Sahel: Compilation of Results." Published on CD-ROM and online at www.agecon.purdue.edu/staff/masters/impact.

McMillan, Margaret, Alix Peterson Zwane and Nava Ashraf (2005), "My Policies or Yours: Does OECD Support for Agriculture Increase Poverty in Developing Countries?" NBER Working Paper 11289. Cambridge, MA: NBER (http://www.nber.org/papers/w11289).

Ng, Francis and M. Ataman Aksoy (2008), "Who are the net food importing countries?" Policy Research Working

Paper 4457. Washington, DC: The World Bank. (http://go.worldbank.org/99JY8FVKF0.)

Rios, Ana, William A. Masters and Gerald E. Shively (2008), "Agricultural Prices and Income Distribution among Farmers ." Working Paper available online at www.agecon.purdue.edu/staff/masters.

Runge, C. Ford and Benjamin Senauer (2008), "How Ethanol Fuels the Food Crisis". (May 28th), author update to C.F. Runge and B. Senauer (2007), "How Biofuels Could Starve the Poor",*Foreign Affairs* 86(3, May/June). Available online at www.foreignaffairs.org.

Thirtle, Colin, Lin Lin and Jenifer Piesse (2003), "The Impact of Research-Led Agricultural Productivity Growth on Poverty Reduction in Africa, Asia and Latin America." *World Development* 31 (12, December): 1959-1975. (http://dx.doi.org/10.1016/j.worlddev.2003.07.001.)

World Bank (2008), Rising food prices: Policy options and World Bank response. Washington, DC: World Bank, April (11 pages). Available online at http://go.worldbank.org/QLBJFC7XI0.

The Global Food Crisis: A Toolkit for Audacious Leaders

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Overview

According to World Bank research, the current level of commodity prices, which are likely to be a medium- to long-term reality, will throw about 100 million human beings back into the ranks of the poor and hungry[1]. Food riots sparked by the doubling or tripling of prices of basic food staples gave us a glimpse of the perils associated with delaying concrete responses to tackle food insecurity. Heads of state, agricultural specialists, and presidents of international organizations met in Rome in June 2008 to tackle the problems created by the food crisis. The resulting document of that meeting included bold directives on the most immediate issue: humanitarian assistance for affected countries. However, the Declaration of the High Level Conference on World Food Security will not be enough to address the food crisis.[2]

On May 14 2008 , in a hearing in the US Congress devoted to the global food crisis, I identified a series of proposals that would make a difference in alleviating the plight of some of the most vulnerable people in the world.

Short-run measures

It is imperative to ensure early emergency reaction to food shortage episodes, including capacity to mobilize food quickly and cheaply to the most affected areas of the world. Efforts to increase funding and improve coordination between governmental agencies responsible for food assistance are all excellent initiatives that have already been announced by many governments in recent months. Additionally, the Declaration takes a bold step forward in calling for the disbursement of food aid, when appropriate, through the use of local or regional purchase.

More ambition would pay off considerably. We should strive for the full elimination of origin requirements on food aid. These requirements constitute a prime example of bad policy that curtails the effectiveness of food aid and spur doubts about the donor country's generosity. My colleague, Kimberly Elliot, has noted that untying US food aid would double US assistance at destination without additional cost to US taxpayers.

Short-run actions need not be limited to addressing requests for humanitarian or technical assistance. Concrete steps to cool down markets of selected food staples can also be taken. Peter Timmer and Tom Slayton recommend relieving China and Japan from World Trade Organization (WTO) rules that forbid the sale or donation of part of their rice stocks. Such a step would not necessarily lead to higher risks in these nations. Only last year, 400,000 tons of rice in Japanese stocks were used as livestock feed because they were not considered fit for human consumption.

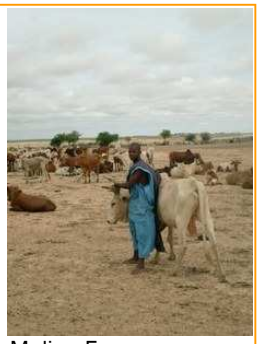
Medium-run measures

Collective action is necessary to "fix the incentives" facing agriculture globally. This entails scrapping policies that encourage farmers to turn land away from food production and revitalizing the WTO by ensuring that it plays a role in solving the challenges in global agricultural markets brought to the forefront by the food crisis.

Policies that stimulate production of biofuels have diverted land away from food production. More knowledge on the overall contribution of biofuels to sustainable development is absolutely essential, but there already exists strong evidence indicating that the US corn-based ethanol program has contributed to raising food prices, and there are also doubts that corn-based ethanol constitutes the best alternative fuel program, on environmental grounds. Meanwhile, oil prices at $125 a barrel have undermined the original rationale for the program by providing sufficient incentives and anchoring the competitiveness of corn-based ethanol. It is therefore unnecessary and misguided for the United States to insist on maintaining aspects of the ethanol program that are tantamount to "picking winners"—such as ethanol mandates or high tariffs on competing fuels—in light of the current food crisis. Their elimination would constitute better food policy as well as better environmental policy.

Export restrictions in food-exporting countries are a doubly harmful reaction to food price increases, and they constitute a prime example of contemporary problems in global agriculture not properly managed by current or

*Senegal President **Abdoulaye Wade** made headlines when he suggested that UN Food and Agricultural Organization (FAO) should be dismantled and "its useful assets transferred to U.N. International Fund for Agricultural Development (IFAD) which should become the U.N.'s World Fund for Agricultural Assistance with an obligatory headquarters in Africa, at the heart of the problem."*



Malian Farmer
Source: www.iicd.org

prospective WTO rules. First, export restrictions add fuel to fire as they nourish increases in world food prices—for some commodities, restrictions on exports provide an extra boost to prices of up to 20 percent. Second and more importantly, export restrictions numb the incentive for farmers to do the necessary investments to augment production.

Export restrictions also highlight the weakness of the global agricultural trading regime. Lack of access to markets in good times and export restrictions in bad times are self-reinforcing phenomena that foster strategic action at the cost of the common good. We need a system capable of ensuring that both imports and exports remain free to flow in good and bad times. Pledges to revitalize the Doha Round alone will not do the trick, even if they help jump-start negotiations. Currently, the Round has been devoted to traditional forms of agricultural protection such as tariffs and subsidies. We need to enlarge the agenda to include discussion on all trade barriers, including export restrictions, biofuel policies, and regulations on genetically modified organisms, so as to ensure that the world trading system remains capable of tackling contemporary challenges in world agriculture. If Africa is to exploit new agricultural technologies, policies toward genetically modified organisms, especially in the European Union, need to be clarified, made transparent, and rendered immune from protectionist pressures. The United States and the European Union should provide leadership in heading an international effort to bring about a collective agreement.

Long-run measures

A positive fallout of the current crisis is to bring agriculture back into focus. Decades of neglect of agriculture have heightened our exposure to food crises and contributed to increasing the number of people who go hungry in the world. In recent weeks, agriculture has been showered with increased development assistance from governments and multilateral organizations.

However, resources alone will not suffice if they are not properly directed to raising agricultural productivity in developing countries, most notably in Africa. Africa has not had technological productivity improvements in agriculture comparable to those in Asia or Latin America. The market on its own will not deliver on productivity improvements because of the low purchasing power of African countries. International public action will be required. Developed countries and multilateral donors should go on a war footing to improving the incentives and institutions for generating research for African agriculture. For example, existing structures such as the Consultative Group on International Agriculture Research need to be revitalized; creative ways of stimulating the basic research and its subsequent adaptation need to be found.

Conclusion

Tackling the challenges posed by the current food crisis requires joint action by various members of the international community. Developed nations should take the leadership role. In the short run, Japan and China should allow their stocks of rice to be exported to those in need, and the United States should eliminate origin requirements on food aid. Over the medium run, we need collective action in the WTO to eliminate distortions in agriculture and agricultural trade, including the replacement of US and EU biofuel programs with green policies that do not actively pick the winners. Over the long run, we need to rally resources and revitalize institutions to boost agricultural research and productivity in developing countries, especially Africa.

Notes

1. Ivanic, Maros, and Will Martin, "Implications of Higher Global Food Prices for Poverty in Low-Income Countries," World Bank Policy Research Working Paper 4594 (April 2008).
2. It is not my purpose to discuss the Declaration of the High Level Conference on World Food Security (http://www.fao.org/foodclimate/conference/en/) but rather focus on those areas where there is overlap with my proposals.

A New Approach to Deal with the Global Food Crisis

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Abstract

The global food crisis in 2008 made the World once again aware that investment in agriculture matters. In view of the long period of food surpluses and depressed food prices, many policy decision makers concluded that hunger is just a distribution problem. As a consequence, public funding for further crop improvements was cut back worldwide over the past two decades, while the private sector continued to invest primarily in the improvement of high value cash crops designed for large-scale and capital intensive farms.

A global food security strategy for the 21st century must end this divergence of public and private sector activities and create more incentives to invest in tailor-made technologies that facilitate the economic empowerment of the rural poor and enable a more sustainable use of natural resources.

1. Introduction

For more than a decade, world food consumption has been above world food production for staple food, and public investment in agricultural research and development (R&D) was cut back worldwide in spite of evidence of its high rate of return on investment in the farm sector (World Bank 2008). This combined with the more recent rise in oil prices, subsidies for farmers to cultivate food crops for ethanol and biodiesel production and harvest failures in several food exporting countries help explain why food prices have escalated in spring 2008 (Economist 2008a).

Even though food prices are decreasing again thanks to the easing of the short-term problems, the situation is likely to remain critical in view of a decade long-neglect of agriculture, the low level of global food stocks and the increasing consumption of meat and dairy products in emerging economies such as China and India (FAO 2008).

Poor people in Sub-Saharan Africa belong to those who are most vulnerable to a rise in world food prices. They live mostly in food-importing countries and food usually represents the biggest share of the average household budget of a poor family. One may argue that it would at least benefit poor food producers in these countries because they can now sell at a better price; unfortunately almost 90% of African farmers are mainly involved in subsistence farming (Paarlberg 2008) and thus do not benefit from global food price increases because very few of them actively participate in international or even national agricultural trade.

In spite of substantial agricultural trade liberalisation and some delayed productivity increases from the Green Revolution, Africa's food imports per capita have grown sharply since 1990, and since 2001, it has imported more cereal grain per capita than any other region (Masters and Garcia 2008, Ng and Ataman 2008).

There are multiple reasons for the worsening food security situation in Africa. First of all, civil wars in some African countries have created an increasing dependence on food aid supplied by the World Food Programme (WFP). Second, the shift of power in the global food chain moved from the supply-side to demand-side. It induced large retailers to cater more strongly to the preferences and values of urban and semi-urban affluent consumers. Since these consumers tend to reject modernization in agriculture and believe it negatively affects food quality and the environment, retailers have become mainly concerned with private food safety and environmental standards that are supposed to signal to consumers that they are equally sceptical about the sustainability of modern agriculture.

Third, in view of the large dependence on foreign aid, conditional lending and market access, many African governments designed agricultural and development policies that please Western donors and investors but do not necessarily benefit their own people. A recent report published by the International Assessment for Agricultural Science and Technology for Development (IAASTD) expresses the public resentment towards modern agriculture in affluent non-agricultural societies most clearly (IAASTD 2008). Its recommendations provide some valuable ideas in how to address the environmental chal-

lenges of agriculture but they are not very helpful when it comes to efforts to improve food security and empowering the rural poor.

The implicit assumption of the report that the promotion of international agricultural trade and new technologies are the problems rather than part of the solution to the food and environmental crisis is representing the mainstream view in affluent societies for the past two decades. The export of this view to developing countries that face completely different conditions proved to do more harm than good as will be illustrated in this article by means of historical evidence. The nostalgic attitude towards agriculture among the growing share of people that is no more involved in agriculture led to policies on the national and international levels that discouraged investment in agriculture and agricultural research and development (R&D) in particular. As it used to be the case in colonialism, the affluent elites in developed and developing countries share common values and interests and tend to either despise or idealise the rural poor (Paarlberg 2008). The paper argues that this collusion of urban elites and their influence in agricultural and development policies help explain why rural poverty in Africa increased while its ability to feed itself decreased over the past two decades.

The development was different in emerging economies that are less dependent on European aid and agricultural trade and more obliged to be responsive to the growing domestic middle class. Countries such as China, India, South Africa and Brazil have invested in human capital on the countryside and home-grown agricultural technologies (Timmer 2008, The Economist 2008b). South Asia may still have more hungry people in total than Africa, but the situation there is improving rather than worsening.

The partial and general economic equilibrium models that are supposed to predict trends in agriculture and guide political decisions with respect to rural development and agricultural trade proved to be unable to explain the relative success of rural development in emerging economies compared to Africa because they fail to take into account the welfare effects of new products and services that result from investment in agricultural technology. In this paper we argue for an new direction in economics largely following the insights of New Growth Theory. We then show by means of the case of New Zealand, how an agricultural policy that is based on the principles of this new theory facilitates endogenous development that facilitates rural empowerment and innovative responses to environmental challenges.

The first chapter in this paper will explain in more detail the three main factors that contribute to the inability of Africa to feed itself. Chapter 2 then looks at theory and policies applied in the 20th century to address food security problems and relate them to the current situation and policy advice.

Finally, chapter 3 argues for a new perspective in economic theory and public policy that aims at mobilizing science and technology to effectively address the urgent agricultural, environmental and socioeconomic problems of the 21st century. For that purpose best practices will be illustrated in developed and developing countries.

2. Why Africa lost its ability to feed itself

2.1 Food Aid

There is no doubt that bringing food to regions that suffer from harvest failure or civil war is a humanitarian duty and the World Food Programme (WFP) is doing its best to fulfill this duty. Yet, the institutional environment in which the World Food Programme has to operate is often creating unintended side effects that harm agriculture in the affected regions on the long run.

One problem are the constraints the WFP faces in its freedom to buy its food stocks from domestic farmers close to the affected regions. These constraints are imposed by the US government which links its willingness to fund the WFP to the requirement of accepting a large share of its food stocks from US farmers. This hidden export subsidy for US farmers is clearly damaging farmers in developing countries who cannot compete with free food (Herald Tribune 2007). The US farm bill of 2008 once again endorses this practice probably in response to pressure from vested interest groups that benefit from producing or shipping the food to Africa. The farm bill further specifies that all food aid should be provided by in-kind food donations, meaning US agricultural commodities like bulk wheat or rice or processed agriculture products. The problem is not just US farmers that need to be weaned off from these subsidies but also US development organisations that benefit from it through the monetization program; beginning with the 1985 farm bill, certain U.S.-based relief organizations and cooperatives were allowed to sell a certain percentage of the

non-emergency commodities to cover food aid costs or, more importantly, to fund their own programs. Development organizations admit that monetization now represents a major source of their program funds (Liebhardt 2008). The United States is the only donor country that continues with these practices revealing its inconsistence in agricultural and development policies.

However, the heavily subsidised multifunctional agricultural system in Europe suffers from a similar inconsistence. European farmers get a large share of their income from their national governments and the EU. Their policy preferences are shaped by tax payers that are not involved in agriculture but prefer a countryside that is not yet spoilt by the advances of modern science and technology. Europe can afford to maintain such an expensive agricultural system that produces for affluent tax payers rather than poor consumers. But to assume, as many European politicians do, that such a system would also be appropriate for Africa, is problematic. It is partly responsible for Africa's failure to increase its agricultural productivity and promote rural empowerment through entrepreneurship (Paarlberg 2008). In addition, the EU tends to increasingly replace tariff trade barriers for developing countries by non-tariff trade barriers in the form of prohibitively expensive public and private standards for food imports that often show no evidence of increasing food safety (Ansell and Vogel 2006, The Economist 2008b). This discourages poor developing countries from adopting modern biotechnology in agriculture for fear of losing European foreign aid and being barred from European food markets. High food safety standards combined with European aid money that deliberately discourages growth in the agricultural sector breeds political engineering and stunts the investment and development of competitive agricultural markets.

2.2 The problem with large retailers

A second reason why Africa is increasingly unable to feed itself is the shift of market power in the international food chain moving from the supply side (products for farmers) to the demand side (products for consumers). Even though this shift had a lot of positive impacts in the form of increased consumer choice and the consideration of their values and preferences in the way food is produced, it also resulted in an increasing reluctance to invest in modern agricultural research and development (R&D) in Europe. The rejection of even clearly labelled genetically modified (GM) foods in stores is just one manifestation of this fear of appearing to be in favour of modern technology in agriculture. Moreover, the high regulatory uncertainty with regard to new agricultural technologies created more market concentration on the supply side and the raising public and private standards in the retail industry successfully created barriers to market entry that also strengthened the incumbents on the demand side. As the new dominant players in the food chain, retailers account today for half or more of food sales world wide. In view of the dislike of wealthy urban consumers of agricultural modernisation – often portrayed as 'shared values' - they tend to side with concerned consumers and sport a view of sustainable agriculture that sees technology as the problem rather than the solution. it is often ignored that these shared values are not a given exogenous factor that emerges from a genuine cultural preference but are often endogenously shaped by stakeholder interests and values communicated through the mass media (Aerni and Bernauer 2006).

Large retailers use their marketing campaigns to communicate to the public that they share their values (even if they might just reflect simple prejudices) and ask the food suppliers to take them into account as well. This is a big difference to the past when consumer preferences were assumed to be simply driven by price and thus quite predictable and not very important in the policy decision-making processes. Food policy merely meant to improve links between farmers and suppliers. The Green Revolution of the 1960s, for example, provided new seeds and subsidised fertilisers but did not take into account taste preferences (Aerni 1999). This was obviously a big mistake that is now bouncing back into the other extreme not in the form of food quality but food safety.

Yet, in spite of portraying happy small-scale farmers in their advertising campaigns, supermarket chains must favour large-scale and capital-intensive farms as suppliers of food that can comply with their high private standards. They require uniform quality, minimum quantities, high standards of hygiene, and sometimes even evidence that farmers have an environmental conscience (as in the case of EUREPGAP). It is not surprising that average smallholders in Africa are ill- equipped to comply with such standards. Traders and supermarkets are therefore likely to benefit capital-intensive farms that are close to large cities rather than small farms in the marginal regions of Africa (The Economist 2008a).

In this context, it is misleading to believe that supermarket chains that increase the share of tropical organic

products in their assortment do so in support of poor African smallholders. The reality is that most of these products originate from highly capital-intensive farms located close to the airports of the large African cities and exclusively run by Western companies (Paarlberg 2008). The resulting new structure of agricultural trade is therefore largely shaped by large retailers in Europe and the United States. Their strategies look increasingly like a new form of colonialism that is based on the collusion of affluent urban elites in the European and African countries in favor of European interests and preferences. That was the case during the slave trade (Appiah 2007) and it is the case today when considering that, unlike the elites in Asian countries, the African elites hardly ever imposed conditions on foreign companies to facilitate technology transfer, collaborate with the local private sector and train local people. Foreign companies may contribute to economic and social development but their activities are mainly concentrated in urban areas and focused on pleasing Western consumers, tax payers and donors rather than the local entrepreneurs, especially when they are located in remote rural areas. Once again the rural poor in the periphery are particularly excluded from the benefits (Aerni 2006, Paarlberg 2008).

2.3 The 'anti-technology' framing of sustainable agriculture

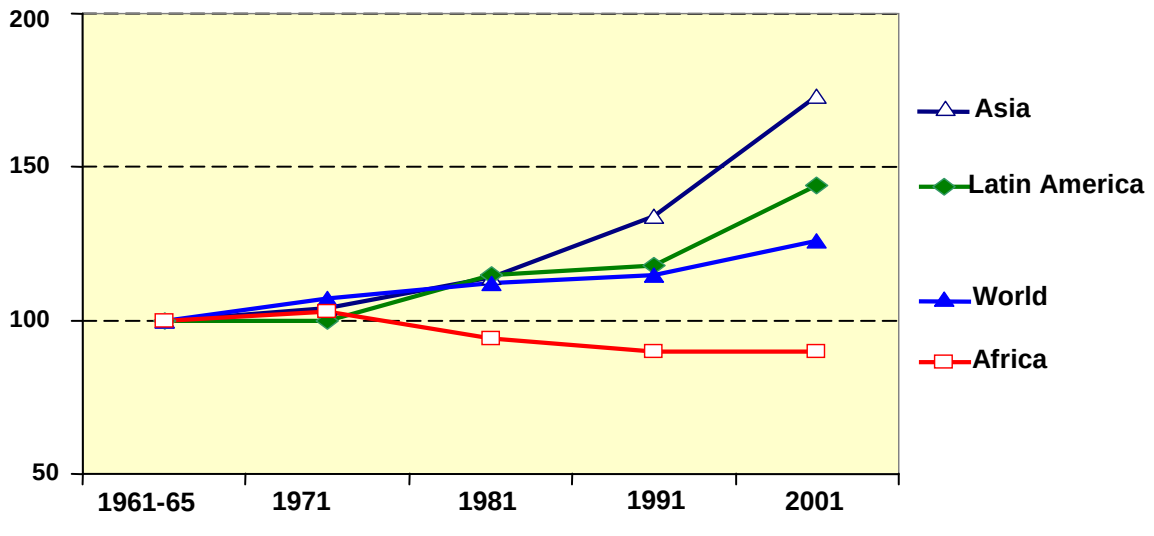
In Africa, 80% of the farms are smaller than 2 hectares and, unlike in Asian countries with a similar agrarian structure, crop yields are extremely low. The overall decline in production/capita of all major food crops (Aerni 2006) can be attributed to the fact that a large majority of African farmers does not have access to fertilizer, improved seeds, and other inputs while mechanization is almost nonexistent. In contrast, the large-scale African plantations of cocoa, cotton, peanuts and sugar may be successful exporters to Europe, but they are almost exclusively run by Europeans and stem from the age of colonialism when Europeans still invested in research to improve these speciality crops (Paarlberg 2008).

Figure 1 shows the dramatic changes of agricultural production per capita in Africa compared to other regions in the world over the past five decades (starting from the period of 1960-65=100). While the numbers increased everywhere, Africa's production per capita decreased and is now still stagnating.

In spite of the appalling evidence that Sub-Saharan Africa needs more public and private sector investment in agriculture and improve rural infrastructure in order to better connect poor farmers to markets, a recent report published by the International Assessment for Agricultural Science and Technology for Development (IAASTD 2008) does hardly address this urgency. In its global summary for decision makers the World Bank-sponsored IAASTD report implicitly frames open agricultural markets and new technologies as the problem rather than part of the solution to sustainable agriculture (Stokstad 2008).

Even though the report contains a lot of valuable insights gained from agricultural research and correctly identifies the major problems in agriculture with regard to biodiversity, soil degradation and water use, it hardly addresses the challenge of how to produce more food with less land and water. Its recommendations are based on the popu-

Figure 1: Regional Differences in the Development of Agricultural Production/Capita (Southgate et al. 2007: 67)



lar but wrong assumption that hunger is a mere distribution problem and unrelated to production. If one would follow this insight and distribute the surpluses in subsidised agricultural systems freely among the people in poor food-importing countries, farmers there would have to abandon farming altogether in the receiving countries because they can not compete with cheap donations. This would thus further aggravate the ability to food self-sufficiency in these countries.

The report was initially meant to highlight the environmental problems of modern agriculture and its impact on smallholders in marginal regions. It was implicitly assumed that food security would not be an issue in a world that produces large food surpluses and consequently depresses food prices. The raising food prices therefore came as a surprise and the IAASTD report had then to be quickly portrayed as a potential solution for the World food crisis as well. Not everyone was buying it.

Even though the report claims to represent an interdisciplinary approach that involves researchers and experts from all areas, the steering group largely ignored the experts in biotechnology and molecular biology and showed no interest in the potential ability of the private sector to contribute to global public good character of sustainable agriculture and food security (Nature Biotechnology Editorial 2008).

The defendants of the right to food and food sovereignty who largely welcomed the IAASTD report (de Schutter 2008) tend to ignore that access to food does not happen by magic; neither can it be left to well-meaning distributors of free food. There are still the laws of demand and supply that determine the price of food and consequently access to food. So if access to food is to be improved without further harming the natural environment more food needs to be produced on less land. The IAASTD report is right to argue for more support of multifunctional small-scale agricultural systems that make sustainable use of the local natural resources and thus enable a more integrated approach to farming. But such systems may easily be combined with promising new agricultural technologies. This would make such agricultural systems more profitable for farmers, less labor intensive (allowing poor families to send their kids to school because they are less needed in the field) and more efficient in the use of the available natural resources. There are no scientific reasons why a combination of integrated farm management and agricultural biotechnology should not be possible. But unfortunately, the report did not make an effort to go beyond the usual ideological division of small, low-tech farming versus big high-tech farming.

The inadequacy of the report in responding to the current situation of agriculture may be related to the fact that its main ideas, largely stem from 1970s and its heated controversy over the risks and benefits of the Green Revolution. In order to understand the continuing absence of new theories that would be more compatible with the reality of the knowledge economy of the 21st century one needs to look at the history of modern agriculture and the resulting change in values in affluent societies.

3. Globalisation and Agriculture

3.1 Policy responses to the first wave of globalisation in the 19th century

Modern agriculture has its roots in the 19th century. At that time, there were Malthusian fears about a looming global food scarcity due to the exponential population growth along with an only linear growth of agricultural production/capita. In spite of the these alarming predictions, there was no international effort to avoid possible mass starvation because Malthusian predictions failed to take into account the breakthroughs in science and technology that revolutionized agricultural production, food processing and the means of transportation and made food more abundant and thus cheaper. These technological advances were mainly private-sector driven. National governments, in turn, were assisting farmers with public investment in applied agricultural research. Their goal was to ensure the successful participation of their farmers in the emerging international agriculture trading system.

The new reality of international agricultural trade is linked to the first wave of globalisation in the second half of the 19th century that led to a rapid decrease in transportation costs and erased many of the geographical barriers that previously protected local agriculture from foreign competition. This threatened the livelihoods of many farmers in the early stage of industrialization and governments started to get worried about the lack of agricultural competitiveness and the resulting impoverishment of the countryside. Yet, instead of protecting farmers from the forces of globalisation, governments decided to harness them for change. National agricultural research institutes were established with the pur-

pose of assisting farmers in their efforts to find innovative ways to cope with technological and economic change (Brugger 1956, Widder 2005). Researchers were actively encouraged to collaborate with farmers in a joint effort to convert new knowledge into products and services that generate increasing returns in farming (Aerni 2007a). Many of the big companies involved in the seed, machinery, trade and food businesses today have their roots in this fruitful joint collaboration of the 19th century. This collaboration was however not just spawning large companies but also improved life in rural areas. Entrepreneurial farmers felt that they are part of global change rather than its victims. They generated income and employment on the countryside and kept rural life vibrant and active. At the same time, they contributed to a global increase in agricultural productivity, which made food more abundant and accessible for the poor. In other words, it was not a global planning agency that helped avoid the Malthusian collapse but the hundreds of thousand of farmers, researchers and entrepreneurs that were encouraged by governments to find solutions and technologies that allow them to cope with global change and at the same time generate income and employment on the countryside. Food security and the end of starvation in Europe was a positive side-effect of increasing agricultural productivity and rural development. The success was related to governments that assumed the role as a coach of farmers rather than a protective nanny. This was possible at that time largely because, firstly, there were no vested interest groups that focused mainly on defending the status quo and, secondly, there were no public resources available to play a nanny (Olson 1962).

