DSGD DISCUSSION PAPER NO. 1

MARKET OPPORTUNITIES FOR AFRICAN AGRICULTURE: AN EXAMINATION OF DEMAND-SIDE CONSTRAINTS ON AGRICULTURAL GROWTH

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with

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ABSTRACT

Rapid growth in the agricultural sector is central to any strategy for slashing poverty and hunger on the African continent. Yet investments aimed at increasing agricultural productivity need to be linked to market opportunities if they are not to depress commodity prices and farm incomes. It is widely perceived that high market transaction costs, weak domestic consumer demand, and lack of export possibilities are major constraints on agricultural growth prospects for Africa. But just how severe are these constraints, and what can be done to enhance market opportunities to enable agriculture to become a more powerful engine of growth for the continent?

This study addresses these questions. It concludes that non-traditional exports have the fewest constraints and remain the most profitable option for increasing export earnings. However, because of their relatively small base (averaging $7 billion/year in 1996-2000) they have only limited potential to raise incomes on the scale required to affect overall economic growth and poverty reduction over the next 10-15 years. Even with an optimistic growth rate of 14 percent per year for non-traditional exports, economy wide simulations show that per capita agricultural income for Africa would only grow by 0.2 percent per year more than in a baseline (business as usual) scenario.

Prices for traditional export crops will continue to decline, but there is scope for African countries to recuperate greater value if they could raise their quality standards and capture growing niche markets for specialized varieties. But again the amount of income that could be generated is small compared to the need if rural poverty is to be slashed in the next 10-15 years. Niche markets also tend to be highly competitive and specialized, with rigorous quality standards, which will be hard for many African countries to meet.

Africa's own demand for various food products is already large (more than $50 billion/year) and is expected to double by 2015. Only part of this output is actually marketed (the rest is consumed on farm) but it still represents a large and growing market that ought to offer some real agricultural growth opportunities. Since Africa currently

imports 25 percent of its food grains such as maize, rice, and wheat (for wheat alone the total is 64 percent), there is even potential to displace some imports with domestic production. But even here African farmers must increasingly compete with low cost (often subsidized) food imports from elsewhere, particularly Europe and North America.

Yet despite this promise, economy-wide simulations suggest that even modest growth in grains productivity could depress domestic grain prices given prevailing agricultural trade policies around the world. This would benefit consumers and poor people in Africa, but it would slow growth in agricultural income. A more promising scenario arises if the productivity of the livestock and grain sectors could be increased in tandem. In this case, there would be an increase in the consumption of livestock products as well as grains, and an increase in the derived demand for feed grains. Agricultural income would then grow even while grain and livestock prices fell, leading to gains for both farmers and consumers. For example, if grains and livestock productivity were to grow by 1.5 and 4 percent per year, respectively, then for all Africa, per capita agricultural income would grow by 0.2 percent per year more than in a baseline scenario and per capita food consumption would increase by 1.2 percent per year.

These results assume continuation of current agricultural policy regimes in the OECD countries, which constrain Africa's ability to compete in many international and regional markets. One way for Africa to increase its competitiveness is to invest in infrastructure and market development to reduce transport and marketing costs. This would help reduce costs for a broad range of commodities, promoting trade and reducing domestic prices with follow on demand effects. A model simulation of the combined impact of improving productivity in the transport sectors and in the agricultural export, grain, and livestock sub-sectors appears to have the most promise for growth in income and food consumption. It could potentially raise annual per capita income growth in the agricultural sector to 1.5 percent and per capita food consumption growth to 2.3 percent, well above the impact of growth in the agricultural sub-sectors alone.

Finally, agricultural growth links with growth in non-agriculture. Increased income generated from the non-agricultural economy could create additional markets for

agricultural goods. Without growth in the non-agricultural economy, gains in agricultural income and calorie consumption for SSA as a whole will be severely limited. Thus, investments in agriculture and other efforts to promote higher agricultural productivity growth need to be complemented with policies and investments to spur non-agricultural growth. More generally, investments in rural infrastructure can help to maximize positive linkage effects of agricultural growth. Agricultural growth can play a major role in increasing food supply, but sustained increases in incomes and reductions in poverty are likely to require a combination of labor-intensive growth in both agricultural and non-agricultural activities.

MARKET OPPORTUNITIES FOR AFRICAN AGRICULTURE: AN EXAMINATION OF DEMAND-SIDE CONSTRAINTS ON AGRICULTURAL GROWTH

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Siet Meijer[4], Mark Rosegrant[5], Yukitsugu Yanoma[6], and Weibo Li[7]

1. INTRODUCTION[8]

Rapid growth in the agricultural sector is central to any strategy for reducing hunger and poverty in Sub-Saharan Africa (SSA). Increased output of food crops augments food supplies and may well reduce the real price of food. Moreover, agricultural growth (even outside of the food sector) boosts incomes, particularly of households in rural areas, both directly and through multiplier effects on other sectors, thereby increasing household access to food.

Technology exists to increase agricultural productivity (though additional resources for research and extension may be required for adaptation to local agro-ecological and socio-economic conditions, and to promote rapid adoption of new technologies). However, lack of marketing opportunities for increased agricultural production could constrain agricultural growth and prevent the sector from serving as an engine of growth on a scale required to significantly reduce hunger and poverty in SSA. High market transaction costs, weak domestic consumer demand, and lack of export possibilities suggest that output increases could lead to a sharp decline in producer prices, inhibiting growth in both production and farmer incomes. Thus, there is need to analyze demand constraints on agricultural growth, including export demand, regional trade and

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domestic demand, and of policies that could help enlarge these markets for African countries.

In this paper, we examine various components of market demand and use various modeling approaches to provide quantitative assessments of the impact of agricultural growth on real incomes, consumption and prices under alternative scenarios. In examining export market constraints for Africa, we explore the potential opportunities for exports of various commodities, including non-traditional exports. Demand for agricultural products need not come only from outside of Africa, however. Thus, we also examine the scope for generating more demand through greater regional (within Africa) trade; as well as the potential growth in domestic markets as a result of population growth, urbanization, and income growth (including agricultural growth-linkage effects).

The analysis is designed to address two major questions. First, how constraining will demand be for future agricultural growth in Africa? More specifically, if productivity increases can be achieved on the supply side, is there sufficient demand for agricultural products to permit agriculture to grow at a rate of four percent per year or higher? Second, under plausible scenarios of productivity growth, which agricultural sub-sectors (e.g., traditional exports, non-traditional exports, cereals) have the best potential for raising real incomes and increasing food consumption? Finally, what are the implications of reductions in marketing costs and growth linkages with non-agricultural sectors in achieving increasing market demand for agriculture?

EXPORTS AS AN ENGINE OF GROWTH?

Currently, the agricultural export sector in SSA is small relative to both world agricultural exports and national incomes. SSA total exports averaged US dollar $100 billion/year in 1998-2000. Agricultural exports accounted for about $13 billion, of which traditional exports (cocoa, coffee, cotton, tea and tobacco) accounted for about $6.5 billion (Table 1). Yet highly volatile and declining terms of trade for traditional exports have contributed to overall slow growth in the value of total agricultural exports (about 2 percent per year in the 1990s).

Table 1—Some basic facts about Sub-Saharan Africa

Development Indicators of SSA	1995	2000
Population, total (million)	579.2	658.94
GDP (current billion US$)	317.96	322.73
GDP per capita (Current US $)	548.96	489.77
Exports of goods and services (% of GDP)	28.53	31.9
Agriculture, value added (% of GDP)	17.97	16.98
Exports from SSA	1194-96 (Average)	1998-2000 (Average)
Total Exports (billion 2000[a] $)	95.55	100.17
Agricultural Exports (billion 2000[a] $)	13.21	12.94
Traditional[b] Crops	6.66	6.50
Others	6.55	6.44

Source: World Development Indicators, FAOSTAT.
[a]Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index obtained from International Financial Statistics, IMF
[b]Traditional agricultural exports include coffee, cocoa, tea, textile fibers, and tobacco

Many observers have argued that non-traditional agricultural exports have significant potential as an engine of growth. Indeed, some niche market exports are growing rapidly, but they remain small relative to total trade and incomes. For example, Kenya's cut flower exports to the European Union total about $141 million US dollars, only about 1 percent of Kenya's total agricultural exports. The small size of these sectors suggests that demand constraints may not be binding in the short to medium term, but are these sectors too small to have major impacts on growth and poverty? Alternatively, would efforts to increase productivity in larger agricultural sectors (e.g., major food crops and livestock) have a larger payoff in overall economic growth and poverty reduction, or might they simply result in lower prices that slow agricultural growth?