3.2. Social planning and welfare economics in the developed world

World War I and II changed everything. With the onset of World War I, globalisation came to an end and agricultural trade was strongly restricted. As a consequence, governments designed new agricultural policies that were largely focused on ensuring national food security (Rieder and Anwander Phan-huy 1994). Government agencies assumed a more active role in the research, production, processing and the sale of food. This government investment helped strengthening the already established firms in agriculture. After World War II, the Allies concluded that the only way to avoid war is to promote trade and international cooperation (Urquart 1990). This view enabled a new joint effort for trade liberalisation (GATT Agreement) and gave birth to the Bretton Woods institutions (World Bank, IMF) and the United Nations. However, agriculture largely remained in the national realm of politics and was based on strong government intervention in view of possible food security problems resulting from the looming Cold War (Desta 2002). At the outset, state intervention was mainly justified in the name of managing the public good 'national food security'. For that purpose, agricultural economists were hired as social planners to ensure the effective management of this public good. The planning models they used (e.g. linear programming) to calculate how certain normatively set policy objectives can be achieved most effectively, were largely developed by scientists in the former Soviet Union (Baker and Swanson 1964). The concept of market failure in comparative-static welfare economics provided the theoretical justification for this approach.

In addition to that, welfare economics in agricultural policy embraced the theoretical concept of the so-called agricultural treadmill developed by Cochrane (1979). In this concept, farmers produce a homogenous and inferior commodity in the form of food. They are portrayed as passive price-takers in a market of perfect competition. The role of technology is reduced to its potential to increase agricultural productivity (while its potential to improve food quality and the environment is not addressed). Since farmers are standing in perfect competition they are assumed to produce at the level where their marginal costs just equal their marginal revenues. The agricultural treadmill induced by technological change is therefore a zero-sum game for farmers: they are forced to adopt a new cost-saving technology but since everyone who wants to stay in business will have to do it eventually, the farmer will never be better off in spite of producing more and offering it at a lower price.

The concept of the agricultural treadmill ignores that farmers are often innovators themselves and create new products and services with increasing rather than decreasing returns. It does also not capture the advantage of labor-saving technologies that allow a farmer to invest more in the education of themselves and their children. Finally, it ignores the environmental and social welfare effects that result from producing more with less. Based on this one-sided concept, agricultural economists concluded that the treadmill, and with it technological innovation, largely benefited food consumers at the expense of food producers. They argued that the agricultural treadmill is producing a sort of market failure since farmers would get poorer even though they produce more.

Moreover, the resulting modernisation of agriculture would destroy the environment and family farming and negatively affect the quality of food. This pessimist view of technology in agriculture provided the foundation of the widespread resentment of technological change in agriculture by respected economists. Their attitude probably influenced the anti-technology policies in agriculture in the Post-Cold War Period more than the environmental protest movements.

In the 1990s, agricultural economists admitted that certain agricultural policies produced 'sub-optimal' results despite the rational social planning. Yet, instead of recommending to return to the pre-War policies of the 19th century when the government assumed to role of a coach, agricultural economists preferred to stick to the nanny approach by recommending to merely switch from production-tied to income-support subsidies (Aerni 2007b). These could be justified in the GATT Uruguay Round as non-trade distorting green-box measures. The new objective was the maintenance of a strong, healthy and environmentally sustainable agricultural sector. It was labelled multifunctional agriculture. It provided the best justification to keep agricultural economists employed as social planners and continue to use the planning models that are focused on creating optimal allocative distribution in areas where the market presumably fails to do so. But did the market really fail? There is increasing evidence that the new agricultural policies and the new justifications for government intervention in agriculture did not bring the expected improvements and could therefore considered to be state failure (Rentsch 2006). Moreover, input providers and food retailers benefited from direct payments more than farmers. The former asked farmers to pay more for seeds, fertilizers and chemicals and the latter asked for a lower price of the agricultural products. Ultimately farmers had to pass on most of their income subsidies to the other actors in the food chain.

At the same time, the new normative goals of agricultural policy to promote environmental, social and economic sustainability through compliance schemes (e.g. agro-environmental measures/labelling schemes in return for more direct payments and premium prices) that aimed at mitigating the impact of agriculture did not meet the expectations (Kleijn et al. 2001). There also seems to be a correlation between the amount of direct payments a rural region receives and its economic decline (The Economist 2005a). This is not surprising in view of the fact that a high dependence on direct payments is not an attractive way of life for local young people with big dreams; so they look for opportunities elsewhere to participate in the new knowledge economy. Apart from that, the private sector is reluctant to invest in heavily subsidised regions because of the receiver mentality of the people and high production costs (pushed up indirectly through direct payments).

3.3 The Green Revolution

After World War II, major scientific breakthroughs in plant breeding, the development of high-yielding varieties and improved irrigation systems triggered substantial productivity increases in crop cultivation. The US government decided that bringing the benefits of these new technologies to developing countries would contribute to global food security and more trust in a market-based economic systems in the relatively young states in the developing world. Guided once again by the principles of comparative-static economics it was assumed that the private sector is hardly in a position to serve poor farmers in developing countries. Therefore public investment in international agricultural R&D, fertilizer production and irrigation was declared to be a public good that must be managed by the public sector. The resulting global public sector initiative is today widely known as the Green Revolution. The United States Agency for International Development (USAID) and the Rockefeller Foundation were the main financial contributors to the establishment of the first Centers of the Consultative Group of International Agricultural Research (CGIAR) in developing countries (Anderson et al. 1991). These CGIAR centers enabled Western scientists to work in well-equipped research centres in developing countries and design high-yielding varieties of major food crops such as maize, wheat and rice. The new varieties were subsequently distributed in rural areas through government agencies. The private sector was hardly involved, even though it later benefited from the scientific knowledge generated through this international undertaking (Parayil 2003). The research at these centres (i.e. CGIARs) contributed to significant increases in agricultural productivity and technology transfer to local universities and national research institutes in developing countries (Borlaug 2007).

As such the Green Revolution greatly contributed to global food security. However, the interaction between Western scientists, who developed high yielding varieties, and local farmers in developing countries who adopted these varieties through the national seed distribution programs, was rather poor. This led to some long-term problems such as inadequate use of pesticides,

insufficient operation and maintenance of irrigation systems, little seed choice for farmers and monoculture practices (Aerni 1999), and a general neglect of farmers in unfavourable area (Byerlee and Morris 1993) .

Left-wing development activists point at these unintended side effects of the Green Revolution and denounce them as the destructive forces of science and business, and they conclude that environmentally destructive monoculture practices must be part of the capitalist logic (Shiva and Bedi 2002). Yet, these undesirable side effects often turn out to be the result of too little rather than too much private sector involvement. For example, public sector researchers based at CGIARs did not have to bother much about the real and complex set of problems farmers are facing in the field or the particular consumer taste that is preferred by different cultures. They could just focus on plant variety traits that would increase yields and then select the elite varieties and hand them over to national agencies for distribution (Anderson et al. 1991). As a result, the private sector may have had little interest to invest in the development and commercialization of new varieties in developing countries. Thus, it largely stayed out of the Green Revolution. This explains for example why the greatest bottleneck in many poor countries is probably the absence of a local seed industry. It also explains why consumers in these countries still prefer the taste of the traditional varieties compared to the new hybrid varieties (Aerni 1999).

3.4 International Agricultural Research

After the end of the Cold War, the public interest in further investing in productivity improvements in agriculture quickly waned and priority in agricultural research shifted to agricultural monitoring as well as more strict food safety and environmental standards. Meanwhile, the adoption of new technologies in agriculture became increasingly suspicious in the eyes of public interest groups. This changing view of agriculture explains why federal funding for academic agricultural research, teaching and extension declined by 8% between 1988 and 2000 (Paarlberg 2008). The cut of public funding for agricultural research was even more radical in European countries. As a result of these cuts, annual public sector funding for international agricultural research conducted at CGIAR centers was reduced by roughly half the level of the 1980s (World Bank 2008) and the share of funding designed to enhance agricultural productivity fell from its original level of 74% in the mid 70s to just 34% in 2002 (Falcon and Naylor 2005).

The slump of public investment in agricultural productivity after the Cold War was not just related to the belief that the Green Revolution has fulfilled its purpose but the sudden pressure on governments to become more transparent and show more respect for tax payer and consumer perceptions and preferences. Taxpayers and consumers in affluent countries tend dismiss the role of business and new technologies in agricultural development. Farmers should instead rely on their traditional low-input and low-tech practices. Researchers may assist them in finding slightly better techniques of soil fertility and integrated pest management but, in general, farmers are to be encouraged to use the agricultural practices they would use anyway. This perception had also an impact on Western NGOs and the way they invest in agricultural development in poor countries. It became a sort of alternative agribusiness: farmers were taught how to use the method of organic farming and comply with public and private standards in required in developed countries. The NGO then ensured that the agricultural produce is exported to their respective home countries where it was sold under different kinds of environmental and social labelling schemes (Aerni 2006c). Such a strategy resembles the top-down approach of the Green Revolution: both strategies assume that there is a sort of market failure because business would not care about the poor. The only difference is that one approach looks at modern technology as the solution whereas the other one sees it as the main problem. However, the ideological mindset of anti-technology NGOs is likely to harm poor farmers in developing countries more than the previous overemphasis on public sector R&D. Farmers need to become actively involved in the process of technological change and they need to learn how to take advantage of the emerging knowledge economy.

Throughout history, technological innovation served on the long-run as a tool of empowerment of the underprivileged. Once a technology becomes a mass-produced and easy-to-handle commodity it becomes affordable to the poor and enables them to use it in a way that helps them dealing with their daily economic and environmental constraints that are related to scarcity rather than affluence. The global knowledge economy offers a unique opportunity for the poor by facilitating the formation of international social networks that are problem-oriented rather than value-oriented. They bring actors from different areas of expertise together and build bridges between the privileged and underprivileged in a joint effort to fight

problems that seriously affect the livelihood of the rural poor (Aerni 2006a). Such an unseen global connectivity has become possible because of the revolution in communication and information technologies. When applied to the food and energy problems it is increasingly linked to the biotechnology revolution that is taking place simultaneously. Both technologies are in use for more than two decades and are about to enter the age of mass customization that makes them cheaper, easy to replicate for poor countries and more adjustable to and combinable with local practices.

4. The potential to integrate agriculture into the new knowledge economy

Information and communication technologies transformed the World and re-defined the rules of the game in many industries. Patents and other intellectual property rights have become a sort of intellectual capital that is highly valued (The Economist 2005a). At the same the cost to replicate new knowledge and technologies are falling at a constant rate. Formerly secretive and dull multinational companies were forced to become more open, flexible and transparent in recent years in view of a fast-changing and uncertain world. In this World, Asian countries turned out to be very effective in copying new knowledge and technologies that help them create their own versions of it. At the same time, they produce the biggest pool of motivated talents in the high tech business and therefore force multinational companies to set up their new research centres in this region in spite of their concerns about weak intellectual property rights (The Economist 2008b). In fact, large companies in the IT as well as an in the biotech industry are selectively going open source because they are dependent on continuous knowledge exchange and cannot expect this to happen unless they are also more willing to make their knowledge available.

Unlike in the old economy where most developing countries merely played the role of suppliers of primary commodities and lacked the critical base of domestic human capital to make use of modern technology to develop their home-grown technologies, the new knowledge economy allows them to participate in the global economy to a far greater extent and even challenge the established business in affluent Western societies.

The models of neoclassical welfare economics that still rely on the classic textbook of Samuelson (1948) as well as the neomarxist theories developed after the first half of the 20th century (Prebisch 1951, Gunder Frank 1969) are unable to explain the sudden rise of emerging economies and the wealth they generated through the production of new goods and services in their countries. These new goods and services are also increasingly successful in the global market which is shifting from exclusive North-South trade to South-South trade (Newsweek Magazine, 2006).

There is however a more advanced economic theory called New Growth Theory, the economic theory of the new knowledge economy. This theory is based on the insight that it is monopolistic competition rather than perfect competition that creates rising standards of living, wealth and economic development. Unlike neoclassical welfare economics, it is able to take into account the welfare effects of new goods and services. New goods and services generate increasing returns, whereas established commodities are subject to decreasing returns. As such, they generate more capital and employment (Warsh 2006).

New Growth Theory rejects the idea of a social planner and sees opportunities where Welfare Economics just sees problems. It argues that knowledge applied in the process of innovation is a non-rival but partially excludable good (Warsh 2006). Investment in knowledge therefore generates increasing returns for a company through the creation of new markets in which it is initially in a position to set the price on its own terms rather than being a mere price taker and therefore confronted with decreasing returns as it is the case in the neoclassical assumption of perfect competition. Monopolistic competition allows a company to extract a small profit from the sale of the new product. This profit is then used to reimburse for the fix costs invested in research and development (R&D) and to reinvest in the improvement of the new good. This simple insight explains why the market economy continues to grow in spite of decreasing returns in existing commodity markets (Romer 1990). The old neoclassical growth model by Solow (1957) considers knowledge a public good that is produced exclusively in the public sector. It cannot explain why companies themselves invest in R&D. To date, his approach continues as to be the theoretical foundation of the analysis of R&D on agricultural development (Pardey et al. 2006, World Bank 2008)

Since knowledge applied in the innovation process is a non-rival good that is not subject to the laws of scarcity,

there is generally an underinvestment in knowledge. Neoclassical welfare economists can however not see this because they are mainly concerned with the optimal allocation of scarce resources (Warsh 2006).

If we want to improve our agricultural, development and environmental policies in the global knowledge economy to make a more effective use of our scarce resources, we need to focus on how to mobilize the production of knowledge, the only non-scarce resource, for the greater public good.

This would require the design of a new national and international institutional environment that is not just concerned with regulation but also provides more incentives for actors to invest in the acquisition of new knowledge. Companies that invest in new knowledge in order to generate new products and solutions not just for the affluent but also the poor, should be awarded accordingly. Such a shfit from regulation to facilitation in public policy would eventually lead to a transition from a mitigation-based to a more adaption-based concept of sustainable development as it is invoked in the new post-environmentalism approach (Nordhaus and Shellenberg 2007, Prins and Rayner 2007).

The increasing growth of knowledge increases the probability that new goods and services are generated through the commercial use of this knowledge. Knowledge therefore creates opportunities for nearly boundless growth, not by devouring more scarce resources (labour, land, natural resources) but by developing new ways (e.g. instructions, designs) how to make more efficient and creative use of existing resources. In other words, 'the raw materials that we use have not changed, but as a result of trial and error, experimentation, refinement, and scientific investigation, the instructions that we follow for combining raw materials have become vastly more sophisticated' (Romer 1994).

Knowledge therefore also holds the key to a more sustainable future. Investment in human capital and improved access to knowledge facilitates social empowerment through entrepreneurship and makes economic growth more compatible with environmental sustainability.

Current policies that still rely on neoclassical theories that did not prove to be very effective when applied to policies to improve the livelihoods and autonomy of the underprivileged poor people through their integration into the global knowledge economy. The failed integration of rural poor in the process of globalisation has fatal consequences because it increases their dependence on outside support and makes them more vulnerable to external shocks. The sudden rise in food prices was not their fault, but they suffer most from it due to their lack of purchasing power. Food prices are decreasing again in view of the disappearing short-term factors but hunger and starvation is likely to continue, not so much in the noisy cities where the poor are well organised but in remote rural areas that are often not even connected to food markets (Aerni 1999). They face an increasing inability to produce sufficient food for themselves because their yields are subject to biotic and abiotic stresses that cannot be controlled because of lack of access to means of plant protection and improved varieties that are more resistant to salinity, drought or floods. Moreover since hardly anything has been invested into the genetic improvement of their orphan food crops and their livestock they are facing decreasing yields even in the absence of nature-related stress factors. An additional problem is that temporary yield surpluses often go waste because of lack of post-harvest facilities and lack of infrastructure to bring the surplus on the market in other regions (Aerni 2006b).

It is not that development organisations involved in North-South Collaboration do not see these problems but their focus on training these people to become self-sufficient rather than growth-oriented is preventing them from actively participating in the new opportunities that are offered by the global knowledge economy (Aerni 2006c).

This is in large difference to the growing South-South collaborations that are more focused on enabling the poor to participate in globalisation and improve their situation by combining their traditional knowledge with new knowledge and technologies. The emerging orphan crop research networks such as the Cassava Biotechnology Network shows how successful such a collaboration can become. Initially this was a classic North-South initiative but when agricultural biotechnology started to face an acceptance problem in Europe, public funding was cut for this highly interdisciplinary multi-stakeholder network. This weakened the influence of Northern donors and strengthened the role of Southern partners. The research priorities shifted accordingly (Thro et al. 1998). Even though funding has become more scarce, these crop networks are offering a new inclusive approach in research by facilitating more exchange between agro-ecologists, social scientists and molecular biologists and by setting research priorities in accordance with local farmer preferences and local private sector activities

(Aerni 2006a). The primary goal has become the development of useful products and services for resource-poor farmers that enable them to improve their livelihoods by actively participate in national or even international agricultural markets.

The Cassava Biotechnology Network is only one example of best practices that could be replicated in other areas and guide food as well as development and environmental policies. Interestingly, best practices in combining affordable technological solutions with local knowledge are mostly developed by people in developing countries themselves who have simply more experience and are more familiar with the constraints rural people face on the countryside. Frugal engineering enabled these countries to create entirely new markets that cater to the mass markets of the metropolitan areas of other developing countries rather than to large consumer markets of affluent societies (The Economist 2008a). The frugal engineering approach could now also be promoted through the establishment of institutions of higher learning in rural areas of developing countries. Their livelihoods are different from those in metropolitan areas and they have different needs and face more constraints. Low-tech innovations or successful and cheap combinations of high-tech and low-tech solutions developed by local people in rural areas could face a demand in other regions and thus create new markets that cater to rural businesses in developing countries (Rich 2007). In this context, New Zealand provides evidence that agriculture can be fully integrated into the global knowledge economy by enabling farmers to better take advantage of the new knowledge and technologies that are relevant in the business of agriculture. It has adopted the principles New Growth Theory to reform its agricultural policy in the 1980s.

4.1. Agricultural sustainability according to New Zealand

New Zealand has liberalized its agricultural sector in the 1980s. As a consequence of this agricultural reform that has removed production as well as income subsidies, government assistance in New Zealand is limited to support for research, pest and disease control, agri-environmental measures and climatic disaster relief (MAF 2003). Its reforms also caused the market focus in agriculture to shift from commodity to added value business and from a 'command and control' policy approach to a more bottom-up and incentive-based approach (Chamberlin 1996). At the same time the national Crown research institutes were semi-privatized and encouraged to collaborate with farmers and the private sector to address the challenges of environmental sustainability and develop new agricultural products. This collaboration is increasingly contributing to a modern agricultural economy that is focused on added-value and, at the same time, a more sustainable use of natural resources. In spite of the agricultural reforms, the number of rural land holdings in New Zealand remained more or less constant at around 80'000 (approximately half are commercial farms and half are 'lifestyle blocks') (MAF 2003). New Zealand has a major interest in ensuring the sustainability of its competitive and export-oriented agricultural sector since an overexploitation of its natural resources would not just undermine its competitiveness in agriculture and harm its 'clean and green' image but also affect its large tourism industry. Yet, it pursues a different approach to address the challenges of 'multifunctionality'. The Resource Management Act (RMA) passed in 1991, is serving as the legal foundation for New Zealand's endeavour to improve agricultural sustainability. It is based on a highly decentralized bottom-up approach to environmental policy. Even though it authorizes the government to issue national environmental standards, it is up to the local authorities (Regional Councils) to choose the best approach on how to implement them. They set the context for development in their regions and provide a framework for district plans (PCE, 2005). Even though Regional Councils are often dominated by rural interests and slow in embracing bold environmental policies, they may at least ensure the proper implementation of the jointly developed strategy.

Apart from environmental regulation, the government as well as farmer organisations in New Zealand are committed to promote innovation and competitiveness in agriculture through investment in research and development. The Foundation for Research, Science and Technology (a branch of the Ministry of Research, Science and Technology) plays a major role in the funding of research on new ways to improve sustainable agriculture. It has established relationships with all the major research organisations and key users of science (private sector, local authorities, government agencies, and other public interest groups) that share the same commitment to convert New Zealand into a full-fledged sustainable knowledge economy (FRST, 2005). The focus on creating value and innovation in agriculture has not just triggered entrepreneurial activity in the research centres that focus on precision agriculture and biotechnology but also on those that are dedicated to ecological agriculture.

Their innovation focus generally enhanced national competitiveness through science, technology and innovation. In most areas where research projects are submitted to the Foundation, it is required that universities and the Crown Research Institutes show how their research contributes to a sustainable and innovation-driven economy. This has led to lots of public-private research projects that have resulted in new products that benefit the environment (FRST 2005). For example, Lincoln University and the fertilizer company Ravensdown have developed a nitrification inhibitor (eco-n) for cows that reduces nitrate leaching (resulting from cow urine patches) into the groundwater and leads to an emissions reduction of greenhouse gas nitrous oxide. Another example is a Rapid Pasture Meter/Sensor, a product jointly developed by the Centre for Precision Agriculture at Massey University and the company C-Dax. The technology helps farmers to optimize fertilizer and water application in livestock farming. Apart from these cases, numerous joint-ventures between public and private research laboratories are dedicated to the use the new tools of agricultural biotechnology to develop more sustainable and profitable new products (Aerni 2006c).

Overall, agricultural sustainability in New Zealand means something completely different than in Europe. The New Zealand government agrees that the farmers are not just producing food but must also ensure the sustainable management of natural resources, but not because these would reflect the postmaterial values of taxpayers but because it is in their self interest. For the New Zealanders, agriculture is still a business and therefore a nanny state is neither desirable nor affordable (Chamberin 1996). Interestingly farmers in New Zealand have become so independent that they invest themselves in research and development to solve particular short-term problems. Most producers in the livestock and dairy sector are members of farmer service organisations such as Dexcel (research and extension), Dairy InSight (industry good activities) and Livestock Improvement Corporation (animal welfare/breeding services). These organisations are mostly owned and funded by the farmers themselves and assist them with research on short-term problems in dairy and livestock farming. Similar organisations exist in other fields of agricultural production.

Farmers themselves have responded to environmental challenges by looking for new market opportunities (diversification), adopting new environmentally friendly technologies, and adjusting their land use to the relative profitability of different products (cultivation in ecological fragile areas decreased significantly after the end of subsidies in the 1980s).

In terms of cultural aspects of sustainable development, the promotion of cultural rights of the native Maori community has become a major focus of the New Zealand government. Yet, the younger generation of Maori leaders argue that Maoris should not rely on mere state dividends for bad things that happened in the past because this would produce a passive grievance culture and a feeling of victimhood that prevents them from actively embracing social empowerment through entrepreneurship and the acquisition of scientific and technical knowledge. There is a general view that a minority culture can only survive in the process of globalization if it actively participates and changes. Government subsidies are important but they need to support cultural entrepreneurship rather than focus on cultural conservation (Wolfgramm 2007, Aerni 2007c).

It is not surprising that this mentality of being active and entrepreneurial across the different cultures in New Zealand has contributed to more self-confidence on the countryside, more food security, more agricultural diversification and innovative environmental management methods. In this context New Zealand served as an incubator for a new experiment in agricultural policy and as such falsified neoliberal and neomarxist thinking alike. The agricultural, environmental and developmental policies that are still based on these old theories may therefore have to be reformed and adopt a more adaptation-based approach to sustainable agriculture and embrace New Growth Theory.

The lesson of New Zealand also indicates that the policy approach applied during the first wave of globalisation in the 19th when the land grant college system in the United States (Widder 2005) and the national agricultural research institutes in Europe (Brugger 1956) were set up to support farmers in their efforts to find solutions to the changing economic environment, is gaining new relevance. Understanding the historical experience of agricultural development may therefore lead to more effective policies that better facilitate rural empowerment, prevent environmental degradation and ensure food security in the 21st century – and all this without having to revert to trade protectionism.

4.2 Lessons to learn for Africa

The New Zealand model of rural development may also be adjustable to countries in Sub-Saharan Africa. For too long African governments and international aid institutions have failed to invest in human capital on the countryside and neglected the role of national universities and the local private sector as engines of economic and technological change (World Bank 2008, Aerni 2007c). There are however significant differences between New Zealand and Sub-Saharan Africa that need to be taken into account. New Zealand could count on a lot of tacit knowledge that its people acquired in the course of the young history of this remote island. Europe was to far away and many products and technologies had to re-invented in New Zealand. This is a big difference to Africa which is close to Europe and largely relying on European experts and technologies. It has little incentives to invest in home-grown technologies. Yet the institutional reforms of New Zealand that were created to encourage entrepreneurship and innovation on the countryside could also be partially adopted in Africa. This would require a switch from top-down social planning to a bottom-up approach that is primarily focused on best practices rather than social theory. The Cassava Biotechnology Network, for example, has shown that it is possible to combine low tech and high tech solutions in form of a participatory approach and hand out the new tools to local entrepreneurs that effectively commercialize them in marginal rural areas that normally don not benefit from any private sector investments (Aerni 2006a).

4.3 Harnessing the biotechnology revolution to address the food and energy crisis

Small local initiatives that enhance food security in remote rural areas are a very valuable contribution to the alleviation of hunger and poverty because there are still by far more people starving on the countryside than in urban areas, even though it is not on the radar screen of the mass media because it is not sufficiently noisy (World Development Report 1998, Masters 2005).

Yet, the trend clearly shows that World agriculture needs to increase its overall productivity if it wants to face the challenge of feeding 9 billion people in 2050 on this planet. They will all eventually desire to eat more meat and dairy products that require more water and energy in the course of production. In this context, it is not sufficient to just produce more food, it also needs to be achieved with less impact on biodiversity, less energy consumption, less water and on less land (Diouf, 2008).

Agricultural biotechnology and genetic engineering can play a crucial role in meeting these challenges. Many people may not be aware of it, but genetic engineering may be able to stop rather than promote the loss of agro-biodiversity. This because many of the not so profitable crops that are only grown by subsistence farmers in developing countries are threatened by deadly plant viruses, pest infestation and/or genetic erosion. All these problems are threatening the abandonment and eventual extinction of these crops. Conventional breeding may help to make some of these crops resistant to a disease or pest but at high public expenses and with the side-effect that the multiple crossing with other varieties leads to the loss of the preferred taste of the original traditional variety which then also results in the non-adoption by the local farmers. Genetic engineering has the potential to ensure resistance without affecting taste. Instead of the crossing the local variety with more resistant varieties from elsewhere the gene construct that confers resistance is directly inserted into the plant. This allows it to preserve its local taste and thus makes it more likely that local farmers continue to grow it (Normile 2008). A recent study show that it is possible to reduce photorespiration in a plant by means of genetic engineering. This may offer new opportunities to increase biomass for feed or energy. Production, not by applying more water and fertilizer, but simply using a more effective use of sunlight (Kebeish et al. 2007).

A recent report of the International Center for Strategic and International Studies argued that the global trend in industry to move from the petrochemical age into a new biology age must receive more investment because it is the only effective way to make a more effective use of our natural resources, manage climate change, reduce the likelihood of war and increase food security on this planet (CSIS 2006). Advances in agricultural biotechnology may well help to attract more public interest and more private sector investment. This would help accelerate the transition.

5. Conclusions

The future challenge of ensuring affordable food worldwide without further undermining our natural resource base can only be achieved if the promotion of technological innovation and the competent coaching of entrepreneurial farmers is assuming a more prominent role in

agricultural-, environmental-, and development policies. Facilitating such a bottom-up induced change would require a willingness of governments to return decision-making power to farmers and semi-privatise agricultural research institutes in order to make them more responsive to the needs of the farming business. This article provided an overview of successful community, research and policy initiatives that adopted this new policy paradigm and thus contributed to sustainable development on the local, regional and sometimes even global level.