PLAN OF THE PAPER

This paper addresses these issues through a combination of analysis of historical trends, review of micro-level studies of trade constraints, and projections of production, trade and incomes under various alternative scenarios and simulation models. Chapter two of this paper examines in more detail the current structure and recent trends in SSA's international trade in agricultural products. We also review the experience of selected countries and assess world export market opportunities for selected commodities, based on previous studies. In chapter three, we examine demand for food products in SSA under alternative scenarios of productivity and income growth using IFPRI's IMPACT model. Chapter four presents an analysis of the impacts of productivity growth in various agricultural sub-sectors (non-traditional export crops, traditional export crops, and cereals) on real incomes, food consumption and domestic prices using a world computable general equilibrium (CGE) model. Concluding observations and policy implications are presented in chapter 5.

2. AGRICULTURAL EXPORT MARKETS: TRENDS, CONSTRAINTS, AND OPPORTUNITIES[9]

Agricultural exports are one major potential source of demand for increased agricultural production in SSA. The record of the past two decades has been mixed, however. Traditional export crops have suffered from declining terms of trade, while low productivity and problems with maintaining high quality have led to declining market shares for SSA countries. A few countries have enjoyed considerable success in increasing non-traditional exports, but the magnitude of these export earnings remains small in total agricultural exports. This chapter reviews these trends and examines some of the successes in an effort to better understand the potential for increased agricultural exports from SSA.

[9] This chapter was written by Xinshen Diao, Paul Dorosh, and Shaikh Mahfuzur Rahman, with help from Yukitsugu Yanoma.

We begin with a review of broad trends in SSA agricultural exports, trade shares in the world economy, and on intra-regional trade, i.e., trade within SSA. Next, we examine trade patterns and constraints by major groups of commodities: "traditional" major SSA export crops (cocoa, coffee, cotton, tea and tobacco) and "non-traditional" agricultural exports (vegetables and fruits, cut flowers, livestock, fish, etc.). Finally, we review of the experiences of several countries in terms of trends and policies to promote agricultural exports.

EXPORT PERFORMANCE OF THE SUB-SAHARAN AFRICAN COUNTRIES: 1981-2000

Table 2 depicts SSA countries' total and agricultural export performance during the past two decades. In absolute terms, the average real value[10] of SSA countries' global exports of all goods and services increased slowly during the 1980s and 1990s, from an average of 80 billion US dollars in 1981-83 to a little over 100 billion US dollars by 1998-2000. Likewise, total exports of SSA as a share of regional GDP also increased over time. During 1981-83, total exports accounted for 23 percent of GDP. By 1990-92 the share of exports in GDP was increased to 25 percent and by 1998-2000 it accounted for 30 percent. This more rapid increase in SSA exports in the 1990s, in absolute terms and as well as in share of GDP, may in part reflect policies designed to promote trade during this period.

Despite the increased trade orientation of SSA, however, the export share of the region in total world exports declined, since the latter expanded at a much faster rate, a phenomenon often seen as the marginalization of the region in world trade (Table 2). In the early 1980s, SSA countries accounted for about 2.56 percent of total world exports. But, this share fell to 1.39 percent by the late 1990s. While world exports increased at an average annual rate of 6 percent during 1980s, SSA exports grew by only 1 percent. During the first half of the 1990s, the average annual growth rate of SSA exports increased to 2.26 percent with the growth rate of world exports remaining unchanged from the 1980s. Both the growth rates of world and SSA exports (2.33 and 1.19 percent,

[10] Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index as a deflator.

respectively) declined sharply in the later half of the 1990s. This sharp decline in SSA exports is due in part by slow growth in global demand for the type of goods SSA countries produced (Ng and Yeats, 2000).

A recent study on Economic Development in Africa by the United Nations Conference on Trade and Development (2001) argues that a secular decline in African terms of trade since the early 1980s is responsible for the marginalization of the region in world trade. According to the estimates of the UNCTAD study, the level of overall terms of trade at the end of 1990s was 21 percent below that attained in the early 1970s for SSA. The decline in the share of SSA in world exports in the past two decades can be explained by the declines in prices of its exports relative to those of the rest of the world. In particular, a major factor behind the downward trend in the terms of trade of SSA is the decline of prices of primary commodities relative to manufactures. Moreover, this downward trend in relative prices of primary commodities vis-à-vis manufactures is accompanied by a high degree of volatility. An IMF/World Bank study (2001) shows that SSA exports experienced approximately twice the volatility in terms of trade as East Asia's in the 1970s, 1980s, and 1990s, and roughly four times the volatility experienced by the industrial countries during the same period.