The revolution in information and communication technologies is allowing the private sector to increasingly support the public sector in the effective provision of public goods (Heal 1999). The future management of global public goods in rural areas will therefore be largely based on public-private partnerships that aim at developing new agricultural products and services that generate increasing rather than decreasing returns. The resulting welfare effects for the respective rural regions are likely to reduce poverty and starvation and foster rural empowerment. Unfortunately, these welfare effects produced by new goods and services are not taken into account in neoclassical welfare economics because of the theory's implicit assumption is that all goods and services that could possibly exist, do already exist (Warsh 2006). As a consequence, this still dominant theory in economics does not allow for the possibility of increasing returns but only decreasing returns over time. It is also unable to recognize that it is monopolistic competition rather than perfect competition that creates innovation and wealth in society.

The hypothesis of the agricultural treadmill (Cochrane 1979) that technological innovation in agriculture would benefit consumers rather than farmers provides the underpinning for state intervention and income support for farmers during the Cold War period. After the Cold War, protectionist policies and farm support measures continued to stick to this comparative static but inadequate view of technology in agriculture. However instead of legitimizing state intervention in the name food security it was now justified with the purpose of maintaining a multifunctional agricultural system. In other words, neoclassical welfare economics continues to shape national and international agricultural policies even though the global knowledge economy has changed the rules of the game and would offer farmers new opportunities to address their agricultural problems through the development of new added-value goods and services that have increasing rather than decreasing returns. The consequence of these continuing defensive agricultural policies are a generally hostile public attitude towards agricultural trade and farmer organisations that invest in political lobbying rather than research and innovation.

The adoption of New Growth Theory in agricultural policy could return decision making power to farmers and allow them to successfully participate in the global knowledge economy. New Zealand agricultural policy has applied it successfully over the past two decades and its results prove that the expected outcome does not just exist in theory.

New Growth Theory has also the potential to improve development and food security in Sub-Saharan Africa. The paper illustrates several examples on how low-tech and high-tech solutions have been successfully combined and applied in semi-subsistence agriculture. It led to the social and economic empowerment of farmers and improved local food security and wealth. In this context, agricultural biotechnology proved to be particularly useful. Tissue culture laboratories and local varieties that are resistant to biotic and abiotic stresses are of high value to small-scale farmers. In addition to addressing local food security problems, biotechnology will eventually also play a major role in helping to solve the food and energy crises through a generation of new crops that will contribute to a transition from a petrochemical-based industry into a more clean biology-based industry. The potential of agricultural biotechnology is however far from being reached mainly because of the ongoing ideological divides. The refusal to combine best organic farming practices with the best of agricultural biotechnology, and the failure to provide the necessary policy incentives for the private sector to invest in the genetic improvement of orphan crops reveals that winning the 'value'-discourse is still more important than solving the real problems of the rural poor.

References

Aerni, P. (2006a) Mobilizing science and technology for development: The case of the Cassava Biotechnology Network (CBN). AgBioForum 9(1): 1-14.

Aerni, P. (2006b) Agriculture in New Zealand. Making global competitiveness compatible with environmental sustainability. Op-ed. CIS News: 7-9.

Aerni, P. (2006c) The Principal-Agent Problem in International Development Assistance and its Impact on Local Entrepreneurship in Africa: Time for New Approaches".

ATDF Journal 3(2): 27-33.

Aerni, P. (2007a) Agricultural biotechnology and its contribution to the knowledge economy. Adv. Biochem. Engin./ Biotechnol. 107: 69-96.

Aerni, P. (2007b) Agriculture in Turkey: structural change, sustainability and EU compatibility. Editorial. Int. J. Agr. Resour. Govern. Ecol. 6(4/5): 429-439.

Aerni, P. (2007c) Exploring the linkages of commerce, higher education and human development: A historical review". ATDF Journal 4(2): 35-48 .

Aerni, P. (1999) Public Acceptance of Transgenic Rice and its Potential Impact on Rice Markets in Southeast Asian Countries". Swiss Federal Institute of Technology, ETH Zurich, Switzerland.

Aerni, P. and Bernauer, T. (2006) Stakeholder attitudes towards GMOs in the Philippines, Mexico and South Africa: The issue of public trust. World Development 34(3): 557-575.

Anderson, R.S., Levy, E., and Morisson, B.M. (1991) Rice Science and Development Politics. Research Strategies and IRRI's Technologies Confront Asian Diversity (1950-1980). Oxford: Clarendon Press.

Anderson, R.S., Levy, E., and Morisson, B.M. (1991) Rice Science and Development Politics. Research Strategies and IRRI's Technologies Confront Asian Diversity (1950-1980). Oxford: Clarendon Press.

Ansell, C. and Vogel. D. (2006) What's the Beef? The Contested Governance of European Food Safety. Cambridge, MA: MIT Press.

Appiah, A. (2007) What Was Africa to Them? The New York Review of Books 54 (14), September 27, 2007.

Baker, C. B. and Swanson, E. R. (1964) The Training of Agricultural Economics in the USSR. Journal of Farm Economics 46(3): 547-555.

Borlaug, N. (2007) Continuing the Green Revolution. The Wall Street Journal Op-Ed, July 18th, 2007.

Brugger, H. (1956) Die Schweizerische Landwirtschaft in der ersten Hälfte des 19. Jahrhunderts, Huber Verlag, Frauenfeld.

Byerlee, D. and Morris, M. L. (1993) Research for marginal environments: Are we underinvested? Food Policy 18 (5): 381-393.

Chamberlin, B. (1996) Farming and Subsidies: Debunking the Myths. Euroa Farms Ltd., New Zealand.

Center for Strategic and International Studies (CSIS) (2006) Biotechnology and Agriculture in 2020. Washington D.C.: The CSIS Press.

Cochrane, W. W. (1979) The Development of American Agriculture: A Historical Analysis. Minneapolis: University of Minnesota Press.

De Schutter, O. (2008) Adress by the UN Rapporteur on the Human Right to Food. High-Level Conference on Food Security, Rome 3-5 June, 2008.

Desta, M. G. (2002) The Law of International Trade in Agricultural Products: From GATT 1947 to the WTO Agreement on Agriculture. London: Kluwer.

Diouf (2008) Speech delivered on behalf of Dr Jacques Diouf, Director-General of FAO. Conference on Fighting Food Inflation through Sustainable Investment, March 10, 2008. London. www.ebrd.com/country/sector/agri/conference/jd.pdf

Falcon W. P. and Naylor, R. L. (2005) Re-thinking food security for the 21st century. Am. J. Ag. Econ.87(5): 1113-1127.

FAO (2008) Soaring Food Prices: Facts, Perspectives, Impacts and Actions Required. Prepared for the High-Level Conference on World Food Security, 3-5 June 2008. Rome: FAO, April (50 pages). Available online, at ftp://ftp.fao.org/docrep/fao/meeting/013/k2414e.pdf.

Foundation for Research, Science & Technology (FRST) (2005) Statement of Intent 2005-2008. Wellington, New Zealand..

Frank, A. G. (1969) Kritik des bürgerlichen Anti-Imperialismus, Berlin, Wagenbach.

Heal, G. (1999) New Strategies for the Provision of Public Goods. In Kaul, I., Grunberg, I., Stern, M. A, (eds) Global Public Goods: International Cooperation in the 21st century. Oxford University Press, New York.

IAASTD (2008) http://www.agassessment.org/

International Herald Tribune (2008) Charity finds that U.S. food aid for Africa hurts instead of helps. By Celia W. Dugger. August 14th, 2007.

Kebeish, R., Niessen, M., K., Thiruveedhi, K., Bari, R., Hirsch, H-J., Rosenkranz, R., Stäbler, N., Schönfeld, B., Kreuzaler, F. and Peterhänsel, C. (2007) Chloroplastic photorespiratory bypass increases photosynthesis and biomass production in Arabidopsis thaliana. Nature Biotechnology 25(5): 593-599.

Kleijn, D., Berendse F., Smit R., Gilissen, N. (2001). Agri-environment schemes do not effectively. protect biodiversity in Dutch agricultural landscapes? Nature 423, 723-725.

Liebhardt, J. (2008) The Shrinking Effectiveness of U.S. Food Aid. Online Africa Policy Forum, International Center for Strategic and International Studies. May 5, 2008. http://forums.csis.org/africa/?p=104&print=1

Masters, William A. (2005), "Paying for Prosperity: How and Why to Invest in Agricultural R&D for Development in Africa." Journal of International Affairs 58(2, Spring): 35-64. (http://jia.sipa.columbia.edu.)

Masters, William A. and Andres Garcia (2008), "Food and Agricultural Policy: Stylized Facts and Explanations". Working Paper available online at www.agecon.purdue.edu/staff/masters.

Ministry of Agriculture and Forestry (MAF) (2003) Agricul-

ture and Forestry in New Zealand. An Overview. Wellington.

Nature Biotechnology Editorial (2008) Off the Rails. Nature Biotechnology 26(3): 247.

Newsweek Magazine (2006) Flying South (by Mac Margolis). Newsweek Magazine January 2nd, 2006.

Ng, F. and M. Ataman A. (2008), "Who are the net food importing countries?" Policy Research Working Paper 4457. Washington, DC: The World Bank. (http://go.worldbank.org/99JY8FVKF0.)

Nordhaus, T. & Shellenberger, M. (2007) Break Through: From Death of Environmentalism to the Politics of Possibility. Houghton Miflin Company, New York.

Normile, D. (2008) Reinventing Rice to Feed the World. Science (321):.330 – 333.

Olson, M. (1965) The Logic of Collective Action: Public Goods and the Theory of Groups, Harvard University Press.

Paarlberg, R. (2008) Starved for Science. How Biotechnology is Being Kept Out of Africa. Harvard University Press, Cambridge, MA.

Pardey, P. G. , Alston J. M., Piggott R. (Eds) (2006) Agricultural R&D in the Developing World. International Food Policy Research Institute, Washington DC.

Parliamentary Commissioner of the Environment (PCE) 2004. Growing for Good: Intensive Farming, Sustainability and New Zealand's Environment. Parliamentary Commissioner of the Environment, Wellington.

Prins, G. & Rayner S. (2007) Time to Ditch Kyoto. Commentary. Nature 449, 973-975.

Rentsch, H. (ed) (2006) Der befreite Bauer. Zürich: NZZ Verlag.

Paralyil, G. (2003) Mapping technological trajectories of the Green Revolution and the Gene Revolution from modernization to globalization. Research Policy 32(6): 971-990.

Rich, S. (2007) Anil Gupta and the Honey Bee Network. World Changing, March 21st, 2007. http://www.worldchanging.com/archives/006333.html

Rieder, P. and Anwander Phan-Huy, S. (1994) Grundlagen der Agrarpolitik. Zürich: v/d/f Hochschulverlag AG, an der ETH Zürich.

Romer, P. (1990) Endogenous Technological Change. Journal of Political Economy 98(5): 71-102.

Romer, P. (1994) New goods, old theory, and the welfare costs of trade restrictions. Journal of Development Economics 43: 5-38.

Rosenberg, N. (2000) Schumpeter and the Endogeneity of Technology: Some American Perspectives. New York: Routledge.

Samuelson, P. A. (1948) Economics (18th edition published in 2004). New York: McGraw-Hill/Irwin

Shiva, V. and Bedi, G. (Eds), 2002. Sustainable Agriculture and Food Security: The Impact of Globalization. Sage Publications Pvt. Ltd, New York.

Solow, R.S. (1957) Technical Change and the Aggregate Production Function. Review of Economics and Statistics 39: 312-20.

Southgate, D., Graham, D. H. and Tweeten, L. (2007) The World Food Economy. Blackwell Publishing 2007, Malden MA.

Stokstad, E. (2008) Duelling Visions for a Hungry World. Science 319: 1474-76.

The Economist (2005a) A market for ideas. A survey on patents and technology. October 20th 2005

The Economist (2005b) The poorest part of America. December 8th, 2005.

The Economist (2006) The battle for brainpower: A survey on talent. October 7th, 2006.

The Economist (2008a) The New Face of Hunger. April 17, 2008.

The Economist (2008b) Charlemagne: let them it cake. May 22, 2008.

The Economist (2008c) A bigger world: A special report on globalisation. September 20th, 2008.

Thro, A..M, Taylor, N., Raemaker, K., Puonti-Kaerlas, J., Schöpke, C., Visser R., Iglesias C., Sampaio M. J., Fauquet, C., Roca1, W. & Potrykus, I. (1998) Maintaining the Cassava Biotechnology Network. Nature Biotechnology 16: 428 – 430.

Timmer, P. C. (2008a) staving off the food crisis. Nature 453, 722 – 723.

Timmer, P. C. (2008) Rural changes stimulate rising giants. Science 331: 642.

Urquart, B. (1990) The UN and its Discontents. New York Review of Book 37 (4), March 1990.

Warsh, A. (2006) Knowledge and the Wealth of Nations. New York: W. W. Norton.

Whitfield, J. (2006) Agriculture and Environment: How green was my subsidy?. Nature 439: 908-909.

Widder, K. R. (2005) Michigan Agricultural College. The Evolution and Philosophy of A Land-Grant Philosophy. Michigan State University Press, East Lansing, Michigan.

Wolfgramm, R. (2007) Continuity and vitality of worldview (s) in organizational cultural orientations: Towards a Maori perspective. PhD Thesis, University of Auckland.

World Bank (2007) World Development Report 2008: Agriculture. Washington DC: World Bank. http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTWDR2008/0,,menuPK:2795178~pagePK:64167702~piPK:64167676~theSitePK:2795143,00.html

PROMOTING COMMERCIAL AGRICULTURE IN AFRICA

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Abstract

This article looks at African agriculture from a business perspective and highlights the current status of agriculture and agribusiness. It seeks to address a number of key questions: To what extent is African agriculture becoming a business and what are the driving forces to make agriculture more market-oriented? How can the domestic and international private sector become a driver of change?

1. Introduction

Agriculture is the dominant sector in most African countries and plays an essential role in rural and overall economic development. More than 60 per cent of Africa's active labour force earns a livelihood in the agricultural sector. Thus, the future of Africa is closely intertwined with the development of its agricultural sector.

However, Africa's potential with respect to commercial agriculture is largely untapped, and the current status of agriculture is a source of major concern. The sector is dominated by poor smallholders, often solely engaged in subsistence agriculture, while the agribusiness sector is in its infancy in most countries. Smallholders face tremendous challenges in accessing input and output markets and find themselves trapped into a vicious cycle of low income, low inputs and low productivity. In 2006, the African average cereal yield was only 40 per cent of the Southeast Asian average.

African agriculture has undergone major market reforms and external liberalisation during the past two decades. All in all, however, these reforms have failed to generate sufficient supply responses to enable agriculture to play a central role as a main driver of growth and poverty reduction. Instead, food availability per capita has declined by 3 per cent in sub-Saharan Africa since 1990, in sharp contrast with increases of more than 30 per cent in Asia and 20 per cent in Latin America. Also, Africa currently imports 25 per cent of its food grains (OECD, 2006, pp. 42-45). The poor performance of African agriculture implies that the continent has been lagging behind in adapting to the structural transformation of the international agro-food market which has opened up new business opportunities for developing-country producers, while at the same time increasing competitive pressures (OECD Development Centre 2007, Chapter 3).

It is in this context that since the turn of the new millennium there has been renewed political interest in supporting agriculture as a sectoral priority. The New Partnership for Africa's Development (NEPAD) has been instrumental in bringing up agriculture on the national and international policy agenda in the 2003 CAADP (Comprehensive Africa Agriculture Development Programme) framework. Given the limited financial resources available to most African governments, it has become critically important to mobilise additional resources, including those coming from bilateral and multilateral donors and the domestic and international private sector.

Additional resources are clearly needed. Over the last two decades, with few exceptions, the allocation of public resources to agriculture has shrunk dramatically. Reversing that trend today is as important as ensuring that scarce resources are efficiently allocated to priority, productivity-enhancing investments.

Donors have already funded a wide array of projects and programmes in agriculture and agribusiness and increasingly put emphasis on the need to promote agro-based private sector development. The international aid effectiveness agenda highlights the importance of aligning donor activities to the recipient country's priorities and of improving co-ordination among donors, to minimise duplications and reduce the bureaucratic burden on the local administration. In this respect, various aid modalities have been devised, including sector-wide approaches to agricultural development. Given the cross-cutting nature of such aid that is closely connected to aid for trade and private sector development, the formulation and implementation of effective agricultural development programmes will remain a major challenge to many African countries.

The paper is based on the book Business for Development08: Promoting Commercial Agriculture in Africa. The books presents an overview of the evolution of world agricultural trade since the mid-1980s, with a focus on four major product groups (bulk commodities, horticulture, semi-processed and processed products) and highlights major characteristics of African agricultural trade (Chapter 1). Chapter 2 makes a first attempt at portraying Africa's corporate landscape in the agro-food sector: who are the major corporate players, both foreign and African, operating in the continent today? Chapter 3 discusses issues related to aid for agriculture in a broader Aid for Trade context. Chapter 4 looks at what governments and donors are actually doing on the ground to promote commercial agriculture in Africa and presents key policy messages emerging from five country case studies. These countries are Ghana, Mali, Senegal, Tanzania and Zambia. The detailed country case studies are available in the Business for Development website: www.oecd.org/dev/publications/businessfordevelopment.

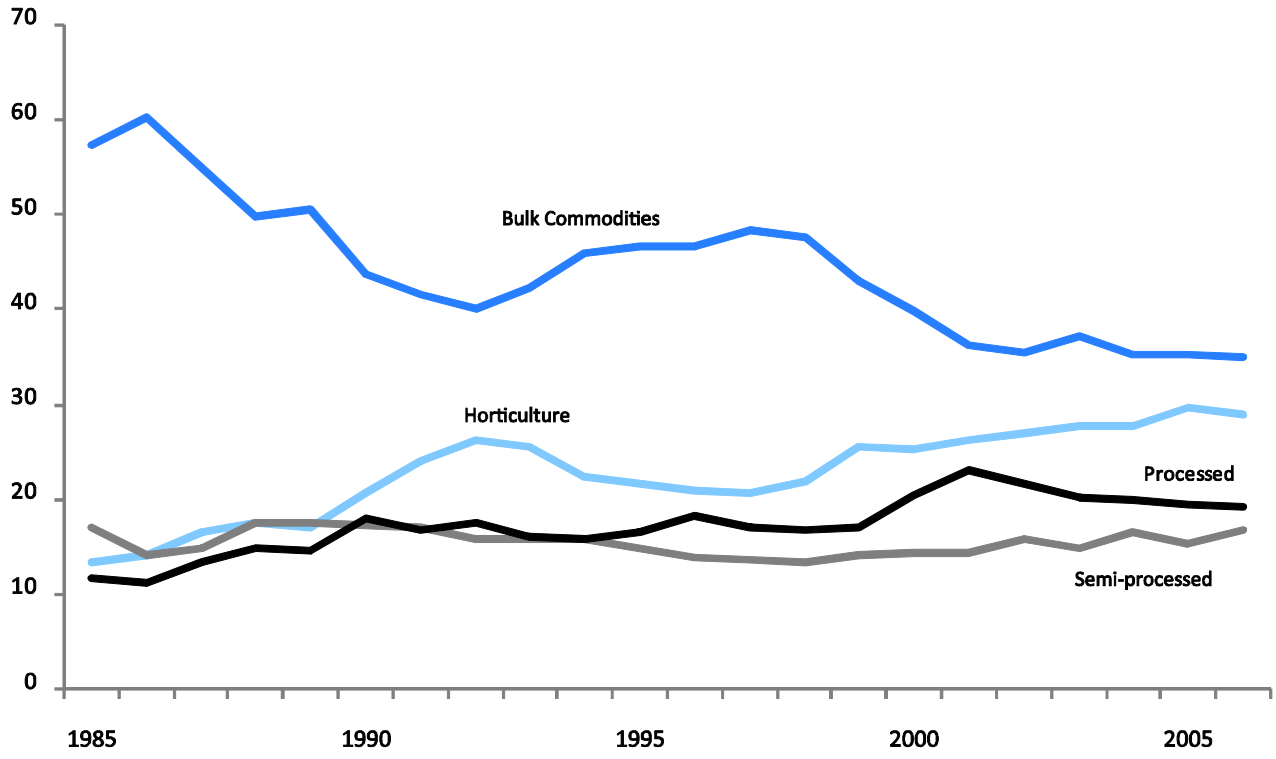
Major questions addressed in the book include: To what extent is African agriculture becoming a business? What are the driving forces to make agriculture more market-oriented and stimulate the development of specialised enterprises for agro-food products? How can the domestic and international private sector become a driver of change? What are African governments and their development partners doing to promote such transformation towards commercialisation?

In what follows, the major messages emerging from the book are highlighted.

2 Africa's declining share in world agricultural trade

African countries participate in the expansion of world agricultural trade but their contribution is relatively small. Looking at the evolution since the mid 1980s, the share of African products in world agricultural imports has actually declined from 5.4 per cent in 1985 to 3.2 per cent in 2006 (Figure 1). Moreover, agricultural exports are highly concentrated in a small number of countries. Over the 2002-05 period, the largest exporter was South Africa followed by Côte d'Ivoire and Ghana, and these three countries accounted for about 56 per cent of total exports from sub-

Figure 1. World Agricultural Imports from Africa by Product Group



Source: United Nations/COMTRADE. 2http://dx.doi.org/10.1787/334136755037

Saharan Africa. Trade in agricultural products represents less than 20 per cent of Africa's total intra-regional trade, although this figure is likely to be too low, given the high levels of informal, non-recorded cross-border trade in food products.

Africa's small share in world agricultural exports may be partly explained by the fact that world agricultural trade is no longer dominated by bulk commodities. Trade in processed food and horticulture (e.g. flowers, fruits and vegetables) has grown twice as fast as bulk commodities over the last 25 years, attaining an export growth comparable to the growth of non-agricultural products. In contrast, trade in bulk commodities has been least dynamic and its relative share in total agricultural exports has declined substantially. Such broad patterns of the evolution of world agricultural trade suggests that a significant part of global agro-food trade has become less dependent purely on natural resource endowment and has moved downstream along the value chains. On the other hand, most developing countries that remained commodity-dependent in 2003-05 have been struggling to defend historical positions in the international market. Africa is home to about two-thirds of such commodity-dependent developing countries.

Africa's specialisation in agricultural trade, although slowly changing, is overwhelmingly in bulk and horticulture, i.e. products whose production is related to geographical conditions. Achieving vertical diversification towards processed, higher value-added products has proved more difficult for Africa than for other developing countries. None of the countries from sub-Saharan Africa is among the world's leading exporters of processed products. This suggests that Africa today has a competitive disadvantage in agro-processing, since the proportion of transaction costs over total costs is higher in this segment of the agro-food sector because of poor logistics, red tape and the high cost of capital. While this is certainly a problem for Africa, better policies can help solve it through the improvement of the business environment and the creation of the conditions necessary for higher private investment in agri-business.

The rise of China and India represents a new and potentially very significant opportunity for Africa's agricultural exports. In their search for commodities, these countries have already strengthened their trade links with the continent. Rapidly growing incomes in these two giants are likely to fuel a strong surge in their demand for food, including through imports. In fact, their agricultural imports from Africa have increased rapidly over the past ten years, although from a small base. Today they represent one of Africa's most important export markets for agricultural products, accounting for about 7 per cent of its exports.

In assessing the scope for further expanding agricultural and food trade with Asia, it is interesting to note that agriculture accounts for about 10 per cent of India's imports from Africa, but it represents less than 4 per cent of Chinese imports from the continent. The product composition differs too, with bulk commodities dominating China's agricultural imports from Africa, while horticultural products account for roughly two-thirds of India's agricultural imports from the continent.

The trading opportunities in agriculture would increase further if both developed and developing countries were to reduce import tariffs and cut domestic subsidies globally and regionally. Agricultural policies of OECD countries, by supporting their farmers through cash transfers or market price supports, have been blamed for preventing developing countries, including those in Africa, from further developing their agricultural sectors. However, more recent analysis questions this conventional wisdom as many countries in Africa are net food importers. At the same time, there might be dynamic effects, where higher prices arising from trade liberalisation could trigger investment, resulting in more production and competition and lower prices in the longer term. How countries will be affected following a successful conclusion of the Doha Development Agenda depends obviously on how ambitious the final agreement will be, but also on the net trade positions and other supply-side particularities of the individual countries.

At the same time, reducing import tariffs may not result in a strong rise in exports, since non-tariff barriers play a major role in agricultural trade, especially for processed products. In addition, many African countries lack the capacity and infrastructure to meet the international standards required for them. In fact, the most valuable and dynamic segments of the agricultural sector are subject to increasingly stringent scrutiny under both international food and health regulations and private standards imposed by supermarkets. Adjusting to the new trading and regulatory environments governing agriculture poses a major challenge for Africa. This is an area where technical assistance from donors and international agro-food corporations would prove very useful.

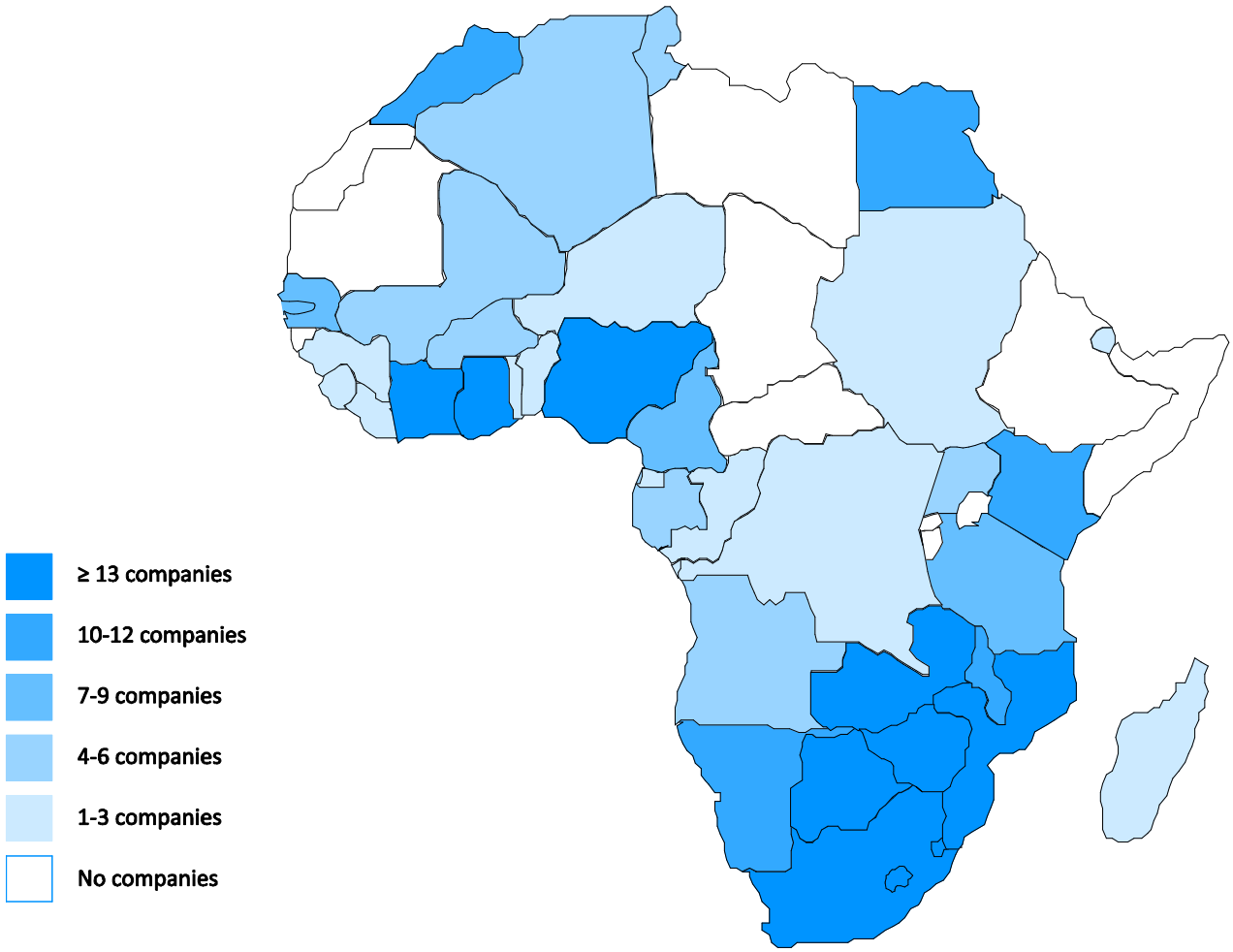
3. Africa on the radar screens of agro-food multinationals

The agro-food sector, spanning the range from input supply (e.g. seeds and fertilizers) to retail, has experienced a strong drive towards globalisation, both in terms of the reach of its sourcing — suppliers in many developed and developing countries participate in global value chains, co-ordinated by buyers and supermarkets — and in terms of the degree of internationalisation of major corporations. A relatively small group of very large multinational corporations (MNCs), spreading their reach across the globe, dominate the sector.

To what extent is Africa involved in the global agro-food system? Who are the major corporate players operating in the continent's agricultural sector today? Very little is known about private enterprises in the agro-food sector in Africa. The up-to-date company information based on *Fortune Global 500* and Jeune Afrique *Les 500*, published in 2007, provides a starting point to map Africa's corporate landscape in this sector.

African countries are gradually appearing on the radar screens of large MNCs in the agro-food sector (Figure 2). Of the 49 corporate giants from this segment listed in the *Fortune Global 500*, 25 have activities on the continent. Activities of these selected firms in the conti-

Figure 2. Geographic Distribution of African Agro-Food Companies and Their Target Markets



Note: Figures include headquarters and target markets.

Source: Based on Annex Table 2.A3. 2http://dx.doi.org/10.1787/334272541774

nent include wholly owned subsidiaries or, in the majority of cases, non-equity linkages such as franchises and licensing. These corporate giants are also present through sales offices and marketing representations.

These very large MNCs have entered the most dynamic markets by concentrating their activities in North and Southern Africa but have largely ignored the countries in between. North Africa has been gaining ground thanks to strong ties and proximity to the European Union, progress in economic liberalisation and improvements in infrastructure. Not surprisingly, in 2006 the region received about two-thirds of foreign direct investment (FDI) inflows to Africa. In the Southern region, South Africa accounted for the bulk of investments.

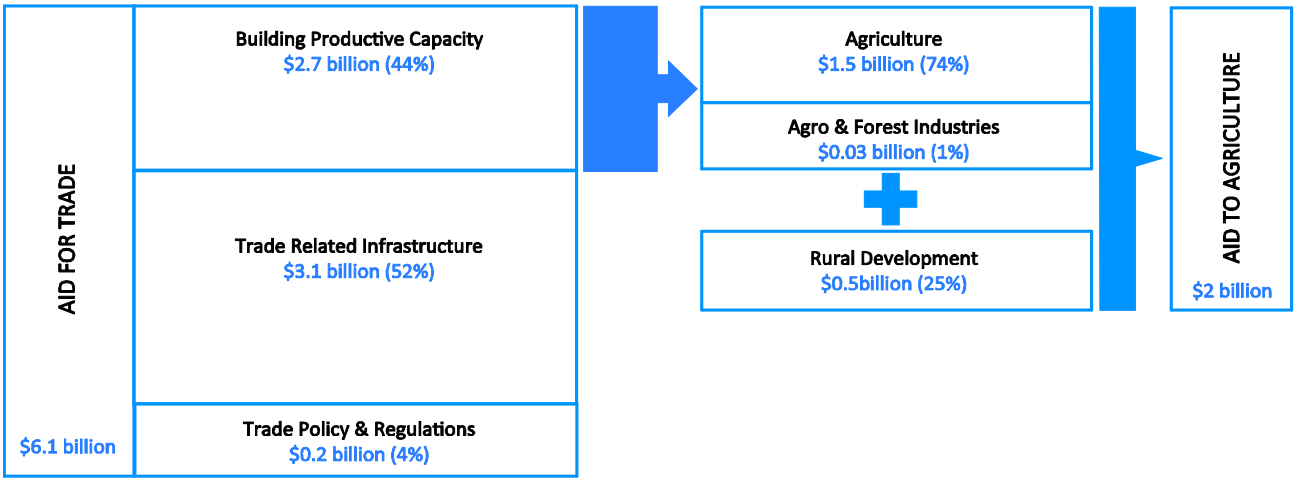
Meanwhile, indigenous African agro-food companies are slowly emerging on the continent as relevant players. Of the 500 companies listed in the Jeune Afrique ranking, 111 are active in at least one segment of the agro-food value chain. The range of income among them is extensive, from revenue of more than $11 billion to a minimum of $90 million.

The beverage sector appears as the most dynamic and developed, with a sizeable presence of both foreign and African companies, sometimes operating in partnership. These collaborative arrangements are mainly based on local licensing and franchise agreements. For instance, the internationally leading beverage company, the Coca-Cola Company, is present in the majority of African states through franchises with local firms which provide bottling and distribution services.

Interestingly, African enterprises have started internationalising themselves. Large companies, in particular retailers, are making inroads in the continent to escape saturated domestic markets. Internationalisation takes place in many forms: firms export their products through partners (e.g. Lesieur Cristal), establish their own sales representation on the spot (e.g. Nigerian Breweries) or even relocate production sites to different countries (e.g. Illovo Sugar). South African companies have been the enterprises pursuing the most proactive internationalisation strategies. Only four of the 24 South African firms present in the Jeune Afrique ranking are not engaged in some kind of international operations. Although they are still small in number, these examples underscore the large business opportunities available in the African agricultural sector.

The emergence of the indigenous agro-food private sector and the interest of non-African multinational corporations in Africa highlight that government efforts to improve the business environment are starting to pay off. Much more remains to be done, however. Private investment in the sector is still small and African producers take part in the agro-food global value chain in a rather passive way, capturing only a small share of the value generated along the chain.

Figure 3. Mapping Aid for Trade and Aid to Agriculture in Africa



Note: Annual average of 2002-2005 at 2004 constant prices.
Source: OECD, DAC/CRS. 2http://dx.doi.org/10.1787/334421462846

4. Aid to Agriculture with a stronger focus on trade and private-sector development

Faced with limited financial resources and an increasingly complex trade negotiation agenda, African countries have shown strong interest in "Aid for Trade" as a mechanism to help build trade negotiation capacities, strengthen productive capacity (particularly, but not exclusively, in the agro-food sector) and improve trade-related infrastructure, thereby realising their export potential.

Total Aid for Trade support to Africa is estimated at $6.1 billion a year (on commitment basis) over the period 2002-05 (the latest year of the OECD/WTO statistics), representing almost one-third of global aid for trade (Figure 3). Support to trade-related infrastructure accounts for over half this amount. Overall, the European Commission and World Bank/International Development Association are by far the largest donors to Africa in all Aid for Trade activities, followed by the African Development Bank/African Development Fund in supporting trade-related infrastructure and building productive capacity. Altogether, these three multilateral donors accounted for over half of the total Aid for Trade commitments to Africa during 2002-05.

In Africa, more than half the support for building productive capacity goes to the agricultural sector and covers a wide range of activities. Donor support to this area averaged about $1.4 billion a year in real terms over 2002-05.

However, until recently aid to agriculture in Africa had been on the decline. Over the last 15 years, the volume of aid to agriculture in Africa decreased both in absolute terms (from $2.6 to $2.0 billion), and as share of total official development assistance (ODA) (from 11 to 5.4 per cent). This trend reflected a worldwide pattern. Limited success of aid to agriculture and a shift towards structural adjustment lending (connected with a stronger focus on economic liberalisation), led to a sharp decline in aid to agriculture since the early 1990s.

Also, an increased proportion of ODA has flowed to social infrastructure and services. Assistance to health and education offers development agencies a number of attractions. Aid can be channelled through large public-sector entities, either as programme support to ministries or as general budget support. Transaction costs are therefore minimised. More importantly, assistance can be clearly linked to increased delivery of basic services, which in turn can be relatively easily associated with progress towards achieving internationally agreed development targets such as the Millennium Development Goals (MDGs). On the other hand, aid to agriculture (and indeed to other productive sectors) often has long gestation periods and lacks the same clear relationship between aid expenditure and outcomes.

Table 1. The Role of Agriculture in the Five Countries

Country	Share of Agriculture in GDP (2005, %)	Real GDP Growth Rate (2006, %)	Real Growth Rate of Agricultural Sector (2006, %)	Share of Agriculture in Exports (average 2000-05)[d]	Major Agricultural Exports
Ghana	37	5.8[b]	6.5[b]	51	Cocoa, timber, horticulture
Mali	38	5.0	5.1[b, c]	77	Cotton, livestock, horticulture
Senegal	14	2.9	- 2.9	20	Groundnuts, horticulture
Tanzania	45[a]	6.2	4.0	36	Cotton, tobacco, coffee
Zambia	22	6.2	2.4	13	Cotton, tobacco, horticulture

.*Source:* ANSD (2007), EIU (2007), GRZ (2007), ISSER (2006), OECD/AfDB (2007), URT (2007).
2http://dx.doi.org/10.1787/335330015231
Note: a. 2006; b. 2005; c. Growth in volume; d. Agricultural exports do not include fish and fish products

Since the beginning of this century, there has been a renewed awareness among both African policy makers and donor agencies of the vital contributions of agriculture to long-term growth and poverty reduction. African countries have come to realise that the underperformance of agriculture has been a major drag on their economic and social development. The donor community, too, has begun to refocus policy attention on the vital contribution that trade and private sector development, especially in the agricultural sector, can make to development.

However, aid to agriculture varies considerably across countries in the region in terms of policy focus, the mode of delivery and the nature and degree of donor harmonisation. In order to gain a more accurate picture of aid to African agriculture and to assess what is actually working on the ground in terms of donor-assistance programmes, the OECD Development Centre conducted five country case studies between 2005 and 2007. Ghana, Mali, Senegal, Tanzania and Zambia were selected because of the particular importance of agriculture in their economic development and their governments' commitment to promote agricultural modernisation and diversification. Moreover, they are among the largest recipients of agricultural aid in Africa and offer a wide spectrum of donor-supported programmes (The country case studies can be viewed at: www.oecd.org/dev/publications/ businessfordevelopment).

5. Structural transformation of agriculture has yet to occur

Although they have been on the policy agenda of the five countries almost since independence, the transformation of agriculture and the development of agro-based industries have yet to materialise. The agricultural sector is characterised by a dualistic structure, with few commercial farmers and a large majority of smallholders, engaged in subsistence or quasi-subsistence agriculture. Food crop productivity has been stagnating and even countries that could be food secure, such as Ghana and Tanzania, continue to experience food security problems. While the Senegalese agro-processing industry is quite active, it nevertheless generates little value added and is only weakly linked to the rest of the economy because of its high dependence on imported inputs.

On the other hand, horticultural exports have emerged as a new driver of agricultural growth. Contract farming (e.g. outgrower schemes) has proved to be an effective mechanism for involving smallholder farmers in export crop production and achieving economies of scale. These interlocking arrangements have proved to be more difficult to set up for staple food crops, mainly because of widespread free-riding on the side of contracted growers.

6. New approaches to support agricultural commercialization

Donors are increasingly adopting a value chain approach to promote private sector development in agriculture and are trying to tackle various bottlenecks simultaneously. Previous interventions mainly focused on production, and did not pay adequate attention to the development of market linkages and the role of support entities. Many new projects now rely on value-chain mapping to identify competitiveness bottlenecks and make sure that all relevant segments are dealt with, including support actors. Some promising examples include projects focusing on demand-driven agricultural services (e.g. veterinary services in Zambia) and other supportive industries (e.g. packaging in Senegal and Mali). This represents a significant improvement on the past, even though projects remain limited to specific export commodities or areas.

Nonetheless, some segments of the agricultural value chain still receive little donor attention. In particular, more consideration needs to be given to the role of input suppliers, the involvement of market intermediaries (including small-scale traders) and the specific needs of agribusiness companies. In this respect, donor efforts seem more advanced in Senegal than in the other four countries. Also key areas for market access, such as marketing and quality standards (e.g. sanitary and phytosanitary standards), receive little attention.

An important lesson emerging from the application of the value-chain approach is that the promotion of private sector development in agriculture goes well beyond the sector itself and cuts across several policy domains. For instance, the promotion of outgrower schemes cannot be separated from the improvement of the overall business environment, in particular contract enforcement, and the development of business service providers.

In the five countries, donors still tend to privilege standalone, area-based projects, which are often executed outside government structures, through local or international

non-governmental organisations (NGOs). These projects have met some success in raising production volumes and facilitating market access, mainly in export-oriented commodities, although their longer term impact and sustainability remain to be assessed. While these projects are important sources of experimentation and innovation, the challenge is to scale them up in terms of both resources and geographical coverage and to mainstream them into government strategies and structures.

Scaling up and mainstreaming require a thorough assessment of local implementing capacities, both within government and in the private sector. Persistent capacity weakness may call for a gradual approach to transferring management responsibilities. Meanwhile, the NGOs executing donor projects (e.g. supporting outgrower schemes) must play a facilitating role and should not become competitors to private providers of business services or undermine the commercial viability of processors.

Positive project results can be found in all countries, but their long-term sustainability is at stake. Evaluations suggest that donor interventions have often paid inadequate attention to local capacities. In fact, few projects have an explicit exit strategy to facilitate the handover of the project to local counterparts and to ensure that services continue to be supplied to farmers in a sustainable manner. Where impact assessments have been conducted, the observed results on income levels and business sustainability are mixed. Sustaining achieved benefits at the farm level after the withdrawal of donor support remains a challenge which should already be receiving more consideration during the project design.

In fairness, governments have not always been coherent with respect to their commitments, both in terms of counterpart financing and in terms of policies to promote private sector development in agriculture.

6. Investing more effectively in agriculture

Despite the political commitment to agricultural development, actual government funding to agriculture has been on a declining trend over the last two decades. Limited and unstable public resources for the sector are undermining the implementation of agricultural strategies. None of the countries, except Mali, is close to achieving the target of 10 per cent set by the CAADP. However, reversing the trend will not be enough to achieve higher agricultural growth. Governments also need to improve the allocation of resources within the agricultural sector and to set more resources aside for productivity-enhancing investments. For instance, evidence from Zambia suggests that the decline in resources has disproportionately affected capital equipment and recurrent departmental charges, resulting in lack of equipment and personnel to conduct research and provide extensions services and training to farmers.

7. Strengthening public sector capacity is crucial

Government structures in charge of agriculture suffer from significant capacity weaknesses, which reduce their ability to play a leading role in the sector, co-ordinate with other ministries and effectively oversee donor projects. Outflows of high-qualified staff moving to private sector positions or donor projects is frequent, reflecting not only low salaries but also the absence of proper human resource development policy to keep qualified staff in-house.

Capacities are particularly limited at the local level. All five countries have embraced decentralisation strategies to make public sector interventions more responsive to local needs. But so far the decentralisation of responsibilities has not been matched with a corresponding endowment of financial and human resources at district and village level. Not only national but also local capacity building needs to receive more attention to make demand-driven public service delivery a reality.

8. Donor co-ordination needs to be improved

Although improving, donor harmonisation and alignment to government priorities in the agricultural sector is less advanced than in the social sectors. The predominance of stand-alone projects and the involvement of several line ministries (e.g. agriculture, infrastructure, land, trade) dealing with agriculture make progress difficult. This holds true even for countries which are considered to be quite advanced with respect to donor harmonisation, such as Ghana and Tanzania.

Donor co-ordination is mainly taking place at the central level, and primarily concerns policy-related issues. Operational co-ordination, especially at field level, occurs only on an ad hoc basis. It is quite common to observe different projects being implemented in the same area

within a country, sometimes with the same farmers participating in more than one project. Co-ordination on the ground should be ensured by the government authorities, but they often lack resources and capacity to do so.

A co-ordinated, sectoral approach could help tackle more effectively the multiple constraints that are hindering agricultural commercialisation. However, the experiences of Zambia in the late 1990s and more recently of Tanzania highlight the challenges of setting up multi-donor sectoral programmes. The establishment of sector-wide programmes in agriculture requires significant political will and patience, as well as strengthened government capacity.

9. Ways forward: setting more balanced action programmes

The over-reaching objective of donor and government assistance to the agricultural sector is to lift smallholders out of poverty and create more off-farm rural employment. In this regard, the market potential of staple foods should not be overlooked. Traditional food crops are often better adapted to local agro-ecological conditions, and rising local and regional demand presents a great opportunity to expand production and develop food-processing industries. Currently donors and governments tend to put too strong a focus on export crops and too little on staple foods.

While contract farming schemes have been successfully established for export crops, examples of such commercialisation programmes are still rare for staple foods. Greater involvement of the private sector in designing and implementing commercialisation programmes may be more demanding for food crops, but this is necessary to develop and sustain local food industries. More donor support for innovative approaches to commercialisation programmes in this segment of the agricultural sector is needed.

Increasing the productivity of food crops is a top priority for Africa today, given the strong prospect of world food prices. This requires sizeable investments in irrigation, storage, transport infrastructure, as well as access to input markets (fertilizers, seeds, planting materials and credit). It also requires better functioning markets and stronger linkages to buyers and processors.

Bibliography

OECD DEVELOPMENT CENTRE (2007), *Business for Development: Fostering the Private Sector*, Paris.

OECD (2006), *Promoting Pro-Poor Growth: Agriculture*, Paris.

ATDF teams up with UNCTAD, WTI and ETH-South Centre to promote Women Entrepreneurship

14 August, 2008, ETH-Zurich

Dr. Thomke: On cost of finance on start-up firms

The workshop was convened by the African Technology Development Forum (ATDF), the United Nations Conference on Trade and Development (UNCTAD), The World Trade Institute (WTI) of the University of Bern and the North-South Centre of ETH Zurich and financially supported by ATDF, UNCTAD, WTI as well as the Foundation 'Walter Hochstrasser' based at ETH Zurich.

The overall objective of the meeting was to establish a network of businesses and investors that could support the attending award-winning women entrepreneurs from Africa and Jordan in their efforts to further develop and expand their respective businesses in areas such as business and product development, marketing and sales advice as well as access to technology, loans and investment.

Summary report of the workshop

In his opening remarks Professor Wolfgang Kinzelbach, president of the North-South Centre of ETH Zurich, noted that women entrepreneurs in Africa tend to be more reliable and successful, hence the need to recognise their efforts and support them in order to fully enhance local entrepreneurship in Africa. He noted that women demonstrate the ability to do business in an environment that is not always conducive to their efforts to become more empowered and independent.

Constantine Bartel of ATDF provided an overview of the services and products that ATDF offers to young entrepreneurs in Africa and its network of institutional partners in Africa and abroad. Ms Fiorina Mugione of UNCTAD introduced the audience to UNCTAD EMPRETEC programmes and highlighted that about 30% of the more than 120,000 entrepreneurs trained are women. The invited entrepreneurs were an example of the impact of the programme on entrepreneurship. Prof. Thomas Bernauer and Dr. Philipp Aerni subsequently moderated the ensuing two panel discussions.

Finally, Dr. Ernst Thomke, a Swiss entrepreneur and inventor of the Swatch concept, argued that entrepreneurs in developing countries lack access to knowledge and entrepreneurship training. He said that converting an idea into a product that competes in the market place is challenge even for simple ones like brick making and crude sunflower oil production. The high cost of credit could strangle inexperienced entrepreneurs in an early stage of development or limit their expansion. Professional coaching, provision of low cost finance, improving the business cultures and facilitating cooperation with academia and development cooperation could facilitate entrepreneurship.

Swiss and African business experiences

Zuhal Ayoub (owner of a fashion accessory business), Sana Zaal Burgan (owner of a health services business), and Sapphira Nyabunwa (owner of a cleaning business), emphasized their strong desire to pursue a personal dream, the need for excelling in what one really believed in, and the need to have a source of livelihood.

The main challenges that all three Afircan entrepreneurs faced when setting up their businesses included: the lack of access to affordable credit and relevant knowledge, lack of a potential customer base, institutional uncertainty as well as inadequate support by foreign institutions. Gender-related institutional obstacles were also a problem for some women entrepreneurs especially those coming from countries where women were still not believed to have the capacity to run sustainable business ventures.

Jeannine Brutschin of Novartis Foundation emphasized the importance of creating functioning health services systems in Africa and gave some examples how Novartis foundation is involved in these efforts. However, she admitted that these activities are not linked to the promotion of local entrepreneurship.

Matthias Heé, CEO of the Swiss textile firm Okutex, explained that his company operates in the global market with significant market in Africa. The company faces in-

creasing challenges in the form of Asian competition (fabrication of their products by Asian firms at cheaper prices) and domestic regulation (complex tax procedures that often consume a lot of time). He further argued that continued access to affordable credit is not just a problem in African countries.

Katharina Zaugg, the CEO of the Swiss business 'Putzen Mitenand' emphasized the importance of doing business in an unconventional and innovative way by establishing a niche market. In her case, the business does not just offer cleaning services but also gives courses on ergonomic cleaning.

Financing opportunities for African SME

The second panel chaired by Philipp Aerni consisted of representatives of SIFEM (Swiss Investment Fund for Emerging Markets), Credit Suisse, Millennium Challenge Corporation, Swissaid and ETH Zurich. Philipp Aerni argued that African entrepreneurs must be considered as an integral part of sustainable development because they facilitate homegrown development, generate income and employment in the formal sector and influential agents of change.

Ms. Andrea Heinzer said SIFEM is a specialized investment advisor providing long-term finance to emerging markets through private equity funds and financial institutions that invest in small and medium-sized enterprises (SMEs). SIFEM manages over USD 450 million of which USD 300 million is committed to 40 private equity funds spread over 30 countries. The largest share of investment is in Asia, followed by Africa and Eastern Europe. However, SIFEM does not invest directly in entrepreneurs in Africa.

The representative from Credit Suisse, Ms. Erna Karrer-Rüedi highlighted the activities of her company with regard to its micro-finance programme. She accepted that the relatively high interest rates (over 24%) in microfinance reflected the risk, administrative costs and insurance. She however noted that the micro-finance sector was performing very well with high return and low default rates. She noted that micro credit is designed for innovative formal businesses but rather for informal enterprises.

Entrepreneurship and government investment in people

Ms. Magda Ismail of the Millennium Challenge Corporation (MCC) gave an overview of MCC activities. She stated that the organization is run by the US government and mostly partners with governments in developing countries that meet certain political and economic criteria set by MCC. Governments that meet the criteria and MCC enter into an agreement to access millennium development funds in the form of grants to reduce global poverty through the promotion of sustainable economic growth.

From left: Sana Zaal Burgan, Zuhal Ayoub, Sapphira Nyabunwa, Prof. Thomas Bernauer, Katharina Zaugg, Jeannine Brutschin and Matthias Heé

Ms. Caroline Morel, executive director of Swissaid, gave an overview of Swissaid activities in developing countries. The institution has 60 years experience in fighting poverty, mostly targeting women, as well as the poorest and marginalised people. It promotes organic agriculture, local knowledge development as well as capacity building. She acknowledged the important role of women entrepreneurship but also emphasized that Swissaid has a focus on the very poor that face very difficult conditions that hardly have access to functioning markets.

Finally Bernard Lehmann, professor of agricultural economics at ETH Zurich highlighted the need to move from a merely self-sufficient to a more market-based approach in African agriculture. He noted that the limiting factors to development could be analyzed from the institutional level considering that political instability is often hindering rural development because of war, corruption, and lack of funds for land reform.

Follow-up of the meeting

ATDF will help Ms. Nyabunwa identify key stages of development, assist in negotiations with partners and structure it's financing in her next business undertaking. ATDF will also assist Safi Cleaning Services to review and elaborate the business plan and examine financial support schemes for the new activities.

What Trade Policy Framework to Address Food Insecurity?

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Abstract

The recent dramatic increases in food prices for a number of key commodities have sparked widespread concern about the relationship between agricultural trade and food security, and the extent to which existing trade policies and rules are adequate. The upsurge in recent interest in the issue has led to disparate initiatives in various areas to address the problem, including the establishment by the UN Secretary-General of a High-Level Task Force on the Global Food Crisis. A rush to implement a number of trade policy measures could end up aggravating and, in some cases, perpetuate food shortages and price hikes. This piece attempts to focus attention on some of the underlying structural causes of the problem, and promote effective action in both the short and long term.

1. Background

Media attention to the 'food crisis' – sharply increasing prices since 2006 – has grown considerably in recent months and years?. While the price increases do indeed represent a 'crisis' for many poor urban consumers in the developing world, less attention has been given to the structural causes of the more persistent food crisis that has faced rural developing country producers and their communities for three decades, as well as long-standing urban hunger and malnutrition over this period.

Recent price rises can be attributed to a variety of different causes, including the long-term trend of increased demand for food; the declining agricultural productivity and the global financial volatility. While there is still no consensus on the relative importance of these causes?, many experts appear to agree on the broad set of factors that are important. Amongst these, it is helpful to distinguish between short and long term trends, temporary factors and those relating to market fundamentals, and to supply and demand side factors.

The long-term decline in agricultural commodity prices since the 1960s has, in the last two years, seemingly been reversed. At this stage it is impossible to know for certain whether this is a temporary price spike, such as that associated with the 1973/74 oil crisis, or a more enduring paradigm shift. Traditionally, price spikes for agricultural products have tended to be short-lived, while price depressions have been more enduring. However, the increasingly close relationship between agricultural prices and oil prices raises the possibility that the current price rises are part of a longer-term phenomenon.

Oil price rises affect the cost of inputs such as fertiliser, as well as transportation costs (such as for sea and road transport), and other costs related to processing and packaging which in turn affects the final prices of value added products.

The role of biofuels in the recent price increases remains particularly controversial. Some analysts suggest that, as farmers allocate a growing share of production of certain crops (particularly maize, oilseeds and sugar) for biofuels, reduced overall supply for food exerts an upward pressure on prices. Indeed, almost 30 percent of the US corn harvest is now going to ethanol production. However, as US corn exports remain significant in overall terms, some contest the significance of this trend.

2. The benefits and drawbacks of biofuels

The production of biofuels derived mainly from agricultural crops may have a number of benefits: it may reduce the total consumption of fuel imports and increases energy security; promotes job creation, diversification and rural development; and reduces greenhouse gas emissions, thus helping combat global warming. The greatest potential for the production of biofuels can be found in the South; whereas developed countries, in meeting their Kyoto commitments, potentially provide the greatest markets.

Biodiesel is the logical contender for best sustainable transport fuel - the limitation being the amount of land required to grow the energy crops. However, some fear that biofuels could become both a humanitarian and environmental disaster. According to George Monbiot, those who worry about the scale and intensity of today's agriculture should consider what farming would look like when it is run by the oil industry. Moreover, if we try to develop a market for rapeseed biodiesel in Europe, it will

immediately develop into a market for palm oil and soya oil. Oilpalm can produce four times as much biodiesel per hectare as rape, and it is grown in places where labour is cheap. Planting oil palm is already one of the world's major causes of tropical forest destruction. Soya has a lower oil yield than rape. A new market for it will stimulate an industry that has already destroyed most of Brazil's cerrado (one of the world's most biodiverse environments) and much of its rainforest.