Table 2—World and Sub-Saharan countries total and agricultural exports, 1981-2000

	1981-83	1990-92	1994-96	1998-2000[b]
Exports of all Goods and Services				
World (billion 2000[a] dollars)	3121.83	5251.72	6591.74	4819.11
-- Growth rate	-	5.95	5.85	-7.53
Sub-Saharan Africa (billion 2000[a] dollars)	80.02	87.39	95.55	100.17
-- Growth rate	-	0.98	2.26	1.19
SSA Exports (% World Export)	2.56	1.66	1.45	2.08
SSA Exports (% of GDP)	22.97	25.45	28.63	30.23
Exports of Agricultural Products (including fish, live animals, and cut flowers[c])				
World (billion 2000[a] dollars)	335.05	438.13	530.61	481.77
-- Growth rate	-	3.03	4.90	-2.39
Sub-Saharan Africa (billion 2000[a] dollars)	12.04	10.20	13.21	12.94
-- Growth rate	-	-1.83	6.67	-0.51
SSA Agr. Exp. (% of World Agr. Exp.)	3.59	2.33	2.49	2.69
SSA Agr. Exp. (% of SSA Total Exp.)	15.05	11.67	13.82	12.92
SSA Agr. Exp. (% of GDP)	3.46	2.97	3.96	3.90

Source: All Goods and Services- World development Indicators, World bank
World Agricultural Exports - World Development Indicators, SSA Agricultural Exports - FAOSTAT

[a]Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index obtained from International Financial Statistics, IMF

[b]World export of goods and services are not available for 2000. The average for 1998-99 is used instead of that of 1998-2000. The export values of fish and fishery products were also not available for 2000. Using the growth rate for the past three years, a projection is obtained.

[c]Values of cut flowers exports from Kenya, Zimbabwe, Zambia, Uganda, South Africa, Tanzania, Cote D'Ivoire, and Mauritius are added to obtain SSA countries export. Data on cut flower exports for 1981-93 were not available.

The lower half of Table 2 shows that, during the past two decades, SSA countries' agricultural exports either declined or expanded marginally in absolute terms. The average real value of SSA agricultural exports declined from 12 billion in 1981-83 to 10.2 billion US dollars in 1990-92. While world agricultural exports grew at a rate of 3 percent per year during this period, SSA agricultural exports declined by 1.83 percent per

year. The erosion of SSA's market shares in OECD countries contributed to this decline as the region's traditional agricultural exports (cocoa, coffee, spices, etc.) were displaced by similar goods from competing countries (Ng and Yeats, 2000). During 1993-96 agricultural exports of the SSA grew faster than that of the world reaching 13.21 billion US$ in 1994-96. In large part, this increase was due to the unusual increase in global demand ("boom") for several African traditional agricultural exports. However, the growth rate fell off in 1997, partially due to the East Asian crisis (Ng and Yeats, 2000). During 1998-2000, the value of SSA agricultural exports fell again to 12.94 billion US$. World export of agricultural products declined annually by 2.39 percent in the second half of the 1990s, while that of SSA decreased by only 0.5 percent. As a share in the world agricultural exports, SSA exports increased only slightly (Table 2).

Table 3 depicts the composition of SSA exports, by four major categories, in 1980, 1990, and 1997. Despite a significant decline in its share, from 75.6 percent in 1980 to 54.7 percent in 1997, crude petroleum continued to hold the major share in total exports. Share of manufacturing exports increased from 4 to 18.4 percent during this period. Non-oil primary commodities also registered some progress by increasing its share from 19.7 to 26.6 percent during this period. However, the SSA agricultural exports as a share of total exports during 1994-96 (13.82 percent) was still below that of 1981-83 (15 percent). That the value of SSA exports increased by about 7.4 billion US$ in 1990-92, compared to that of 1981-83, and by another 7 billion US$ in 1994-96 (Table 2), was due to the increases in manufacturing and non-oil primary commodities other than agriculture.

Table 3—Composition of exports from Sub-Saharan Africa, 1980, 1990, and 1997

	1980	1990	1997
	(Percent share of total exports)		
Crude Petroleum	75.6	61.3	54.7
Non-oil Primary Commodities	19.7	22.8	26.6
Manufactures	4.0	15.5	18.4
Unclassified	0.7	0.4	0.3

Source: Economic Development in Africa, UNCTAD.

a. Exports by Commodity Groups

Table 4 presents the structure of SSA agricultural exports by major product categories. In the table agricultural exports are divided into four groups – traditional, food and livestock products, fish, and all other products, which are mainly various non-traditional export products. Traditional agricultural exports include cocoa, coffee, tea, textile fibers, and tobacco. The absolute value of traditional exports declined drastically during the early 1990s. With a moderate recovery during the mid-1990s, it fell again in 1999-2000 staying below the 1981-83 level. Although the value of traditional exports from SSA declined by 0.7 percent annually during the second half of the 1990s, its share in world exports increased by 1.15 percent per year. Nonetheless, the share of traditional exports in SSA total exports still remained over 50 percent, as exports of tea, tobacco, and cotton partially compensated for lagging export earnings of coffee and cocoa.