The extent to which biofuels are responsible for the recent price rises was perhaps the most hotly-contested issue at the 3-5 June FAO high-level conference on world food security in Rome. Experts, as well as governments, differ greatly on this issue. The World Bank has estimated that as much as 65 percent of the recent price rises are due to expansion of biofuel production, whereas the IMF estimates that the figure is closer to 30 percent. While biofuels are a fast-growing sector, they still represent only a very small proportion of total energy use.

Weather-related production shortfalls, such as failed harvests in Canada, Australia and elsewhere, have also contributed to the recent price increases. It is still unclear whether this is a short-term or long-term problem. While weather-related risk has always been an intrinsic factor in farming, human-induced climate change may have contributed to recent extreme weather events, such as the Australian drought. Climate change may in the future also lead to increased vulnerability to such conditions, and to productivity decreases, although different global regions will be affected differently.

The fact that commodities are usually priced in US dollars, a currency which has suffered sharp depreciation recently, has also been considered a factor.

Demand-side changes may also be important. In particular, increased consumption, and changes in dietary patterns, in middle-income developing countries such as China and to a lesser extend India, may have contributed to the recent price increases. Growing demand for protein in particular has placed further pressure on animal feed crops such as maize and soy. However, the FAO has suggested that these changes in themselves are not responsible for the sudden price spike that began in 2006.

3. Responding to volatility of food prices

Price volatility has increased dramatically: one contributory factor has been the declining government food stocks, whilst another has been the speculation from private investors.

The new focus on the immediate food crisis associated with the recent price rises may in fact be an opportunity to draw attention to a number of the more deep-seated structural issues surrounding agricultural productivity in developing countries, the persistence of hunger and malnutrition, and their relationship with trade rules and trade policy. The role of developed country subsidies (as well as IMF and World Bank lending conditionality) in undermining productive capacity in developing countries, and encouraging an economically inefficient allocation of global resources, are clearly relevant in this respect. Although governments at the Rome conference recognised the problems of under-investment in agriculture and declining aid to the sector, the declaration sets out policy responses only in vague and rather general terms.

Debate continues over whether supply will be able to adjust to meet demand, or whether increased agricultural production of commodities like corn will – in the context of continued high oil prices - simply be absorbed by the expanding biofuel industry. Some experts point out that, even if all arable land were devoted to biofuel production, it will not meet the global energy demand. Furthermore, although only some products such as corn, sugar and oilseeds are directly linked to the biofuels market, there are increasingly close linkages between different products and between product categories.

4. Trade policy linkages

Promoting food security in trade policy formulation and negotiations entails addressing issues related to availability, accessibility or affordability, and stability of food. This debate is even more critical to net food importing countries. The smaller a country is, the more open it is to trade in order to expand the variety of resources and food products available to it (FAO 2008). The trade policy linkages are therefore first and foremost related to exports and imports that determine the supply, accessibility and nutritional stability of food. Countries that grow food and may need to increase productivity by improving yields may depend on imported inputs to do so and therefore. There is need for policy-oriented research to define the specific situations facing small and vulnerable economies (SVEs), Landlocked countries and Least Developed Countries (LDCs) on not only how they might be affected by further trade liberalisation but also how they can improve their productivity

and competitiveness. The current realities of global trade and the declining dollar, and rising food prices has encouraged some countries to take short-term trade policy responses including controversial measures such as export taxes and restrictions, as well as consumer subsidies.

4.1 Some observed short-term interventions

Since the intensification of the hikes in food prices, African policymakers have been considering ways to lower prices and make food affordable. The measures that several countries have undertaken so far range from food subsidies for consumers to incentives for farmers to increase production. For example Nigeria, Burkina Faso and Ethiopia, lowered prices by releasing emergency grain reserves onto the market. Senegal and Ethiopia dropped tariffs on food imports, or enacting food subsidies. Ethiopia banned the export of its cereals and added 10 percent surtax on luxury imports to fund wheat subsidies for the poor.

4.2 Medium-term interventions

Those countries that focus to improve domestic productivity include Sierra Leone, Liberia and Ghana. For example, Uganda, Tanzania and Ghana will start growing high-yielding Rice that was developed by the Africa Rice Center in Benin and would release subsidized fertilizer in an effort to increase food production. Senegal's "grand agricultural offensive for food security", programme aims at making the country self-sufficient in grains within seven years by boosting rice production from 100,000 to 600,000 metric tons annually.

An appropriate trade policy response would need to incorporate a coherent approach to biofuel production, adaptation to climate change and mitigation, measures to ensure that price increases actually benefit the small farmers, and measures to enhance productivity and competitiveness in developing countries (potentially including, but not limited to, the existing 'aid for trade' mechanism under discussion at the WTO). Ongoing Doha Round negotiations, such as on new food aid disciplines, are also relevant.

5. Adaptation and trade policy

While the task ahead for governments and the development community is to enhance the adaptive capacity of the poor and poor countries, a number of areas in trade policy could contribute to addressing climate change and its impacts on agriculture. The trade policy areas that could be addressed include properly internalising into transportation of goods and service the costs greenhouse gas (GHG) emissions.

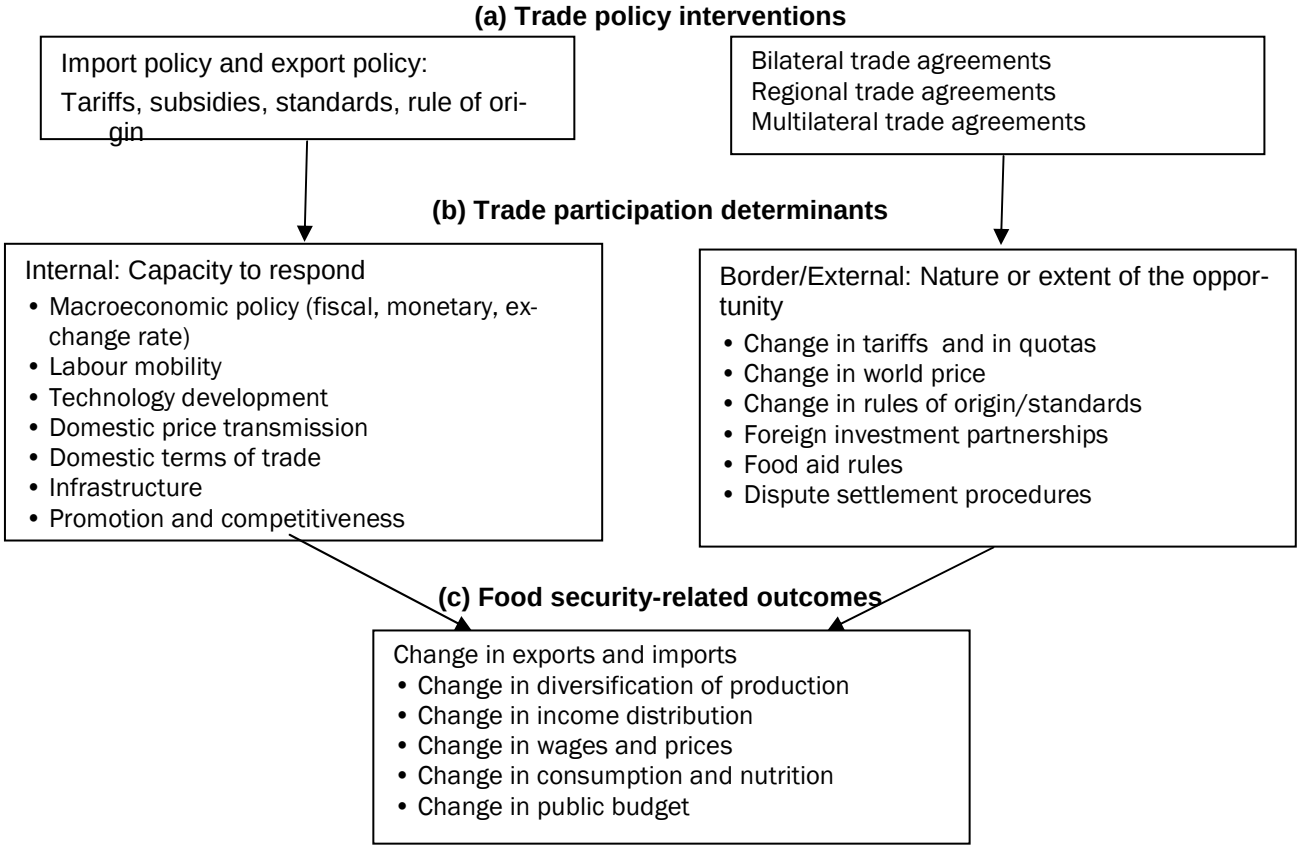
Institutional cooperation at the multilateral level between the United Nations Environment Programme (UNEP), the Climate Change Convention and the WTO can seek to address issues related to renewable energy and efficiency, and their connection to energy security. This could entail re-evaluating the WTO rules on trade defence measures, such as the rules on anti-dumping or subsidies to take into account social and environmental agreements. Environmental protection clauses in trade agreements could include the transfer of energy efficient and other environmentally friendly technologies to developing countries and put in place measures to combat deforestation caused by international trade.

Case of Vietnam and Mozambique

Vietnam initiated the agricultural reforms process with a gradual liberalisation of small-scale agriculture. Family business was encouraged in agriculture, forestry and fishery, while households were made the basic unit of production, and finally land tenure reform was implemented in the early 1990s. Restrictions on trade in major agricultural products were removed in the late 1990s, making direct export possible. At the same time, new cash crops such as coffee and cashew were effectively introduced. This made possible a broad-based increase in rural household incomes before wholesale market liberalisation and privatisation of the large state-owned sector was addressed in the context of Vietnam's process of accession to the WTO.

Mozambique has been able to increase production in agriculture, the main source of livelihood. However, the growth was a return to normal production levels after a long war. Important development potential exists for various cash crops (e.g. cotton and cashew) as well as for aquaculture and timber plantations, bur the production is only barely competitive on the international markets except for sugar and tobacco with efficient private sector investment in productivity. Production of food crops for local and regional markets is also potentially an important source of rural income, but remains underdeveloped. Small-scale agriculture was practically neglected by the government even after the official reversal of the collectivisation policy in the mid-1980s.

Figure 1. Trade and food security linkages : policy interventions, determinants and food-security outcomes



Source: J. R. Deep Ford and Gregg Rawlins (2007) Trade policy, trade and food security in the Caribbean, FAO 2007

Conclusion

There is a need to look closely at the theory and practice of trade measures such as export bans, price controls and subsidies and how they have impacted on the availability and affordability of food especially for the poorest populations in developing countries with a special emphasis on a number of Asian and African countries. In response to the latest price rise, a number of governments have implemented some of these trade policies. While these measures might help temporarily at the domestic level, it might not be true in the long run and may even push world prices up even higher.

Authors:

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References

J. R. Deep Ford and Gregg Rawlins (2007) Trade policy, trade and food security in the Caribbean, FAO 2007

http://www.un.org/issues/food/taskforce/

UNCTAD, Tackling the global food crisis N° 2, June 2008

Fuel for nought: George Monbiot biofuels = disaster, Guardian (UK), 23 Nov 2004

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COMPANY STATUS AND BUSINESS PLAN

COMPANY STATUS

PETREC Zambia Limited was incorporated in September 2007 to provide two core services to the Zambian market:

1. Manufacturing of preforms for the packaging industry in Zambia.
2. Recycling of (polyethylene terephthalate) PET post-consumer bottles to produce granules.

The site location has already been identified and negotiations with the current land owners are in progress. Once the negotiations with the current land owners are concluded, the Environmental Impact Assessment will immediately be carried out. Environmental Council of Zambia has already been approached and its views have been incorporated in the determination of the impact the project will have on the community environmentally.

PETREC Zambia Limited is looking for partners locally and internationally that could provide support for advanced technology, raw materials and market the products.

BUSINESS PLAN

The increasing utilisation of plastics in industry and consumer application, combined with increased consumer awareness and environmental legal requirements surrounding solid waste recycling has led to an increased demand for recycled plastic products. PETREC Zambia Limited intends to capitalise on these opportunities in Zambia in the production of granules from recycle materials and preforms from recycled materials and virgin resins.

PETREC Zambia is setting up a PET recycling plant to be located in Lusaka, Zambia. Its initial production capacity is 4,000 tons of granules per year and 1,500 tons of preforms per year. The raw material will be the post-consumer PET bottles currently being generated throughout the country as well as virgin resins for preforms.

Market for the resultant products is locally available. Local manufacturers of plastic containers will form the biggest consumer of PETREC Zambia products. Sufficient potential buyers of the product have already been identified.

(a) Revenue and Capital

As indicated above, production capacity of the plant is 4,000 tons of granules and 1,500 tons of preforms per year. PETREC projects to generate a combined revenue of $2.8Million per year with a net profit of over 22 percent.

A thorough market research by independent organizations has been done to ascertain the viability of the project. The total capital required to start operation is $1.76Million, composed of site preparation, production equipment purchase and installation, mobile equipment and initial operating expenses components.

All the required production equipment has been identified and, the trip to visit the equipment suppliers has been organized for September 2008..

(b) Financing partners

As stated above, PETREC requires capital investment of $1.76Million to start operation.

PETREC Zambia is therefore seeking external financiers in form of:

1. equity partnership
2. lease financing
3. debt financing or
4. a combination of any of the three financing options

PETREC Zambia is more than willing to avail a comprehensive business plan to would be financiers for consideration.

For more information contact:

OBERT MAMBWE

Managing Director, PETREC Zambia Limited

PETREC market research was supported by ATDF Entrepreneurship Hub in Lusaka

ATDF Corner:

The proposed ATDF-ZDA Incubation and Business Centre

ATDF Entrepreneurship Hub Ltd, 16 Chakeluka Road, Olympia Park
P.O. Box 31484, Lusaka, Zambia

Overview

Many potential entrepreneurs and start-ups often need face challenges in accessing finance, communication, company registration, land and contracts as well as space. For this reason, ATDF and ZDA are partnering to launch two Business Centres (BC) in Lusaka and Kitwe to expand the pool of firms supported and enabled a few more Zambians to consider entrepreneurship as a viable, secure and exciting career option.

Zambia Development Agency (ZDA) is has six main divisions: Investment Promotions and Guarantees, Small and Medium Enterprises, State Enterprise Restructuring, Monitoring and Privatisation, Export Promotions, Multi-Facility Economic Zones and Research and Policy. As a strategic partner, ZDA will help ATDF access facilities while ATDF will offer management and basic office equipment.

ZDA would help attract appropriate partners and donors in Zambia while ATDF will bring in partners from abroad. The Pilot incubators will also help ATDF and ZDA identify key elements that could be used in the design of future incubators outside Lusaka. ATDF has already acquired some experience in managing an incubator in Zambia, established a network of mentors and established relations with key technology developers and business services providers. In addition, ATDF, through its Entrepreneurship Hub, has also learnt how to fund and manage start-ups in none high-tech sectors.

This incubator will help ATDF expand its assistance to SMEs, especially in the informal sector, and entrepreneurial youths from universities and colleges.

Objectives

1. Help potential entrepreneurs develop their ideas in firms and products through mentoring and attachments to established institutions and private firms.
2. Reduce cost of firm formation through the use of pool resources (e.g. telephones, faxes, internet, and secretarial and managerial services).
3. Assist research centres and universities as well as municipalities establish incubator facilities and programmes.
4. Accelerate innovation delivery to the market.
5. Mobilize financial resources for our participating individuals and institutions.

Products and Services

A The incubation centres will offer:

1. Office space, communication, secretarial and administration services;
2. Company and intellectual property rights registration and maintenance ;
3. investment, taxation and financial advisory services to SMEs and start-ups.

ATDF's target is to graduate at least 100 firms a year by the fifth year from our various incubator facilities. Enrolled candidates have to be interested in forming firms or commercializing technologies.

B Products for banks, financing institutions and agencies

The BC will help financiers in the following ways:

1. Screen candidates for third parties;
2. Oversee the development of a team of SMEs over the financed period;
3. Co-finance a pre-qualified group of SMEs growth and market their services;
4. Manage the funds for an agreed number of SMEs or start-ups; and
5. Help structure the financing of slightly large projects (above $50,000 per project)

For more details contact: kondev@atdforum.org

Investing in Agriculture to Overcome the World Food Crisis and Reduce Poverty and Hunger

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In many parts of the world, increased agricultural growth will play a key role in addressing the current world food crisis, in contributing to overall economic growth, and in helping to achieve the first Millennium Development Goal of halving the proportion of poor and hungry people by 2015 (MDG1). The challenge of meeting MDG1 under the current circumstances is considerable, especially in Sub-Saharan Africa (SSA).

Of the means used to promote agricultural growth, sound government spending can be one of the most direct and effective. This brief presents ranges of estimates of the costs involved using two different approaches. There have been numerous attempts to estimate the costs of achieving MDG1, mostly at the global or regional level, including the United Nations' Zedillo Report and studies by the World Bank and the United Nations Development Programme.

These estimates have varied widely, mostly because of different methodologies, assumptions, coverage, measures, and interpretations. The two primary methodologies used in these studies have involved unit costs and growth-poverty elasticities (determining the extent to which poverty declines as growth increases). There has been no consistent basis of analysis for the first method, and studies using the second have been limited by data availability.

We have attempted to address some of these issues by providing improved, research-based estimates of the global and regional investments required to achieve MDG1. Because this is a complex issue and each of the approaches mentioned above has distinct merits, we have decided to produce estimates based on both approaches to provide a fuller picture. Expanding on the two approaches, we also present estimates of the costs of financing the inputs required for accelerating agricultural production in SSA.

Approach 1: Public investment requirements based on alternative scenario simulations

The unit-cost approach calculates the incremental public investment requirements of changes in key drivers affecting agricultural growth under a baseline versus an MDG1 focused scenario using IFPRI's IMPACT model. The public investment drivers considered in this brief are agricultural research, irrigation, and rural roads (public financing of the use of inputs such as fertilizers and improved seeds is considered separately below).1 The estimates further assume continued policy reform and enhanced economic growth driven by the more rapid agricultural growth achieved through investments. The MDG1-focused scenario (a very-high investment scenario) assumes annual GDP growth of 3.31 percent compared to the baseline (3.06 percent), a 30-percent increase in livestock numbers, and a 60-percent increase in food-crop yield growth.

TABLE 1—Annual Total Agricultural Investment ($ billion in 2008 US$) Required to Achieve Significant Progress on MDG1 (Unit Cost/IMPACT Method) by 2015

	SSA	SA	EAP	LAC	MENA	DEVELOPING WORLD
Baseline Scenario						
Agricultural Research	0.65	0.71	0.21	1.93	0.42	3.92
Rural Roads	0.74	0.13	0.51	1.27	0.09	2.74
Irrigation	0.56	3.84	1.80	0.72	0.74	7.66
TOTAL	1.95	4.68	2.52	3.92	1.25	14.32
Very-High Investment Scenario						
Agricultural Research	1.83	1.54	3.18	4.06	0.99	11.6
Rural Roads	2.90	0.49	0.43	3.26	0.32	7.4
Irrigation	1.02	5.47	0.81	1.13	1.03	9.46
TOTAL	5.75	7.50	4.42	8.45	2.34	28.46

Note: Only countries and regions with baseline data for public agricultural research investment and conversion information from PPP (purchasing power parity) to MER (market exchange rate) are included: 9 in EAP, 5 in SA, 39 in SSA, 11 in LAC, and 7 in MENA; Central Asia was excluded due to sparse data.

Under the baseline scenario, total global annual agricultural investment requirements would amount to US$14.3 billion. Under the very-high investment scenario, requirements would basically double to US$28.5 billion per year (Table 1). The incremental spending required—the additional amount necessary to meet MDG1—would thus be US$14 billion for all developing countries.

Under the very-high investment scenario, SSA would require a total of US$5.8 billion per year or an additional US$3.8 billion annually, South Asia (SA) would require total annual spending of US$7.5 billion or an incremental amount of US$2.8 billion per year, East Asia and the Pacific (EAP) would require US$4.4 billion in total annual spending and an additional amount of US$1.9 billion per year, Latin America and the Caribbean (LAC) would require a total of US$8.5 billion or an incremental US$4.5 billion per year, and the Middle East and North Africa (MENA) would require total annual spending of US$2.3 billion or additional spending of US$1.1 billion per year.

To achieve MDG1, it would help to also invest in complementary services, such as secondary female education and access to clean water. Factoring in these two areas increases total global annual investment requirements from US$14 billion to US$32 billion under the baseline scenario, and from US$28 billion to US$53 billion under the very-high investment scenario. Total annual investments in SSA would increase from US$2 billion to US$5 billion under the baseline, and from US$6 billion to US$11 billion under the very-high investment scenario.

Approach 2: Public investment requirements based on growth-poverty elasticities

The second IFPRI study focuses solely on SSA, and uses growth-poverty and growth-public expenditure elasticities to estimate the resources required to meet MDG1 in SSA and three subregions. Many SSA countries have pledged to increase their government support to agriculture in order to achieve an annual agricultural growth rate of 6 percent, a goal that has been adopted by the New Partnership for Africa's Development through the Comprehensive Africa Agriculture Development Programme. As part of the Maputo Declaration of 2003, for example, many African heads of state agreed to allocate 10 percent of their government budgets to agriculture. However, questions remain as to how the resources should be allocated in order to have the largest impact on agricultural growth and poverty reduction, and whether the pledged resources will be sufficient to meet the 6-percent growth and MDG1 targets.

This approach first calculates the required agricultural growth rates using elasticities of poverty reduction with respect to agricultural growth, and then uses those rates to estimate the necessary public financial resources, using growth-expenditure elasticities. Because growth in the nonagricultural sector will also contribute to poverty reduction, through growth linkages with agriculture, the additional poverty reduction effects from this sector are also considered. The components of agricultural spending that are examined are agricultural administration, agricultural research and extension, irrigation, and small rural infrastructure such as unpaved feeder roads.

Using this methodology, SSA countries will need to boost their annual agricultural growth to 7.5 percent per year in order to achieve MDG1. To reach this target, government agricultural spending will have to increase to US$13.7 billion per year (Table 2).

If SSA countries fulfill their commitments to allocate 10 percent of their budgets to agriculture under the Maputo Declaration, the MDG1 target would require additional or incremental spending of US$4.8 billion per year. However, there is a large variation in investment requirements across SSA subregions.

In addition to government spending, use of inputs such as fertilizer and high-yielding seeds are required to achieve rapid productivity growth in agriculture. According to the

TABLE 2—Annual Total Agricultural Spending ($ billion in 2008 US$) Required to Meet MDG1 in Africa by 2015 (Growth–Poverty Elasticities Method)

	Sub-Saharan Africa	West Africa	East Africa	Southern Africa
Total	13.67	9.06	3.79	0.83
Additional/Incremental	4.77	2.77	1.96	0.04

International Fertilizer Development Center, fertilizer use is extremely low in many SSA countries, averaging 8.8 kilograms (kg) per hectare (ha). If fertilizer use gradually rises to 50 kg/ha, a level that has already been reached by most middle-income SSA countries and which is a target established by an African Fertilizer Summit (2006), total fertilizer use will increase by 5 to 6 times. Fertilizer prices in SSA are extremely high because of inefficient distribution systems and high transportation costs. Taking all this into account, the total cost of fertilizer and improved seeds required to achieve an agricultural growth rate of 7.5 percent is estimated at more than US$9 billion a year (Table 3).

Considering the current level and trend of fertilizer and seed use, the incremental cost of these inputs is about US$6.8 billion per year. It is unrealistic to expect farmers to pay this cost, or to have access to credit to facilitate market participation. Public-sector support seems to be necessary; however, a fertilizer subsidy program has to be designed in such a way that it avoids crowding out the private sector and distorting markets and farmers' incentives. A fertilizer voucher system designed to target the poorest 50 percent of farmers would likely have few such negative effects. If the subsidy component for these farmers is 60 percent of costs, the incremental public-sector cost (including operational costs) would be about $2.25 billion per year (Table 3, row 3).

Conclusion

Investing in agriculture is key to reducing poverty and hunger in developing countries and is an essential element in addressing the current food price crisis. Though numerous studies have attempted to estimate the costs involved in achieving MDG1, none includes agricultural growth requirements or quantifies the public resources needed to support that growth. The required growth and financial resources vary based on past progress in poverty reduction and the role of agriculture in the overall economy. Our analyses address some of these gaps by simulating required total and incremental agricultural spending using two different approaches. The estimates do not include the health and nutrition spending needed to address MDG1 in a comprehensive manner.

In sum:

- The global incremental public investment required—the additional amount necessary to meet MDG1—would be US$14 billion for all developing countries.
- In Sub-Saharan Africa, governments and development partners will need to increase their agricultural spending considerably in order to achieve MDG1. The estimated incremental annual investments required in SSA range from US$3.8 billion to US$4.8 billion according to our two estimates (with the latter being in addition to SSA countries committing 10 percent of their budget to agriculture).
- The incremental annual costs for a partly publicly funded input financing scheme that reaches the poorest 50 percent of farmers in Africa would amount to an additional US$2.3 billion per year.

TABLE 3—Annual Cost Estimate ($ billion in 2008 US$) of Fertilizer and Improved Seeds Required to Meet MDG1 in Africa by 2015

	Sub-Saharan Africa	West Africa	East Africa	Southern Africa
Total	9.14	3.81	3.01	2.31
Additional/Incremental	6.82	2.78	2.34	1.70
Financed by public sector	2.25	0.92	0.77	0.56

Note: Agricultural growth-to-fertilizer elasticity is about 0.2–0.3 in the literature. Setting elasticity at 0.25, fertilizer use has to grow at 10 to 40 percent annually across SSA, such that fertilizer use gradually increases from the present 10 kg/ha to 50 kg/ha by 2015. With a modest land growth rate of 2 percent a year, total fertilizer use required to achieve a 7.5 percent annual agricultural growth rate is estimated to be 8.5 million tons a year by 2015, from the present level of 1–2 million tons. The cost of fertilizer is much higher in SSA than in other regions, ranging from 2 to 4 times the cost in developed countries.

sector despite wide.-ranging reforms? Two factors underpin this moderate increase in the value of SSA agricultural exports. First, recovery in agricultural production since 2000 does not appear to be that widespread. And although there has been some expansion in SSA agricultural exports, the share of the region in global exports has remained rather small, with agricultural exports becoming concentrated in a small number of countries. Over the period, 2002-2005, just three countries accounted for about 56 per cent of total SSA agricultural exports, the largest exporter being South Africa, followed by Cote d'Ivoire and Ghana. Second, the modest increase reflects the continued dependence of SSA on traditional non-fuel primary commodity exports such as coffee, cotton cocoa, tobacco, tea, and sugar[1]. These traditional commodities remained the top exports of the region in value terms over a period of five years: coffee, cotton, tobacco and tea in 2000; and cocoa, cotton, sugar (and wine) in 2005. Most importantly, in 2005, fewer countries exported the top four products (see table 1).

There was a steady increase in the export volumes of these traditional commodities from about the mid-1990s. The fact that this did not translate into a higher value of exports until after 2000, reflects the low prices of these commodities on the world market over this period. These commodities have been afflicted by high price volatility, and until about 2002, by falling prices[2]. During the 1970s, 1980s and 1990s, the volatility in terms of trade for SSA exports was about two times that for East Asian exports and nearly four times that experienced by industrial countries (UNCTAD, 2003).

This continuing dependence on traditional commodity exports[3] also reflects the region's inability to tap fully into the international trade in market-dynamic (non-traditional) commodities, such as horticulture and processed foods. These products are highly income elastic with lower rates of protection in industrial and large developing countries (UNCTAD, 2003).

During 2000-2005, for instance, no African country featured among the world's 20 leading exporters of processed food, which include countries such as Brazil, Argentina, Mexico, Thailand, India, and Indonesia. South Africa, which was the largest exporter of these products in the region, had a global market share of less than one per cent. Mauritius, the second largest exporter of processed products in SSA came a distant 59th in global rankings with only a 0.2 per cent market share. And in the case of semi-processed products, South Africa was the only SSA country among the top 20 exporters during 2000-2005. There were no SSA countries among the leading exporters of processed products over the same period (OECD, 2008a).

This notwithstanding, Africa has made some progress in diversifying its international agricultural trade, although the pace is slow. A few countries have made inroads into the international trade in horticultural products, but only South Africa made it to the list of the top 20 horticultural exporters in 2000-2005, with an average market share of 2.3 per cent. Morocco which was among the top 20 exporters during 1985-1990 had dropped out of the group in 2000-2005, as its market share declined to just over one per cent. Two other African countries export some considerable amounts of horticultural products. These are Kenya and Côte d'Ivoire but each has a share of less than one percent of the global market (OECD, 2008a). In recent years, a few countries such as Ethiopia, Ghana, Uganda, and Zambia have also increased their exports of these products, although the volumes are quite small in the majority of cases (except probably in the case of Ghana) compared with the volumes of their traditional export commodities.

Table 1. SSA: Top four African exports, 2000 and 2005

Rank	2000				2005			
	Product	No of countries	Value $m	% of total exports	Product	No of countries	Value $ m	% of total exports
1	Coffee	22	788	8.6	Cocoa	11	2,500	16.6
2	Cotton	22	688	7.8	Cotton	19	779	5.2
3	Tobacco	13	628	7.1	Sugar	17	726	…
4	Tea	22	614	7.0	Wine	18	603	…

Source: Extracted from OECD, 2008a, p.31.

… not available

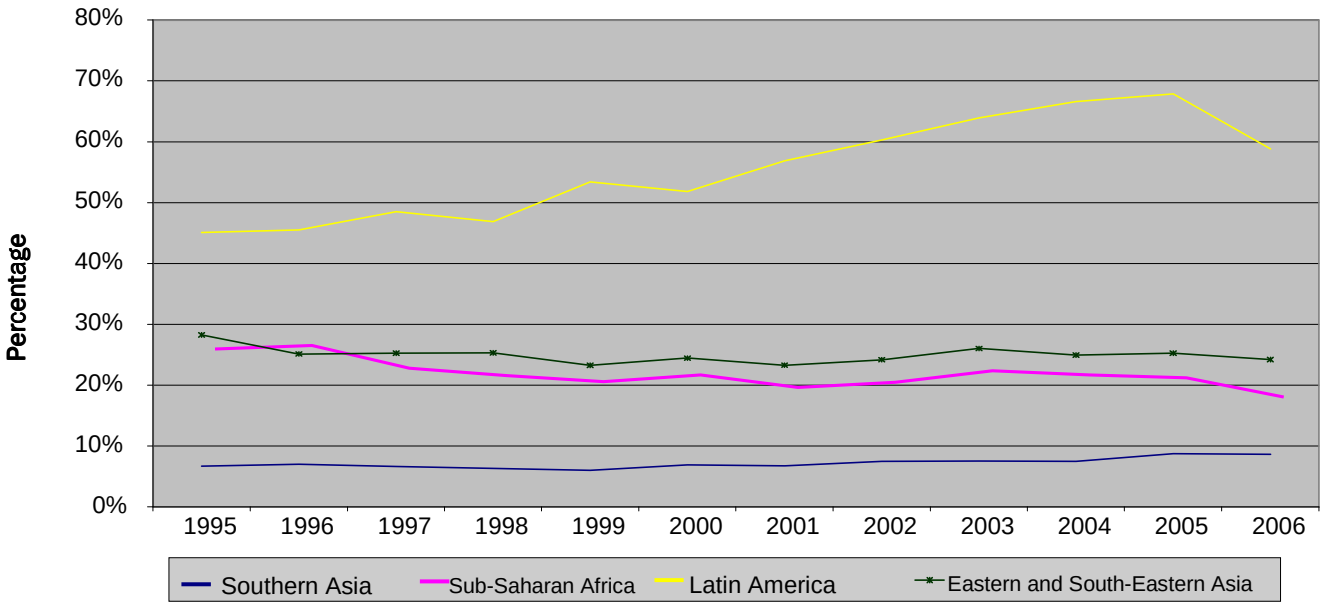
On the other hand, Africa's share in world agricultural imports decreased steadily from 5.4 per cent in 1985 to 3.2 per cent in 2006. This could be explained, in part, by the fact that global trade in agriculture is no longer dominated by the traditional bulk commodities. These are the least dynamic in terms of export growth, and their share in total agricultural exports has declined substantially. Most developing countries that remained commodity-dependent in 2003-2005, two-thirds of which are in Africa, have thus been struggling to defend their historical positions in the international market. In the last 25 years, trade in horticulture and processed food has grown at double the rate of traditional bulk commodities. Thus, these products are now comparable to non-agricultural products in terms of export growth. Indeed, the continent's potential in commercial agriculture remains largely untapped with a fledgling agribusiness sector in most countries (OECD, 2008a).

The substantial increases in the value of agricultural exports of both the East and South Eastern Asia and Latin America over the period, 1995 to 2006, reflect the changed composition of their exports towards these high value exports. Moreover, significant increases in export volumes have been attained on the back of increased productivity in traditional commodity exports due to intensive methods of farming. As discussed later, technological advances that have led to improved productivity by some old agricultural exporters in Latin America and East Asia, and by some new exporters in Asia during the 1970s and 1980s largely by-passed SSA. The region has not benefited from productivity gains, which have been attained for a variety of crops, including corn, soybeans, sugar and rice.[4] These gains coupled with farm mechanization have resulted in significant increases in production by some commodity exporting countries, such as Brazil and Vietnam. And, some of these countries have emerged as more efficient producers than Africa in some traditional agricultural commodities, such as cocoa (Malaysia), and coffee (Indonesia and Vietnam) (UNCTAD, 2003a; see also Havnevik, et. al., 2007).

The above factors appeared to have contributed to the steady decline in the proportion of total agricultural production traded in SSA from around 27 per cent of production in 1995 to just below 20 per cent a decade later. Of the other developing regions, Latin America recorded a sizeable increase in the proportion of its exported agricultural output from under half to about two-thirds of its total agricultural output. However, there was no change in the ratio of agricultural output exported by the other two developing regions (Fig. 3).

It is apparent from the discussion above that there have been some positive developments in Africa's international trade in agriculture following trade liberalization. First, there have been some expansions of Africa's exports. However, this was not reflected in the value of the region's export until after 2000 because of the low commodity prices prior to that period. Second, there has been some

Figure 3. Proportion of agricultural output exported (percentage)



Source: UNCTAD, 2008a

THE TRAGEDY OF AFRICAN AGRICULTURE: TRADE LIBERALIZATION AND AGRICULTURAL EXPORT PERFORMANCE

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Abstract

The paper analyses the evolution of Africa's international trade in agriculture following the implementation of trade liberalization policies, and attempts to explain Africa's performance in agricultural exports. Much of Africa has emerged from these reforms with much smaller shares in world agricultural trade with only a modest increase in the value of its agricultural exports. This is, in part, because trade liberalization lacked complementary policies to address the structural and institutional constraints on enhancing agricultural productivity, output and exports. The paper concludes that the objective of policy interventions to improve the export performance of Africa's agriculture should be to improve productivity, and efficiency of agricultural trade, through the provision of "public goods".

1. Introduction

One of the main objectives structural adjustment programmes (SAPs), including trade liberalization policies, implemented over the past 25 years all over Africa was to shift relative prices and resources in favour of the tradable sector. That is, to increase production for exports. It is therefore important to investigate the performance of African agriculture, in particular agricultural exports, over this period.

Two main strands of trade liberalization policies were expected to have a direct positive impact on the agricultural sector and exports. The first is reducing the high taxation of the sector by aligning producer prices with world prices. The second one is promoting the development of private input and output markets ("getting prices right"), an integral part of which was the dismantling of agricultural marketing boards and cutting off subsidies on a range of inputs, such as fertilizers and insecticides. Macroeconomic policies such as reducing over-valuation of the exchange rate and others that engender a more stable macroeconomic environment were also expected to encourage agricultural production for exports. The expectation was that by enabling agricultural exporters to capture a higher proportion of the world market price for their products, these policies would give them higher incentives to produce and export more. Macroeconomic stability and realistic exchange rates were also expected to encourage production for exports and the diversification of such exports.

Despite the implementation of these policy reforms, the majority of African countries, especially in Sub-Saharan Africa (SSA), has paradoxically even ended up with reduced shares in world agricultural trade. As a result, African countries continue to participate principally in the low-growth sector of global trade, a fact which has important ramifications for their trade performance, and development generally. This is because world trade in primary commodities has been growing roughly at about half the annual rate of the growth of trade in manufactures since the 1950s. Global trade in agriculture has grown at 3.5 per cent per annum since 1950; fuels and mining at 4.0 per cent, while trade in manufactures registered an annual growth rate of 7.5 per cent (WTO, 2007).

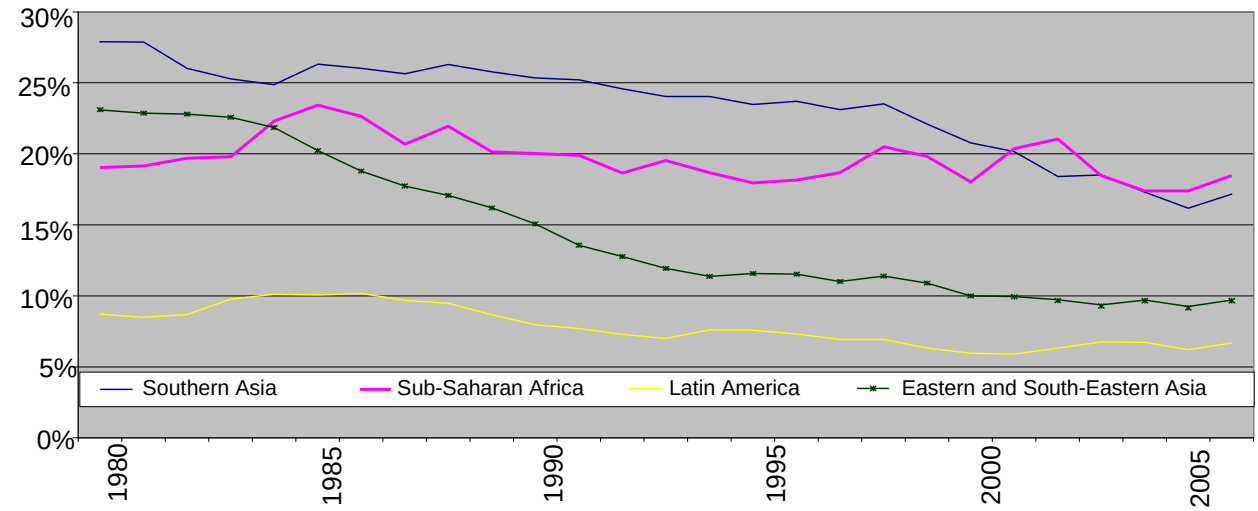
This paper analyses the evolution of Africa's international trade in agriculture following the implementation of trade liberalization policies and attempts to explain Africa's agricultural exports' performance. It does not venture into a cause and effect analysis. The paper is structured as follows. Section one examines the evolution of African agricultural production and exports in the post liberalization period. Section two attempts to explain the export performance of Africa's agriculture, while section three touches on some possible broad policy responses to the poor performance of the sector. Section four offers some concluding remarks.

2. Evolution of agricultural production and exports

The SSA agricultural sector was not spared by the global economic slowdown in the late 1970s, which negatively affected most economies in the region. Within a context of improved macroeconomic conditions, the sector recovered from this downturn in about the mid-1990s. Subsequently, agricultural growth accelerated to 3.8 per cent per annum between 2001 and 2005 from 2.3 per cent during the 1980s (World Bank, 2008). However, this did

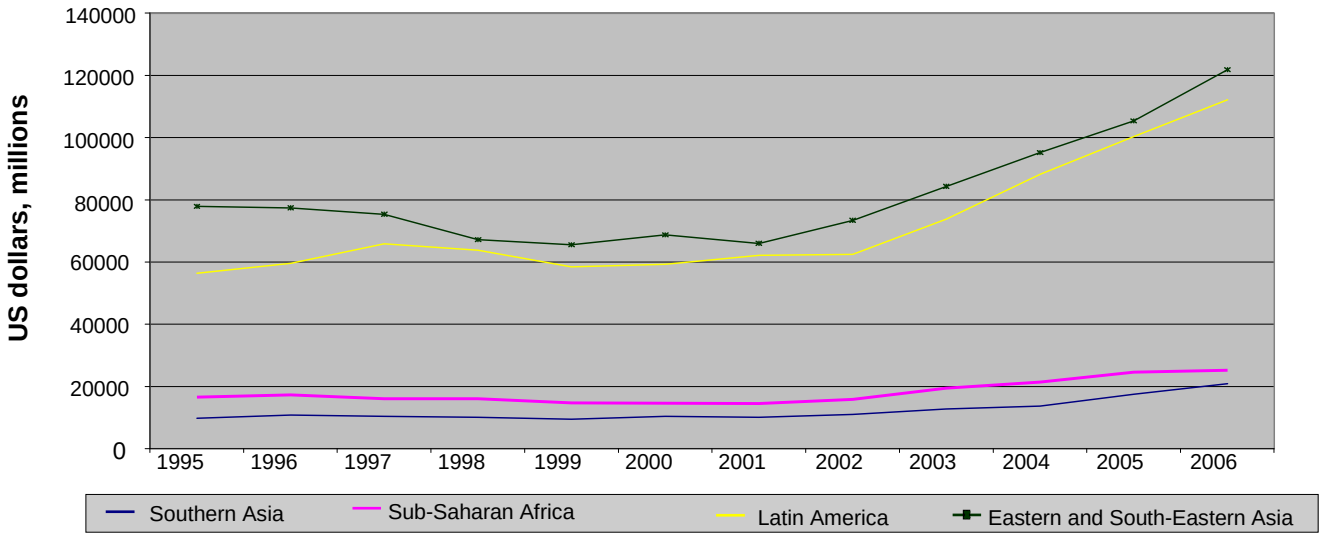
The views expressed in the paper are those of the author and should not be attributed to the UNCTAD Secretariat or its Secretary General.

Figure 1. Agriculture as a proportion of GDP



Source: UNCTAD (2008a)

Figure 2. Agricultural exports by value*, SSA and other developing regions



Source: UNCTAD, 2008a

Note: Total exports of primary commodities by value, excluding fuels, ores and metals.

not reflect much in the indicators of the agricultural sector's performance, such as its contribution to total output or its value.

The contribution of agriculture to total output in SSA generally stagnated between 1980 and 2006 at about 19 per cent (Fig. 1). In value terms, SSA agricultural production remained stable between 1995 and 2000: while the nominal value of agricultural exports declined slightly from about $16.6 billion to $14.7 billion between 1995 and 2000, before a recovery to $25.3 billion in 2006 (figure 2).

Juxtaposed with the performance of agriculture East and South East Asia, there are some striking differences. The proportion of agriculture in East and South East Asian economies fell significantly over the period under consideration, due to the increasing share of manufactures. The outcome of this as depicted in Fig 1 is that SSA has become the region in the developing world with the highest ratio of agriculture to GDP since 2000, a manifestation of the lack of structural transformation. Similarly, the increase in the value of SSA agricultural exports following liberalization appears rather modest when compared to the significant increases in the value of agricultural exports by Latin America and Eastern and South Eastern Asia (figure 2).

How do we explain this rather weak performance of the

diversification in several countries towards horticultural exports. However, African countries have remained by and large very small players in this market. Africa's agricultural exports have thus remained overwhelmingly concentrated in traditional bulk commodity exports, which have also become concentrated in a smaller number of countries.

Furthermore, the contribution of agricultural exports to total output does not appear to have undergone any significant change over the period under consideration. Of the 38 African countries for which data is available for at least two decades, only five recorded agricultural exports in excess of one-fifth of their GDP (Cote d'Ivoire, Ghana, Malawi, Seychelles, and Swaziland). Seychelles recorded a substantial growth in its agricultural exports during the 1990s and especially during the most recent period, 2000-2006. The remaining four countries have been consistently high exporters of agricultural commodities since the 1980s. Two countries, Benin and Madagascar, have also increased their agricultural exports significantly since the 1980s, with exports exceeding 10 per cent of their GDP in 2000-2006 (World Bank, 2007).

3. Explaining Africa's agricultural exports performance

3.1 Policies matter

As mentioned earlier, trade liberalization due to its impact on relative factor prices was expected to lead to increased production of tradables. That is, increased exports and changes in the composition of such exports. Given the relative importance of agriculture in African countries one would therefore expect an increase in agricultural exports as well as some diversification into new agricultural exports.

Trade liberalization has created a price incentive structure which has contributed to some of the positive developments noted above. Nevertheless, a closer examination of some of the successful agricultural exporters reveals that the main factors that underscore this performance, with the possible exception of the devaluation of the CFA franc, go beyond trade liberalization and represent deliberate efforts by governments to develop the agricultural sector.

The consistently high agricultural exports noted in the case of Cote d'Ivoire appear to have resulted from huge investments made in the agricultural sector during the 1960s. This was part of the country's development strategy anchored on cash crops (coffee, cocoa, and timber) and later reinforced by secondary agricultural export crops such as bananas and pineapples. Furthermore, after 1965, the government launched a "Crops Diversification" policy with the objective of, *inter alia* increasing total export receipts and promoting a dynamic agro-industrial sector based on raw materials from local commercial crops. This policy led to the introduction of new crops such as soya beans and cashew nuts, and to the transfer of some crops from one region to another in order to improve the quality and productivity of commercial crops already in production, including pineapples and rubber (Traoré, 1990).

Ghana's performance could be explained by the somewhat *ad hoc*, but successful programmes to promote non-traditional agricultural exports such as pineapples, cashews, pepper and shea nuts. While there were some remarkable increases in cocoa exports in the 1990s after the steep declines experienced in the 1980s, these did not come from new planting as much as from diversion of cocoa that was previously smuggled to Côte d'Ivoire back into Ghana (Herbst, 1993). On the other hand, successful resistance by successive governments of the National Democratic Congress and the People's National Party to the pressure from donors to privatize fully the cocoa marketing system meant that Cocoa Marketing Board (CMB) still provides some support, albeit limited, to the cocoa sector. The increases in cocoa exports since 2000 are due to two main factors: new plantings and associated increases in acreage cultivated during the 1990s; and the programme of the Peoples' National Party government to supply inputs (fertilizers and insecticides, spraying guns) through the CMB to farmers.

The devaluation of the CFA Franc in 1994 helped to improve the competitiveness of all exports from the franc-zone. In addition, specific factors in countries such as Benin helped to boost agricultural exports. By the 1990s Benin had become politically stable, and financial sector crises sparked by the collapse of its main commercial banks had been successfully resolved by the end of the decade. These factors coupled with increased area devoted to cotton cultivation and the implementation of a Cotton Sector Reform Project[5] jointly implemented by the World Bank and the Government of Benin in 2002 helped to sustain its cotton exports in recent years.

The recent improvements in maize production and output in Malawi since the drought of 2005 have been attributed mainly to the government's fertilizer subsidy programme.

According to government estimates, the 2007 maize crop harvest was about 70 per cent higher than the average for the past five years. Malawi has thus become a regional exporter of maize.[6] However, as discussed later, sustained improvements in agricultural productivity and output would require a more comprehensive policy package that addresses the various constraints on the supply response agriculture, and not just subsidized fertilizer.

Overall, there have been some positive developments in African agriculture following trade liberalization, although these remain limited. Indeed, the present state of African agriculture has come under greater scrutiny in recent months because of the food and fuel crises, which have eroded the gains of the recent high prices accruing the exporters of traditional commodities. The very high food price increases in recent years has created a global food crisis which is affecting most the low-income net food-deficit countries (LIFDCs).[7] The fact that most of these LIFDCs are in Africa has raised serious questions about the performance of the agricultural sector in the aftermaths of trade liberalization.

3.2 Weak supply response

Advocates of trade liberalization believed that agricultural exports were constrained by misguided policies, such as the high taxation of agriculture, to promote import substitution industrialization. Hence, it was assumed that simply removing these constraints, *inter alia*, by aligning producer prices with world prices while promoting the development of private input and output markets ("getting prices right"), would provide the right incentives for increased production of agricultural exports. The sector was thus expected to benefit from policies such as reducing over-valuation of the exchange rate and the dismantling of marketing boards and a more stable macroeconomic environment.

This diagnosis, however, represents only a partial understanding of the problem, and takes no account of the structural problems that plague the agricultural sector in Africa. Thus, while trade liberalization addressed policy-induced barriers to trade, it was not integrated with sectoral policies which could have addressed these supply side response issues. These problems have prevented the region from attaining its full potential in agricultural exports even within the context of improved macroeconomic fundamentals.

The agricultural sector is by no means homogenous in all countries and across different agro-ecological zones, and a myriad of agricultural production relations and institutions can be found all over SSA. However, it is commonly agreed that the response of agricultural production to price incentives is determined by how structural and institutional factors influence not only productivity but also profitability. These factors include the socio-economic structures, physical infrastructure which impedes the efficient functioning of rural and urban markets. Other factors that determine the response of the agricultural sector in SSA to policy incentives are the weak agricultural research and extension system, low productivity due to reliance on rudimentary agricultural technology, paucity of credit and agricultural inputs, including land, labour, and gender relations, supply of basic consumer goods, and high levels of risk. Within this context, the elasticity of total farm output and agricultural exports to policy changes, including changes in price could hardly be expected to be very large, particularly in the short to medium term.

Indeed, empirical evidence suggests that aggregate supply response of agricultural production to price incentives is much weaker in low-income countries because of these non-price constraints[8] (UNCTAD, 1997a; 1998a). However, while there is some consensus that these non-price factors constrain agricultural production and productivity, there is no agreement on how they could be removed. Also, there is no consensus on whether there are trade-offs between policies which address these and policies that support the attainment of the "right prices".

(a) Short-run supply response[9]

One channel for the short-run supply response of agricultural production to the price incentives created by policy reforms is the "vent for surplus" effect, which occur as idle land is brought under cultivation, coupled with increased utilization of labour in response to price incentives, or greater availability of incentive goods.[10] This was the experience of countries such as Ghana, Madagascar, Mozambique and the United Republic of Tanzania at the beginning of their trade liberalization programmes. This, however, is essentially a one-off response as there are limits to the availability of unutilized resources, such as land (see also, Pratt and Yu, 2008), the use of which is governed by the traditional tenure system, which may not respond immediately to the demands for increased land for cultivation. Also, complex gender divisions of labour in most farming communities determine how much (female) labour is allocated to what tasks or crops, and how in-

come from farming activities is distributed within the household.

A second channel for short-run supply response is the reallocation of resources in order to attain efficiency gains, which depends on three factors: (i) the level of capitalization of farm operations and the level of flexibility this grants households to reorient production; (ii) the commitment of households to meet part of their subsistence needs through their own production, which in turn depends on the level of efficiency of rural food markets; and (iii) gender relationships which determine the flexibility with which households can reallocate resources.

Agricultural intensification is the third process for a short-run positive supply response in agricultural production. This could be labour-based or a combination of additional labour and other variable inputs, such as organic and chemical fertilizer. In most African conditions, however, sustainable intensification requires additional capital. As such, it depends on the assessment of risk, credit availability, skills and appropriate intensification packages. One observable trend in African countries during policy reform is the decline in the use of purchased inputs, such as fertilizer for a variety of reasons, including the removal of subsidies, and the dismantling of marketing boards. The decline was, however, not uniform across countries (Pratt and Yu, 2008).

While policy reforms, such as decontrolling prices, cutting or eliminating fertilizer subsidies and privatization did help to improve fiscal discipline in most African countries, their effect on agricultural production and exports has been far from benign.[11]

(b) Investment and productivity growth

Even if the structural constraints to short run agricultural supply response are addressed successfully, long-run trends in productivity and output, and export performance depend on the pace of investment and technological progress. In predominantly agricultural economies, the major source of investment funding for both agriculture and other sectors is the net agricultural surplus.[12] However, African agriculture is so severely undercapitalized, with many farmers trapped in a low-productivity and subsistence cycle of poverty, so the injection of external resources is a *sine qua non* for increasing agricultural productivity and growth.

Credit constraints

There is conflicting evidence on whether insecure land titles, stemming from the myriads of African land tenure systems promote or discourage new investments to improve land.[13] However, it is generally agreed that insecure titles deny farmers the right to use land as collateral to secure loans from the banking system to finance new investments.. With reduced credit from the formal system, in part because of financial sector reforms implemented as part of market-oriented reforms (UNCTAD, 1997b, Bronwbridge and Gayi, 1999), and little or no net agricultural surplus, both short- and long-term investment in agriculture appeared to have suffered.

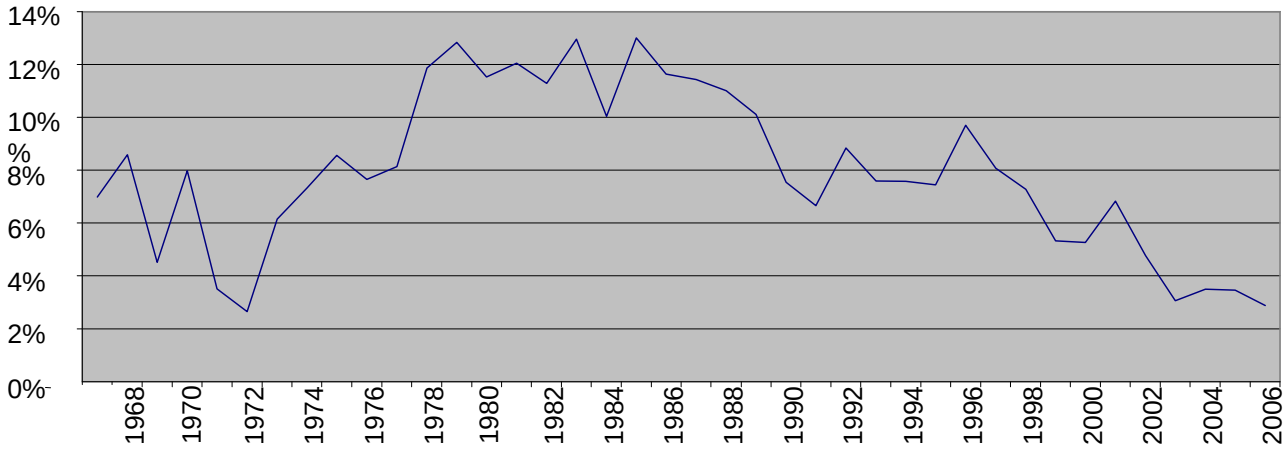
Public investment

The reforms have created opportunities for private investments in agricultural enterprises, but the profitability of these investments remains very much dependent on public investment in infrastructure; that is, the supply of "public goods" . Improvements in rural transportation enhance the functioning of product and input markets and increase real returns. Investments in potable water, electricity, health and educational facilities improve the overall quality of rural life. They also boost agricultural productivity as well as reduce the number of farm work days lost through ill-health. Reduced public investment during the period of reforms, and resulting weak infrastructure frustrated the development of more efficient markets.

In SSA, there are also problems with *agricultural research*, which is the key to the rate of technological change. The small size of countries and research stations, dispersion and high staff turnover have all combined to frustrate the attainment of a "critical mass" of scientific and technical staff. The outcome of this is that, with the notable exception of maize (and more recently cassava and rice), most of SSA has no immediately applicable crop technology that might (with adequate price incentives) substantially increase the profitability of investments in agriculture.

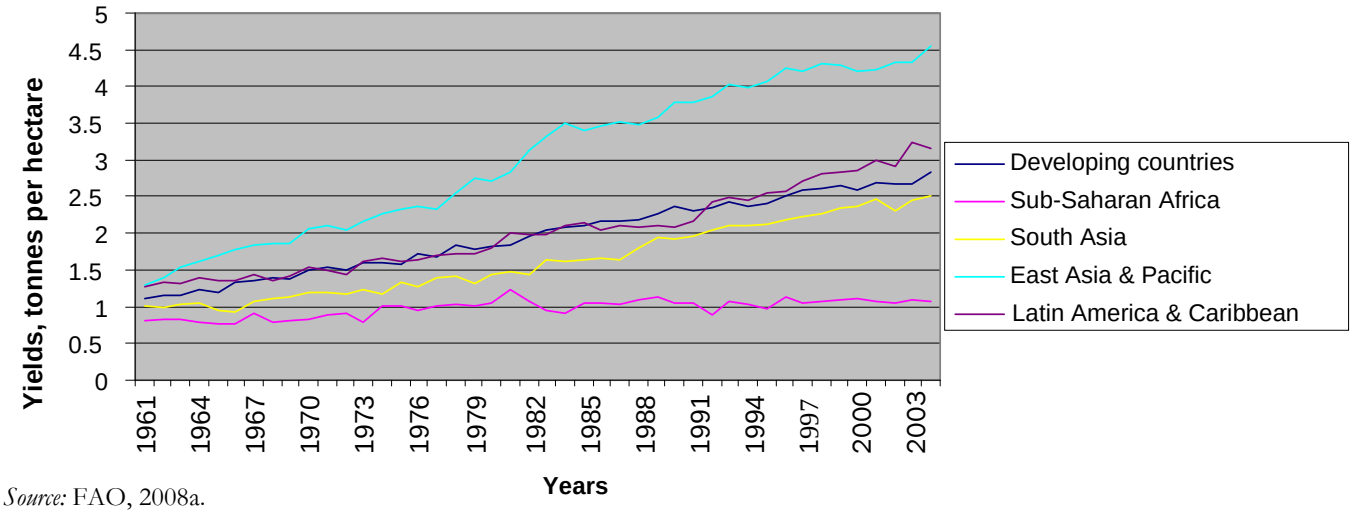
A reduction in *donor support* for agriculture has also meant that there are fewer resources to devote to addressing the problems of the sector. Overall, donor support for agriculture declined steadily from its peak of $8 billion in the early 1980s to $3.4 billion in 2004. This decline is evident in both multilateral and bilateral support, and also in relative terms. For example, the proportion of total ODA going to agriculture declined from a peak of 16.9 per cent in 1982 to just 3.5 per cent in 2004.

Figure 4. DAC ODA to Agriculture, fisheries and forest as proportion of total DAC ODA, 1967-2006



Source: OECD, 2008b.

Figure 5. Cereal yields, SSA and other developing regions



Source: FAO, 2008a.

Comparative figures in respect of ODA from DAC group of countries are 13 per cent and 3 per cent over the same period (Fig. 4). In the case of Africa, World Bank lending to agriculture fell sharply from $419 million in 1991 to $123 million in 2000, although this recovered to $685 million in 2006 (World Bank, 2008). And total ODA to African agriculture declined by more than fifty per cent from $3.2 billion in 1988 to $1.2 billion in 2004. The sharp decline in aid to agriculture since the early 1990s reflected not only the limited success of aid to agriculture but also a shift towards adjustment lending with a greater focus on economic liberalization (OECD, 2008a).

It appears the decline in ODA to agriculture has often translated into a decline in public investment expenditure in agriculture in SSA because in many countries, this was externally financed. The proportion of government expenditure going to agriculture has declined in several African countries over the past two decades during the period of market-oriented reforms (OECD, 2008a).[14]

Low yields

It comes as no surprise therefore that African agriculture lags behind the other developing regions judging by all indicators of agricultural productivity and the use of modern inputs. In 2004, for example, the FAO reported that although Africa has the highest agricultural area per capita in the developing world, it has the lowest irrigated area (3.7 per cent)[15] and fertilizer consumption (12.6 kg/ha/arable land). This is much below the developing country average of 22.7 per cent and 109.0 kg/ha/arable land respectively (see table 13.7 in Gayi, 2007).

Only a quarter of the total crop area of SSA is planted with modern crop varieties. Asia adopted these varieties as far back as the 1960s, and about 80 per cent of South and East Asia's crop area is under these varieties four decades later. The use of chemical fertilizer has expanded in all regions of the developing world except SSA. Considering that over the past three decades higher fertilizer use accounted for at least 20 per cent of the growth in developing country agriculture[16] (World Bank, 2008), one can understand the slow agricultural growth, including the stagnation of cereal yield in SSA since 1984 at around 1000 kg/ha/arable land (Fig. 5).

For two of the main traditional commodity exports of Africa, cocoa and coffee, Asia's productivity has much higher than that of Africa over the period, 1961 to 2005. This is particularly in the last decade when the yield gap increased between the two regions. In 2006, for example, Asia's productivity in both crops was almost double that of Africa's: 1,100kg/ha and 830kg/ha for cocoa and coffee respectively compared to Africa's 540kg/ha (cocoa) and 450kg/ha (coffee). However, for reasons that are not immediately apparent, tea yields have been consistently higher in Africa than in Asia over the same period and reaching 1,930 kg/ha in 2006, about one-third higher than Asia's yield of 1,269kg/ha (FAO, 2008a). Therefore, Africa does not seem to have any intrinsic reason for being trapped in low productivity cycle for other agricultural exports. The continent can also attain levels of productivity comparable to those of other developing regions if only there is the will and the resources to address the problem as can be seen from the example of tea.

It would, thus, appear that the source of the increase in agricultural production in Africa noted earlier is from more enhanced utilization of existing resources rather than increases in productivity and investment growth. This increase also coincided with the recovery in resource inflows and imports. Trade liberalization, and in particular the reduction in overvaluation of the exchange rate, increased incentives to produce for exports and reduced the shortages of basic consumer (incentive) goods in the rural areas (UNCTAD, 1998). It was, however, not complemented with policies addressing the key constraints on investment and productivity which are crucial for the long-term performance of the agricultural sector.

The supply response in agriculture and exports after trade liberalization would have been much higher if trade liberalization had incorporated a complementary policy package to address the structural constraints on agriculture. Consequently, much of African agriculture has not experienced the structural transformation that took place in other developing regions in the production of traditional bulk agricultural commodities and in international horticulture and processed food markets. Paradoxically, while developments in the global markets for the latter have opened up new business opportunities for African countries, it has also increased the competitive pressures on the continent in responding to these opportunities. The next section explores some of these external constraints to the participation of African agricultural producers in the international trade in new market dynamic agricultural products.

3.3 External constraints

(a) Market access[17]

The majority of African countries benefit from preferential market access schemes of various types. The least developed countries (LDCs) and other low income African countries benefit from two types of such schemes in their main export markets. These include, the African Growth and Opportunities Act (AGOA), and the Everything But Arms (EBA) of the United States and the EU respectively. The African Caribbean and the Pacific (ACP) Group of countries also enjoy preferential market access to the EU within the framework of the Cotonou Agreement, which is currently being replaced by the Economic Partnership Agreements (EPA).

However, many agricultural products face tariff peaks (very high tariffs) and tariff escalation (higher tariffs on processed products), which discourage diversification into higher value-added products (McCalla and Nash, 2007). Thus, African countries may yet encounter market access problems in trying to expand into higher value added products. This highlights the importance of country specificity in drawing conclusions on the market access conditions for African countries. For example, African countries that specialize in certain agricultural exports (e.g., meat, milk, sugar, or some cereals) are penalized just as those that export to highly protected markets.[18] And average tariffs on agricultural products are much higher than those on manufactures (McCalla and Nash, 2007) as international trade in agriculture is one of the items on the built-in agenda for which negotiations are still on-going.

The Doha Work Programme has the long term objective of establishing a fair and market-oriented trading system, including correcting and preventing restrictions and distor-

tions in world agricultural markets. The Work Programme aims at, *inter alia*, "substantial improvements in market access; reductions of, with a view to phasing out, all forms of export subsidies; and substantial reductions in trade-distorting domestic support" (WTO, 2001). Some progress was made in the agricultural negotiations during Hong Kong WTO Ministerial Meeting in 2005 (see, WTO, 2005), but some observes have pointed out that these amount to no more than marginal gains for developing countries. This is because the Ministerial Declaration does not call for the elimination of domestic subsidies in major developed countries. It does not envisage curbing or effectively disciplining the "green box" subsidy of major developed countries[19] (Das, 2006; Sharma, 2006). Finally, the formulas for cutting tariffs and subsidies, the so-called core modalities, and the treatment of sensitive products were not resolved (Heydon, 2006).

In addition to these concerns over the progress agricultural trade liberalization, Africa still faces market access problems in the form of non-tariff measures (NTMs) being deployed as non-tariff barriers (NTBs). African exports are subject to increasingly stringent standards within the context of the WTO Agreement in the Application of Sanitary and Phytosanitary (SPS) requirements as well as Technical Barriers to Trade (TBT).[20] This has given rise to concerns about these Agreements at two levels.

First, the lack of transparency in the application of these requirements and contingency protectionist regimes (e.g., anti-dumping) has led to their being perceived as NTBs. Indeed, some studies have contended some African countries have suffered losses of export revenue as a result of this.[21] Second, several African countries do not have the technical capacity and resources to comply with the required standards.

Building the necessary laboratory and managerial capacity to meet the TBT and SPS standards in export markets has therefore become a prime issue for technical assistance programmes directed at trade and trade-related infrastructure of African countries. Such activities should also be prioritized within the framework of "Aid for trade" capacity building programmes.[22]

(b) Competitive pressures in the global trading system[23]

These problems of SSA agriculture have been exacerbated by the more recent developments in international trade for agricultural commodities. Marketing and distribution channels are now increasingly dominated by supermarkets within a context of global consumption patterns and new demands linked to production, technology, and health and safety concerns of food. The health and safety concerns of food underscore the requirements for traceability of supplies, which have in turn reinforced the dominance of global commodity market chains or global value chains (GVC) (Fitter and Kaplinsky, 2001; Gibbon and Ponte, 2005).

The tightening of demands associated with the participation in these GVCs has compounded the challenges faced by Africa in its efforts to expand new income elastic agricultural exports. Participation in networks has become an important requirement for accessing developed-country markets. And, in order to gain competitive advantage in global markets, there is now increased premium on accurate information, timely delivery, and packaging. This creates entry barriers to new suppliers such as those from Africa. Considering the weaknesses of Africa's private sector, underdeveloped and unreliable transport and communication networks and weak institutions, there is little evidence that this enormous competitive disadvantage would be overcome in the foreseeable future (UNCTAD, 2003; Havnevik, et. al., 2007).

4. What are the policy options?

> *Agriculture ... offers great promise for growth, poverty reduction, and environmental services, but realizing this promise also requires the visible hand of the state—providing core public goods, improving the investment climate, regulating natural resource management, and securing desirable social outcomes.* (World Bank, 2008: 2).

This section discusses some specific policy proposals that could help strengthen Africa's export performance. It is by no means exhaustive but rather indicates some specific policy perspectives, which follow from our earlier discussion. The proposals are based on the view that export development requires more than trade liberalization and that trade policy needs to be closely linked to sectoral development policies. Constraints on supply response are best addressed by specific sectoral policies and not just macroeconomic policy reforms. Macroeconomic and political stability as well as policy predictability are necessary foundations for the efficacy of agricultural sectoral policies in Africa. Given that some of the problems facing Africa's agricultural exports have to do with conditions in global markets, the strategy to promote Africa's agricultural exports must be based on polices by national govern-

ments, working in cooperation from Africa's development partners.[25]

The overall development strategies of countries should incorporate an "Agricultural Sector Development Strategies" (ASDS), which takes into account the agro-ecological conditions of each country, and go beyond strategies for developing crop agriculture. ASDS should incorporate complementary programmes to develop off-season employment activities as a means of revitalizing the rural economy and addressing food security concerns within a holistic framework. Increased opportunities for all-year round employment will also help to stem the flow rural-urban migration of able bodied young people who could then be encouraged to take to farming as a profession and replace growing population of ageing farmers. ASDS should incorporate some or all of the following issues depending on the development priorities and agro-ecological conditions of each country.

4.1. Supply-side constraints

These constraints should be addressed through an integrated programme of "supply-side measures" with two main objectives of tackling supply-side constraints critical to: (i) Creating greater incentives to encourage investment in the agricultural sector, and to improve agricultural productivity and exports. (ii) Enhancing the competitiveness of African agricultural exports. Some of the essential components of the integrated programme of "supply-side measures" are discussed below.

Incentive Package

A comprehensive *package of fiscal and other incentives* to investors in the agricultural sector should be developed consonant with the government's macroeconomic objectives and agricultural development priorities. This may comprise (i) an input subsidies programme, carefully designed and targeted at specific groups to improve agricultural productivity; (ii) Improving access to credit by enhancing the efficiency of the financial sector; (iii) Donor or private sector supported "Special Export Development and Investment Funds" to provide financial resources in support of business ventures in agriculture.

Improving productivity

The state, or in collaboration with private sector agents, should increase the level of *investment in technology*, infrastructure (roads, irrigation facilities, post-harvest storage) extension services, supply of inputs, R&D to improve productivity and quality of smallholder farms, as well as to improve marketing systems. Governments should endeavour to meet their commitment under NEPAD's Comprehensive Africa Agriculture Development Programme (CAADP) to increase public expenditure on agriculture as a share of total government expenditure to 10 per cent by 2008.[26] Specifically, increases in productivity and in agricultural supply response could be attained through public programmes in the context of "green box" policies,[27] especially to support poor farmers in remote rural areas. These policies are classified as non-trade distorting, and are not proscribed by the WTO Agreement on Agriculture.

Reforming socio-economic institutions

In the medium to long-term, governments have to deal with *socio-economic institutions* that inhibit the efficient deployment of various factors of production, such as land tenure systems and associated inheritance systems, and gender relations. This will necessitate specific policies for land reforms; and improving the property rights of women who account for much of the agricultural production in SSA.

4.2 Diversification and value-addition

Governments have to develop programmes which promote diversification towards higher value-added products. An essential element of this should be to collate and disseminate market information to producers on new market dynamic, income elastic products. This should be in partnership with Export Promotion Authorities and collaboration with exporters' associations. As the opportunities for such diversification are influenced by the existence of sanitary and phytosanitary standards (SPS) in international trade, and the capacity of producers in African countries (especially small farmers) to comply with them, there is the need for complementary programmes to promote market penetration and improved market access based on compliance with these standards (see next section).

4.3 Market access

The determining factor in market entry is the capacity to upgrade and produce according to specific requirements relating to quality, health and environmental standards as well as consumer preferences and tastes. At present, some African producers encounter difficulties in meeting these standards. This notwithstanding, standards have an important and positive role to play in the development

and expansion of world trade. For example, the compliance with sanitary and phyto-sanitary standards enables the effective management of risks associated with the spread of plant and animal pests and disease. Compliance with these standards also helps to stimulate value addition, innovation and product differentiation.

To assist with compliance with trade standards, governments in collaboration with exporters' associations, could set up capacity-building programmes to upgrade the capacities of countries to comply with such standards. Similarly information bureaux on requirements for participating in global value chains will promote the utilization of opportunities in dynamic markets. Some of these programmes could be supported by donors bilaterally or within the framework of aid-for-trade.

Liberalization of international trade in agriculture should go hand in hand with policies to ensure an objective application of various measures on SPS, TBT and environmental standards, which are increasingly being deployed as non-tariff barriers, even as tariffs are being eroded. Ongoing agricultural negotiations in the Doha Round provide a legitimate framework within which to address the pressing market access problems of Africa's agricultural exports. [28]

4.4 Private sector participation

A major challenge for new African entrants is how to identify market opportunities and meet the specific requirements for each market. This necessitates a constant examination of diversification opportunities, as areas of competitive advantages are dynamic and change constantly over time. Considering the weakness of the private sector in much of Africa, and the "public goods" nature of these services, they would have to be provided by governments or in partnership with the private sector under PPP (public-private partnership) arrangements depending on country circumstances. Also, the application of global value chains to agriculture means that private sector development in agriculture cuts across several policy domains, including improvements in the overall business environment and contract enforcement, and the development of business service providers. .

4.5 Regional integration, South-South trade

Governments, in partnership with the private sector, need to promote regional economic cooperation with the objective of overcoming the constraints of small domestic markets and diversifying away from traditional bulk primary commodities into market-dynamic products. Africa already has a variety of regional economic groupings at different stages of trade integration. However, a major problem for most of them is the weak implementation of trade protocols signed by members. Thus, there is the need to ensure that countries comply with the obligations of all regional trade protocols they have entered into in order to promote intra-African trade in line with NEPAD priorities.

The emergence of "Southern drivers" of the global economy suggests that Africa has to rethink its existing trade and development strategies and reorient its external trade towards new growth poles in Asia, such as China and India, but also Brazil and Russia. This calls for innovation on the part of governments and the private sector, including exporters' associations, and enhanced participation in various South-South trade cooperation arrangements (e.g., Forum on Asia-Africa Cooperation in Export Promotion).

4.6. Development partnerships

It is important to sustain the recent increases in aid to SSA agriculture in view of the important role of ODA in funding public investments. However, greater coordination and harmonization of aid among donors and with recipient countries will be critical in ensuring its effectiveness (UNCTAD 2006) in addressing the priorities of the agricultural sector in each country. African countries require technical assistance programmes to help them adjust to the new global environment in particular the food and health standards enunciated in SPS and TBT Agreements as well as the private standards of supermarkets. These could be delivered with the framework of "Aid-for-Trade" and other trade and trade-related technical assistance, such as the Enhanced Integrated Framework which was designed to integrate trade into the national development plans and co-ordinate delivery of trade-related technical assistance to LDCs. Indeed, A few of such trade capacity building programmes supported by both the EU and the US are already running and are excellent examples of bilateral cooperation between Africa and its trading partners to provide trade and trade-related infrastructure to facilitate market penetration (see, UNCTAD, 2008b and EC, 2008).

Concluding remarks

This analysis of the performance of agricultural exports in Africa suggests that the positive developments after trade liberalization remain limited and modest particularly in comparison to other developing regions. This is, in part, because trade liberalization lacked complementary policies to address the incentives, structural and institutional constraints that are most critical for enhancing agricultural productivity, output and exports. These constraints have persisted and frustrated the positive response of agricultural exports to the new incentive framework created by trade liberalization. Production and marketing costs have increased during liberalization with the removal of subsidies and currency devaluations; while the dissolution of marketing boards added price risks to the uncertainties of rain fed agriculture. The consequence is that much of Africa continues to be dependent on traditional bulk agricultural commodities as a major source of its export earnings. Paradoxically, Africa has been losing its market shares in even these exports to other developing regions.

Africa has made a start in the exports of new market-dynamic agricultural products, but these remain rather small compared to the continent's potential in these markets. The private sector and private-public partnerships (PPPs) are critical in exploiting the opportunities in these markets. However, there are very few African countries in which the private sector is developed enough to assume the lead in gaining access to global value chains (GVCs) and in penetrating the markets for these products. Thus, resuscitating the capacities of the African state will be crucial, particularly in the long run, to any meaningful improvement of Africa's position in GVCs and therefore greater participation in the international trade in new market-dynamic products (Gibbon and Ponte, 2005). The importance of the role of the state in providing these "public goods" is no longer contested even by the architects of Africa's trade liberalization (see for example, World Bank, 2008).

It follows that policy interventions to improve the export performance of agriculture should be targeted at specific socio-economic issues and institutions that have been identified as frustrating Africa from reaching its true potential in international agricultural trade. The main objective of an Agricultural Sector Development Strategy (ASDS) should be to improve agricultural productivity and efficiency of agricultural trade. As such it should be directed, *inter alia*, at increasing public investments in R&D, rural infrastructure, including roads and irrigation facilities as well as in health and education. Facilitating access to inputs, encouraging new investments, and enhancing access to market information would also help in improving the overall efficiency of agricultural trade. A speedy conclusion of ongoing agricultural negotiations in the Doha Round in a manner that responds to the development interests of African countries would also be critical for Africa's agricultural trade in general.

In the final analysis, however, ASDS cannot realistically be formulated independent of other sectors. It should be an integral part of overall economic development policy. In their design of policy packages, such as ASDS, to develop the agricultural sector, in particular to diversify and enhance agricultural exports, governments have to make complex policy choices taking into account the inter-sectoral dimensions as well as various linkages between agricultural, manufacturing, and services sectors. The tragedy of Africa's agriculture is that in the past quarter of a century, agricultural polices have been formulated with little thought to inter-sectoral linkages. And as part of economic policy reforms, the critical role of the state in the provision of "public goods" has been undermined, evidenced by drastic reductions in government's agricultural expenditure as a share of its total expenditure.

Notes

1. Most of these traditional commodities, for example coffee, cocoa, tea, sugar and sugar products have suffered significant declines in trade volumes from 18 to 11 per cent between 1980-1981 and 2000-2001, while the volume of international trade in fruits and vegetables increased by about 15 per cent. Internationally traded volumes in the case of rice, chickens, and cut flowers increased by more than 40 per cent in each case between 1993-1995 and 2003-2005 (Havnevik, et. al., 2007: 26).

2. Despite the strong increases in nominal export prices for a range of primary agricultural commodities in recent years, the overall trend depicts a fall in real prices between 1993-1995 and 2003-2005 (Havnevik, et al., 2007: 26). For a detailed discussion of high price volatility and its impact on African economies, see UNCTAD, 2003a, in particular pp. 2-22).

3. Of the 48 countries for which data was presented over the period, 2003-2005, primary commodities made up more than 90 per cent of the total exports of 13 countries, including eight which are oil exporters; and more than 75 per cent of half the total number of countries. Excluding fuels, primary commodities made up at least 70 per cent of the total exports of one in three countries. Almost all the ten countries for which primary commodities

(including fuels) made up less than 50 per cent of the total exports are middle-income countries.

4. Indeed, the transforming economies in South Asia, East Asia and Pacific and Middle East and North Africa, have accounted for about two-thirds of agricultural growth in the developing world mainly through productivity gains rather than through expansion in land devoted to agriculture. Cereal yields in East Asia rose by 2.8 per cent a year between 1961 and 2004, far more than the 1.8 per cent recorded in the industrial countries (World Bank, 2008b).

5. The main objective of the reform is to increase the productivity and efficiency of the cotton sector by moving from a monopolistic structure to a system based on competition. It also aims at expanding cotton production while spreading the productivity gains and income increases to a larger number of cotton producers and generating multiplier effects within and outside the cotton sector and the rest of the economy

6. In 2007, a 50kg bag of fertiliser was sold to farmers at about $6.50. That is, at a quarter of the price (about $27.00) in 2004. See, http://africanagriculture.blogspot.com/2008/02/caution-urged-on-malawi-fertilizer_11.html

7. The Low-Income Food-Deficit Countries (LIFDC) include food deficit countries with per capita annual income below the level used by the World Bank to determine eligibility for IDA assistance (i.e. $1,575 in 2004). In accordance with the guidelines and criteria agreed to by the Commission for Africa, these countries should be given priority in the allocation of food aid. All African countries, except five, are LIFDCs. The exceptions are Algeria, Gabon, Libya, Namibia and South Africa.

8. This is the main conclusion reached by in the large Economics literature on the elasticity of supply in agriculture to price signals which deals with mostly methodological issues and the quality of data for evaluating supply response in different socio-economic contexts. However, this is not discussed here as it is not directly related to the discussion in this section.

9. Unless otherwise stated, the discussion in this section n is based on UNCTAD, 1998, chapter III.

10. These include consumer goods such as soap textiles, sugar, cooking oil, tinned milk, matches, roofing sheets, radios and bicycles among others, which were in short supply because of the collapse experienced by many countries prior to the implementation of adjustment programmes.

11. This much has been acknowledged by the Independent Evaluation Group that reviewed World Bank assistance to agriculture in SSA in 2007 (World Bank, 2007).

12. This is defined as the agricultural value added less the total consumption of agricultural poroducers.

13. It is still an open question whether tenure system encourage or discourage investments and agricultural innovation. There is some evidence that indigenous land tenure systems, Including the rules of inheritance, which necessitate the division of a deceased's farm(s) among numerous heirs have often reduced farms to sizes, which are too small - or where the deceased had several farms to scattered plots, which are too far apart - to justify any meaningful investment. On the other hand, it has also been suggested that investments to improve land are actually increased under this system because they can increase the security of use rights (UNCTAD, 1997b; 1998a).

14. In one of the earliest reforming countries, Ghana, for instance, the proportion of government total budget to agriculture declined from 10 per cent in 1983 to just 3.5 per cent in 1988 (see, http://www.country-studies.cotn/ehana/the-economic-recovery-proeram.html - accessed 18 May 2008); In Burundi, fiscal reforms, including the privatization of state-owned financial institutions, led to a drastic reduction in the already low level of credit to the

agricultural sector in favour of commerce or trading. Agricultural credit declined from 2.5 per cent of total domestic credit to under 1 per cent between 1980-1994 and 2003-2005 (Nzobonimpa, et al 2006).

14. This proportion is far lower than the level attained by other developing regions attained even in the early 1960s.

15. This excludes dry land agriculture.

16. For detailed discussions on market access issues and subsidies, see UNCTAD, 2003a, pp. 22-26.

17. Exports from Benin, Malawi, Mauritius, Swaziland and Togo, for instance, are penalized because they are mostly highly protected products, and preferences do not fully compensate for the loss. On the contrary, those of Chad, the Democratic Republic of the Congo and Libya are not, as these are mainly oil, gas, and mineral products (Bora, et. al, 2007).

18. The developed countries have been accused of "box-shifting" of domestic subsidies, whereby many of these subsidies subject to reduction commitments have been reallocated to the "green box" (Das, 2006; Sharma, 2006).

19. The SPS sets out the rules on food safety and animal and plant health standards. Whiles it allows countries to set their own standards, it also stipulates that regulations must be based on science; and should be applied only to the extent necessary to protect human, animal or plant life or health. They should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail. Member countries are encouraged to use international standards, guidelines and recommendations where they exist. However, members may use measures which result in higher standards if there is scientific justification.

20. See, for example, Wilson and Otsuki, 2001. One recent study has, however, suggested that the magnitude of the losses attributable to the stringent and non-transparent use of these standards is much smaller than the estimates of earlier studies (Rios and Jaffee, 2008). And yet another study estimates that SPS and TBT measures have on the whole a negative impact on trade in agricultural products and that exports of developing and least developed countries to OECD countries are significantly reduced by these regulations (Disdier, et. al., n.d., mimeo).

21. Some on-going technical assistance programmes are targeted at building trade capacity in selected developing countries. These include the Joint Integrated Technical Assistance Programme to Selected Least Developed and other African Countries (JITAP) (International Trade Centre UNCTAD/WTO), and the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries (EIF).

22. Except otherwise stated, much of the discussion in this section is from UNCTAD, 2003a.

23. The governance of these GVC (which defines the functional division of labour along the chain) determine the chain membership, oblige other actors to perform unwanted value-added activities, or alternatively to exclude them. Redistribution processes take place in the GVC along the axes of marginalization/exclusion and inclusion/upgrading (Gibbon and Ponte, 2005).

24. For a detailed discussion of these policies, see UNCTAD, 2003a; UNCTAD, 2003b; and NEPAD's CAADP at http://www.fao.org/docrep/005/Y6831E/y6831e-01.htm#TopOfPage.

25. Indeed, considering that most governments have already fallen short of this target, the timeline for meeting it should, perhaps, be extended to 2015.

26. The following measures are permitted under the Agreement: increasing expenditure for agricultural research, extension, training for specific food crops pest and disease control and even marketing. SSA governments could also provide infrastructure in support of agricultural development without falling foul of the provisions of the Agreement. These include: physical infrastructure to promote agricultural activities, including roads, electricity, water, dams and drainage schemes, environmental programmes and assistance for deprived regions. The calculation and application of the aggregate measurement of support (AMS) is not product-specific, and as such guarantees some flexibility in domestic support policies as long as global commitments reflected in individual country schedules are not exceeded

27. which are exempt from the calculation of a country's current total AMS. These policies encompass: agricultural input subsidies to low-income or resource-poor producers, investment subsidies, and government assistance to encourage agricultural and rural development. These exemptions allow considerable leeway for SSA governments to support their agricultural sectors (Gayi, 2007; see also Hodge and Charman, 2007).

28. For a discussion of some specific proposals on how the on-going negotiations of the Doha Round could help improve the agricultural sector, enhance exports and address in SSA food security concerns, see Gayi, 2007, pp 313-316.

References

Das, BL (2006). "Imbalances in the Hong Kong Ministerial Outcome", http://www.twnside.org.sg/title2/par/HK_outcome_SUNS_version_13feb06.doc (accessed, 11 July, 2008)

Disdier, A. Fontagné, L. and Mimouni, M (n.d.). The impact of Regulations on Agricultural Trade: Evidence from the SPS and TBT Agreements (mimeo).

European Commission (2008). Making Trade Work for Development: Aid for trade - A selection of case studies from around the world, European Community, Belgium, June.

Food and Agriculture Organization (FAO) of the United Nations (2008). FAOSTAT Online statistical database.

Gayi, S.K. (2007) "Does the WTO Agreement on Agriculture Endanger Food Security in Sub-Saharan Africa?" in Shabd S. A. Davis B. and Guha-Khasnobis, B. (2007) (Eds) *Food Security: Indicators, Measurement, and the Impact of Trade,* UNU-WIDER Studies in Development Economics, Oxford University Press

Fitter R and Kaplinsky R (2001). Who gains from product rents as the coffee market becomes more differentiated? A value chain analysis. *IDS Bulletin* 32 (3): 69–82.

Gibbon P and Ponte S (2005) *Trading Down: Africa, Value Chains and the Global Economy.* Philadelphia: Temple University Press.

Gibbon, P. (2006). *Current Trends and the New Development Role of Commodities,* Common Fund for C ommodities.

Havnevik, K. Bryceson, D., Birgegard, L., Matondi, P. and Beyene, A (2007). *African Agriculture and the World bank: Development of Impoverishment?* Report based on a workshop organized by the Nordic Africa Institute, Uppsala, March 13-14, 2007, Nordiska Afrikainstitutet.

Herbst, J. (1993). *The Politics of Reform in Ghana, 1982-1991, Berkeley*: University of California Press, http://ark.cdlib.org/ark:/13030/ft2199n7n7/

Heydon, K (2006). "After the WTO Hong Kong Ministerial Meeting: What is at stake?" *OECD Trade Policy Working Paper*, No. 27, OECD, Paris.

Pratt, A.N. and Yu, B. (2008). "An Updated Look at the Recovery of Agricultural Productivity in Sub-Saharan Africa", *IFPRI Discussion Paper* 00787, August

McCalla AF and Nash, J (2007). *Reforming Agricultural Trade for Developing Countries, Key issues for a pro-development outcome of the Doha Round*, Volume One, The World Bank, Washington DC.

Nzobonimpa, O.; J. Nkurunziza and L. Ndikumana (2006): "Promoting a Development-Oriented Financial System in Burundi." Paper prepared for the African Economic Research Consortium (June).

OECD (2008a) *Business for Development 2008, Promoting Commercial Agriculture in Africa, A development Centre Perspective.* Paris: OECD.

OECD). (2008b) OECD Online Statistical Database, [accessed 21 July 2008].

Rios, L.D. and Jaffee, S (2008). "Barrier, Catalyst, or Distraction? Standards, Competitiveness and Africa's Groundnut Exports to Europe", *Trade Note* 35, The World Bank Group, August 4.

Sharma, D (2006). "WTO Hong Ministerial: Much Ado About Nothing", *Motion Magazine*, January, 21.

Traoré, Aly (1990) "Ivory Coast: Agricultural and Industrial Development" in Hamid Aït Amara and Bernard Founou-Tchuigoua (1990) (Eds) *African Agriculture: The Critical Choices,* Zed Books Ltd., 57 Caledonian Road. London & New Jersey and United Nations University Press Tokyo 150 in co-operation with The Third World Forum, Dakar.

UNCTAD (1998). *African Development in a Comparative Perspective*. United Nations publication, sales No. GV.E.99.0.21. Oxford: James Curry and Trenton NJ: Africa World Press.

UNCTAD (1997a) *Trade and Development Report, 1997*, United Nations publication, sales no. E.97.II.D.8, New York and Geneva.

UNCTAD (1997b). *The Least Developed Countries 1997 Report*, United Nations publication, sales No.E.97.II.D6. New York and Geneva.

UNCTAD (1999). *The Least Developed Countries 1999 Report*, Sales No.E.99.II.D2, United Nations publication, New York and Geneva.

UNCTAD (2003). Economic Development in Africa: Trade Performance and Commodity Dependence, Sales No.E.03.II.D34 United Nations publication, New York and Geneva.

UNCTAD (2006). *Economic Development in Africa: Doubling Aid: Making the "Big Push" Work*. United Nations publication, sales no.E.06.II.D10. New York and Geneva.

UNCTAD (2008a). *UNCTAD TRAINS database Online, Accessed on 27 May, 2008*

UNCTAD (2008b). *Economic Development in Africa: Export Performance Following Trade Liberalization: Some Partterns and Policy Perspectives,* Sales No.E.08.II.D22 United Nations publication, New York and Geneva.

Wilson. J.S. and Otsuki, T. (2001). "Food Safety and Trade: Winners and Losers in a Fragmented System", Policy research Working Paper, 2689, The World Bank, October.

World Trade Organization (WTO) (2001), *International Trade Statistics 2001*, Geneva: World Trade Organisation.

WTO (2001). "Doha WTO Ministerial 2001: Ministerial Declaration", WT/MIN(01)/DEC/1, 20 November.

WTO (2007). *International Trade Statistics 2007*, World Trade Organization, Geneva, accessed on-line at

World Bank. (1997). *Global Economic Prospects and Developing Countries*, World Bank, Washington DC.

World Bank. (2007). *World Development Indicators* (Electronic Database), Washington, D.C.: The World Bank.

World Bank (2008). *World Development Report: Agriculture for Development,* Washington, D.C.: The World Bank

http://www.wto.org/english/res_e/statis_e/statis_e.htm

http://www.wto.org/english/tratop_e/serv_e/gatsqa_e.htm

http://www.country-studies.com/ghana/the-economic-recovery-program.html - accessed 18 May 2008.

THE FOOD VERSUS FUEL ISSUE: CASE OF THE PHILIPPINES

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Abstract

In light of the recent food crisis this paper dwells on the issue of whether or not biofuels production impacts on food security particularly among less developed countries. It uses initial findings from current research on the impact of the biofuels program in the Philippines. It first discusses the Philippines biofuels program in general using as a backdrop, the past and existing food policy in the country. Two levels of analysis are provided. At the macro-level, results from a computable general equilibrium model focusing only on sugarcane and coconuts as feedstock are presented. At the micro-level, results from partial budgeting analysis for jatropha are discussed. The CGE results indicate that promoting sugar and coconut as feedstock for biofuels tends to expand overall agriculture value added but output of the food processing sector declines. Experiments in the model suggest that household income increases primarily due to wage increase but level of output of the main staple crop (palay/rice) declines. In the farm level analysis, budgets generated for jatropha indicate favorable profits comparable to those in rice and corn farms. This suggests that jatropha grown in marginal land areas, as biofuels feedstock offers new alternative income opportunities among rural households without necessarily sacrificing food production.

INTRODUCTION

The recent food crisis manifested by the drastic drop in global grains stocks coupled with unprecedented rise in prices has brought to fore important policy issues particularly among the most vulnerable poor countries. Among these include the issue on whether or not biofuels production makes economic sense. To date, there is no clear consensus on the matter noting that different circumstances prevail and that food security is interpreted differently across countries.

In the Philippines, for example, government policy makers have equated food security to self-sufficiency in rice and corn – the two major grains produced in the country. This objective is etched in statutes the most recent of which, is Republic Act (AR) 8435 otherwise known as Agriculture and Fishery Modernization Act of 1997 (AFMA). This policy finds its roots in nationalistic ideals exemplified by the enactment of RA 3018, otherwise known as the Rice and Corn Nationalization law of 1960 (Cabanilla, 2006). This law, in fact, led to the establishment of government parastatals (e.g. Rice and Corn Board, National Grains Authority, National Food Authority) which monopolized international trade in food particularly rice and corn – now referred to as political commodities (Panganiban, 1998).

In contrast, Malaysia, a country which is more endowed with land and water than the Philippines has adopted a policy of self-reliance (instead of self-sufficiency)[1]. The argument for this type of policy is that while Malaysia has the resources to achieve self-sufficiency in rice, it will be achieved at the "expense of high financial costs to the government and relatively high taxes on poor consumers (Arshad, et al, 1996).

It is obvious from this policy stance that Malaysia was keen on adhering to the principles of comparative advantage in agriculture. Despite its high level of rice and corn import dependence it has posted favorable trade balance in agriculture compared to the Philippines which had a negative trade balance in agriculture since the early 1990s.

Undoubtedly, biofuels programs – a recent phenomenon among LDCs, have important implications on food security, trade, and rural poverty. Biofuels advocates in the Philippines, for example, argue that the program offers opportunities for expanding income sources among rural households. Those that oppose it, on the other hand, point out the negative impact on food production and the environment.

Using available information, this paper attempts to make an initial assessment of the implications of the biofuels program on food security in the Philippines. The next section discusses the concept of food security adopted in this paper. This is followed by a brief description of the biofuels program in the Philippines. Implications of the pro-

gram on food security are discussed in the last section.

Food Security: Our Definition

For this paper, we view food security in the context of the FAO definition: "A situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2002, The State of Food Insecurity, 2001).

We note here that the above definition has evolved from the changing perception about the capacity of the world food system to address global food needs. As a review, the following definitions reflect epochal food concerns:

1974. In the 1974 food crisis, food security was referred to as "Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices. This reflects the global concerns in 1974 on the volume and stability of food supplies.

1983: The FAO definition of food security at this time was "Ensuring that all people at all times have both physical and economic access to the basic food that they need". This new concept includes securing access by vulnerable people to available supplies. Attention was called to the balance between demand and supply side of food security equation.

1996: In the FAO World Food Summit, the definition changed to "Food security, at the individual, household, national, regional and global levels (is achieved) when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

The performance of the world food system has been an important factor in the changing perception about food security. From the first major food crisis in 1974, the record shows that except for periodic supply disturbances brought about mainly by bad weather, the world has been capable of producing enough food, and for rice, the percent share of total production that is internationally traded has increased (Dawe, 2006). The significance given to economic access in the recent definition of food security is therefore appropriate. This suggests that income generation is a key to food security. In the rural areas, expansion of economic opportunities is important.

Philippine Food Policy

Food policy in the Philippines is primarily anchored on two major crops – rice and corn. Almost 60 percent of the Philippine Department of Agriculture (DA) budget is allotted to rice and corn and domestic prices of these staples have been set higher than world market price – a stark contrast to the pricing policy in the 1980s when domestic price of basic staples were set below world prices (Cabanilla, 2006). In the current effort to achieve rice self-sufficiency and, as a reaction to the recent food crisis, the government has allotted P50B (roughly $1.13B). Referred to as FIELDS program, this fund is intended to subsidize Fertilizer, Irrigation, Extension, Loans, Dryers, and Seeds. No comparable amount has ever been channeled to programs covering other cash crops.

Tariff policy has also favored rice and corn with 50% tariff rate for each, the highest among all agricultural commodities. The Philippine government has fortified its control on the market by granting the National Food Authority (NFA) full control over imports of rice and corn. Medium term agricultural development plans explicitly mention the promotion of high value crops (mostly cash crops) production but commensurate budgetary allocation has not been provided (CPDS 1996; WB 1999). Continued emphasis on self-sufficiency in rice and corn has rendered high-value commodities (HVC) production a minor agricultural undertaking.

Institutional reforms that would facilitate the needed rural transformation are constrained by the policy bias for rice and corn. For example, the enactment of the Local Government Code of 1991 (RA 7160) provides the means for an increased involvement of local government units (LGU) in pursuing agricultural development programs. However, fiscal constraints have compelled planners at the local level to implement programs that are attuned with national food self-sufficiency objectives. in their attempts to access national budget for food security purposes , local government units are forced to prepared plans that resemble national biases for specific commodities (Cabanilla, 2002). Thus, plans and programs implemented at the local level are usually not consistent with the demands of the community. Efforts towards rural diversification are stifled.

Despite the apparent policy bias for rice, however, domestic production has fallen short of demand. The Philippines is now among the highest importers of rice in the world averaging close to 2M metric tons of rice imports per year in recent times (Table 1) What compounds the problem is the fact that poverty incidence is in the uptrend with rates of incidence highest in known food surplus areas such as Mindanao. Periodic reports suggest incidence of hunger is highest in these food surplus areas (SWS, 2004). This gives credence to the efforts currently done to promote biofuels feedstock production which is intended partly to address rural poverty.

The Biofuels Program

The Philippines biofuels program is promoted with the view not only as a response to the soaring world oil prices but also to provide alternative income opportunities to rural households (Department of Agriculture, No Date). It stems from the Biofuels Law (RA 9367 of 2006) that stipulates mandatory mixing of bio-ethanol and biodiesel in domestically consumed gasoline and diesel respectively. In the initial year of implementation (2007), the required mixture is 1% for biodiesel and to increase to 2% in 2010. For bio-ethanol, the required mixture is 5% in 2007 and 10% in 2010.

Five feedstocks are currently being promoted for the program – coconut, and jatropha for biodiesel, and cassava, sugarcane and sweet sorghum for bio-ethanol. Among the five, jatropha and sweet sorghum are not yet part of the Philippine agricultural landscape. Jatropha is not a food crop and claimed to grow even on marginal land not normally planted to any commercial crop. Indeed, early par-

Table 1. Rice production, consumption, and importation of the Philippines, 1999-2007

	Palay production	Rice production	Rice consumption	Rice imports/deficit
1999	11,787	6,111	7,451	838
2000	12,389	6,424	7,892	642
2001	12,955	6,717	8,086	811
2002	13,271	6,881	8,589	1,201
2003	13,500	7,000	8,677	889
2004	14,497	7,517	9,596	1,003
2005	14,603	7,572	10,126	1,830
2006	15,327	7,947	10,324	1,723
2007	16,240	8,421	10,530	1,850

Source: Bureau of Agricultural Statistics

Figure 1. *Jatropha* plantation in Pangasinan, Northern Philippines

ticipants to the program have located jatropha projects in areas which have low opportunity cost (Fig. 1).

Coconut and sugarcane are among the country's major export crops and cassava is primarily a food crop with more than 80 percent of the 2M metric tons average annual production being processed into various food items such as starch. This suggests an unavoidable competition between food processing and biofuels production for available feedstock except in the case of jatropha.

From a purely technical point of view, none of these crops compete for land with rice which is grown normally under flooded condition (except upland rice). Sweet sorghum, however, may compete with corn for land since both crops basically have similar agronomic requirements and optimally grown after wet season rice (just before the onset of summer).

However, as demand for feedstock for biofuels production increases, changes in relative prices may actually lead to a siphoning off of resources away from food production. This brings to fore policy issues related to food security. On the supply side, will food production decline? What happens to aggregate output in agriculture? What happens to household income? The following section sheds some light to these issues.

Initial Findings

Table 2 summarizes initial results from a CGE modeling exercise with particular focus on using sugarcane and coconut as feedstock. Among the notable findings are the following:

a. Gross Value Added in Agriculture: As a whole, the CGE experiments point to relatively large increases in the value added of the Agriculture, Fishery and Forestry sector. This comes primarily from the expansion of the sectors (coconut and sugar) that produce the required feedstock. As expected, value added in food processing declines but by a lower amount compared to the increase in the sectors producing feedstock.

b. Employment: Total employment in agriculture also expands and this primarily comes from the sugar and coconut sectors.

c. Food Crops Output: There is a perceptible decline in the value added of rice and corn. This suggests that due to the change in relative prices variable inputs tend to move towards the production of biofuels feedstock. As shown in Table 2, the sugar and coconut sectors experience large increases in price.

Table 2. Selected impacts for industries in the agricultural and food processing sectors, in percent deviation from the base

Commodity	Value Added	Employment	Consumption	Imports	Exports	Price[a]
Agriculture Fishery and Forestry	0.42	1.27	0.03	0.04	-0.12	0.12
Palay	-0.03	-0.05	na[b]	0.00	0.00	0.16
Corn	-0.08	-0.13	0.02	0.45	-0.17	0.13
Sugar	13.41	42.74	-15.36	0.00	1.32	18.32
Coconut	2.71	6.41	-3.16	0.00	0.42	3.42
Other crops	-0.04	-0.11	0.03	-0.01	-0.12	0.12
Livestock and poultry	-0.07	-0.20	0.05	0.07	-0.14	0.10
Other agriculture fishery and forestry	0.01	0.03	-0.07	0.06	-0.13	0.23
Food Processing	-0.26	-0.88	-0.27	1.00	-0.90	0.44
Rice and corn milling	-0.03	-0.07	0.00	0.54	-0.13	0.15
Sugar milling	-5.77	-20.01	-5.99	26.25	-9.77	6.53
Other food manufacturing and beverages	-0.11	-0.40	-0.08	0.10	-0.27	0.23
Coconut oil and related products	-0.57	-5.93	-0.99	0.00	-0.88	1.15

[a] This is the weighted average of the prices of imports and domestically produced goods.

[b] Not applicable.

d. Household Income: Although not shown in the table, results of the modeling experiments suggest that household income tend to increase (Cabanilla and Rodriguez, 2007).

Tables 3 and 4 summarize initial findings for the farm-level analysis. It will be noted that profitability of jatropha production is comparable to rice and corn. Interviews with scientists in the University of the Philippines at Los Banos suggest that profits become positive after the third year. If indeed, as claimed by those promoting jatropha, the crop will not displace other crops currently in the cropping system, it will bring about net economic benefits to rural areas. Farm operators will earn Php 5,460.00 per hectare per year, on the third year and additional employment equivalent to 40 man days per hectare will be generated.

Concluding Comments

With population in the Philippines now at 89 million and growing at 2 percent per year, the pressures on existing resources are mounting. The country is now the number one rice importer in the world the socio-political pressure to increase domestic production has risen to unprecedented level. Since poverty incidence is now in the uptrend, the need to increase incomes of the poor has become even more crucial.

The challenge in addressing these domestic problems is further heightened by the emergence of global concerns on climate change and deteriorating environment. Amidst all these, the role of the rural/agricultural sector has remained highly significant. Agriculture is a sizeable proportion of the economy generating close to a quarter of Gross Value Added and over 40 percent of total employment.

Table 3. Comparative costs and returns of biodiesel feedstock (pesos per hectare)

Items	Value*
Total Cost	24,610.00
Cost of producing a ton	1,640.67
Cost of producing a kilogram	1.64
Gross Return	37,500.00
Net Return**	12,890.00
Net Profit-Cost Ratio (%)	0.52
Net Present Value (NPV)	5,224.73

Table 4. Comparative costs and returns of staple food crops (pesos per hectare per cropping)

Item	Rice	Corn
Variable Costs	11,395.00	18,600.00
Labor	5,850.00	10,560.00
Material Inputs	5,545.00	7,950.00
Fixed Costs	6,537.78	9,212.00
Total Cost	17,932.78	27,812.00
Gross Return	22,218.00	38,250.00
Net Return	4,285.28	10,438.00
Net Profit-Cost Ratio (%)	0.28	0.38

Data taken from case interviews with farmers, Laguna, Philippines.

Inherent difficulties underscore the need for a careful reshaping of the agriculture landscape. For example, the country suffers from an average of 20 typhoons every year, the incidence of calamities have become more frequent. The opportunity costs of land and water are rising rapidly with population.

By presenting preliminary results of analysis on the impact of the biofuels program in the Philippines, this paper has provided initial insights on the issues related to food security confronting the country especially in light of the recent food crisis. Two specific points need reiteration. First, use of coconut and sugar as biofuels feedstock expands GVA in agriculture, increases total employment but contracts food processing and rice and corn production. In the current situation, this suggests net contribution to economic output and employment but at the political cost of declining output in the major grains sector. Second, prospects of using jatropha for biofuels production look positive. It is a non-food crop and if planted on marginal areas, as planned by the government, it will have positive contribution to food security particularly on the demand side.

From a broad perspective, the paper reiterates the need to improve productivity in agriculture in general. The Philippines has historically underinvested in agricultural R&D having allocated less than one percent of agriculture GVA to research. The increase in feedstock prices noted in the modeling exercise – a point already emphasized earlier from a global perspective (Rosegrant et al, 2006) serves as a signal for the continuous introduction of new technology in agriculture.

Even on food, a high price policy which has been adopted in the past to encourage grains production is counterproductive. Its wage-price spiral effects stifle economic growth. It also penalizes food producers themselves since many are net food buyers (Dawe, 2006).

REFERENCES

Arshad, F., M. N. Shamsudin and R. Salleh. 1996. Food security in Malaysia. [on line at http://www.com.upm.edu.my/-fatimah/foodsec.htm].

Biofuels Philippines. *About Biofuels*. 2007. <http://www.biofuels.com.ph/about.html>. (21 Feb. 2008)

Cabanilla, L. S. and U-Primo Rodriguez (2007). Impact Assessment of Agricultural Programs: Ex-Ante Analysis for Biofuels. Preliminary report submitted to the Philippine Bureau of Agricultural Research.

Cabanilla, L. S. 2006. "Philippine Agriculture, Food Security and APEC: An Integrative Report" in Cabanilla, L. S. Editor, *Philippine Agriculture, Food Security and APEC*. Philippine Institute for Development Studies (PIDS).

Cabanilla, Liborio S. "Achieving Food Security: Some Critical Points to Consider," in Cabanilla, Liborio S. and Merlyne M. Paunlagui (eds.) *Food Security in the Philippines*, c. 1999. Institute of Strategic Planning and Policy Studies and UP Center for Integrative and Development Studies.

Cabanilla, L. S. 2002. Achieving food security: the role of and constraints faced by LGUs. PASCN Discussion Paper No. 2002-07. Makati City, Philippine APEC Study Center Network.

Department of Agriculture, Philippines (no date). Biofuels Roadmap

De Dios, J.V. Emmanuel A. "SUGARCANE and SWEET SORGHUM: A Feasible Potential Source of Fuel." <http://www.merrittenergy.com/A Feasible Potential Source of Fuel.pdf>. (22 Nov. 2007).

De La Torre Ugarte, Daniel G. "Developing Bioenergy: Economic and Social Issues". *BIOENERGY AND AGRICULTURE: Promises and Challenges.* 2006. <http://www.ifpri.org/2020/focus/focus14/focus14_02.pdf>. (9 Mar. 2008).

Energy Information Administration. *EIA - Annual Energy Outlook 2008 (Early Release).* December 2007. <http://www.eia.doe.gov/oiaf/aeo/pdf/appa.pdf>. (21 Feb. 2008).

Food and Water Watch, Network for New Energy Choices, and Institute for Energy and the Environment at Vermont Law School. *EMBARGOED The Rush to Ethanol: Not All Biofuels Are Created Equal.* 2007. <http://www.newenergychoices.org/uploads/RushToEthanol-embargoed.pdf>. (21 Feb. 2008).

Inocencio, A., C. Dufournaud and U. Rodriguez, 2001. *Impact of Tax Changes on Environmental Emissions: An Applied General Equilibrium Approach for the Philippines.* IMAPE Project, Policy and Development Foundation, Makati.

International Society for Southeast Asian Agricultural Sciences, et al. "Feasibility Study for an Integrated Anhy-

drous Alcohol Production Plant Using Sweet Sorghum as Feedstock." Los Baños Laguna: ISAAS, Inc., 2007.

McKenna, P. *Corn biofuel 'dangerously oversold' as green energy*. 2007. < http://environment.newscientist.com/channel/earth/energy-fuels/dn12283-corn-biofuel-dangerously-oversold-as-green-energy.html >. (21 Feb. 2008).

Panganiban, D. 1998. Grains: the political crops. In Dy, R. (ed.) The Food and Agriculture Centennial Book: 100 years of Philippine Agriculture. Manila, Philippines, University of Asia and the Pacific.

PCARRD, 2004. 'Productivity Crisis' in Philippine Agriculture: A Reflection of R&D Underinvestment. Policy Action Group Working Paper No. 2004-01, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD)

Philippines. Bureau of Agricultural Statistics. "Crops Statistics of the Philippines, 2001-2006." *Downloads*. 2007. <http://www.bas.gov.ph/downloads/>. (21 Nov. 2007).

Philippines. Department of Agriculture. *DA Biofuels Feedstock Program*. 2007. < http://ovcre.actetsme.info/files/DA.pdf>. (22 Oct. 2007).

Philippines. Department of Agriculture. *Agribusiness Lands*. 2007. <www.da.gov.ph/>. (22 Jan. 2008).

Philippines. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. "The Philippines Recommends for Cassava." Los Baños, Laguna: PCARRD-DOST, 1983.

Philippines. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. "The Philippines Recommends for Coconut." Los Baños, Laguna: PCARRD-DOST, 1975.

Philippines. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development. "The Philippines Recommends for Sugarcane." Los Baños, Laguna: PCARRD-DOST, 2001.

Rajagopal, D., & Zilberman, D. *Review of Environmental, Economic and Policy Aspects of Biofuels*. September 14, 2007. < http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1012473#PaperDownload>. (12 Dec. 2008).

Reyes, Senen U. "Bio-Fuels: Creating New Opportunities for Agriculture." *Market Information*. 2007 <http://atsea.agr.gc.ca/asean/4299_e.htm> (5 Nov. 2007).

Rosegrant, MW. et al. "Biofuels and the Global Food Balance". *BIOENERGY AND AGRICULTURE: Promises and Challenges.* 2006. <http://www.ifpri.org/2020/focus/focus14/focus14_03.pdf).

Rosmarino, T. *Annual Greenhouse Gas Emissions by Sector: Slide9.* 2006. < http://www.nysforum.org/documents/html/2007/execcommittee/may/enterprisepowerconsumptionreduction_files/800x600/slide9.html>. (21 Feb. 2008).

Schuh, G. E. 1990. "The New Macroeconomics of Food and Agricultural Policy" in Eicher and Staatz, eds.

Sen, A. 1986. *Food, Economics, and Entitlements.* Lloyd's Book Review No. 160 (1986)l-20. Reprinted in Eicher and Staatz. Eds.

Stern, S. N. *Stern Review: The Economics of Climate Change*. 2007. < http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm>. (21 Feb. 2008)

Villancio, Virgilio T. "*Jatropha curcas* (Tubang bakod) Seed Production for Biodiesel." *TubangGatong*. 2007. < www.pcarrd.dost.gov.ph/cin/AFIN/Jatropha Production article_Gil Villancio.pdf>. (5 Nov. 2007).

Zeller, M., & Grass, M. *Prospects and Challenges of Biofuels in Developing Countries*. October 25-27, 2007. < http://ageconsearch.umn.edu/bitstream/123456789/28941/1/sp07ze02.pdf>.

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