The value of SSA exports of food and livestock products (including vegetables and fruits, and hides and skins) has remained close to constant, both in terms of absolute value and share of total exports, over the past two decades (around 3.5 billion US dollars). But the share in world exports of food and livestock products has declined drastically, from 1.8 percent in 1981-83 to 0.4 percent in 1998-2000 (Table 4).

Table 4—World and SSA exports of agriculture by major product categories

	1981-83	1990-92	1994-96	1998-2000
Traditional (cocoa, coffee, tea, tobacco, and textile fibers)				
World (billion 2000[a] dollars)	47.32	52.44	61.10	53.72
-- Growth rate	-	1.15	3.89	-3.17
Sub-Saharan Africa (billion 2000[a] dollars)	6.91	5.26	6.66	6.50
-- Growth rate	-	-2.99	6.10	-0.62
SSA share (% of World Trad. Agr. Exp.)	14.60	10.03	10.91	12.10
SSA share (% of SSA Total Agr. Exp.)	57.39	51.54	50.45	50.24
SSA share (% of SSA Total Exports)	8.63	6.02	6.97	6.49
SSA share (% of GDP)	1.98	1.53	2.00	1.96
Food and Animal Products (excluding fish)				
World (billion 2000[a] dollars)	197.46	250.55	299.23	839.18
-- Growth rate	-	2.68	4.54	29.41
Sub-Saharan Africa (billion 2000[a] dollars)	3.50	3.10	3.58	3.47
-- Growth rate	-	-1.33	3.62	-0.75
SSA share (% of World Exports of F&A)	1.77	1.24	1.20	0.41
SSA share (% of SSA Total Agr. Exports)	29.06	30.42	27.08	26.82
SSA share (% of SSA Total Exports)	4.37	3.55	3.74	3.46
SSA share (% of GDP)	1.00	0.90	1.07	1.05
Fish and Fishery Products				
World (billion 2000[a] dollars)	21.90	43.51	54.51	53.15
-- Growth rate	-	7.92	5.80	-0.63
Sub-Saharan Africa (billion 2000[a] dollars)	0.52	0.86	1.41	1.44
-- Growth rate	-	5.76	13.09	0.56
SSA share (% of World Exports of fish)	2.37	1.98	2.58	2.71
SSA share (% of SSA Total Agr. Exports)	4.31	8.43	10.65	11.11
SSA share (% of SSA Total Exports)	0.65	0.98	1.47	1.44
SSA share (% of GDP)	0.15	0.25	0.42	0.43
All Other Agricultural Exports				
World (billion 2000[a] dollars)	68.37	91.62	115.78	95.17
-- Growth rate	-	3.31	6.02	-4.78
Sub-Saharan Africa (billion 2000[a] dollars)	1.11	0.98	1.56	1.53
-- Growth rate	-	-1.40	12.36	-0.50
SSA share (% of World Exports of fish)	1.63	1.07	1.35	1.61
SSA share (% of SSA Total Agr. Exports)	9.24	9.60	11.82	11.83
SSA share (% of SSA Total Exports)	1.39	1.12	1.63	1.53
SSA share (% of GDP)	0.32	0.29	0.47	0.46

Source: FAOSTAT and World Development Indicators.

[a]Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index obtained from International Financial Statistics, IMF

This is mainly because of a significant growth (29.4 percent per year) in world exports of food and livestock products during the second half of the 1990s. SSA failed to maintain the pace of total world exports in this category. It was not only that the growth rate of SSA exports of food and livestock products had always been lower than that of the whole world but also that it was negative during the 1980s and the later half of the 1990s. Most strikingly, while the world exports of food and livestock products increased annually by more than 29 percent between 1994-96 and 1998-2000, that of SSA declined by 0.75 percent per year.

Exports of fish and fishery products from SSA increased from 0.5 billion US dollars in 1981-83 to 1.44 billion US dollars in 1998-2000, registering a higher growth rate than that of world exports of the same category during 1990s. Its share in total agricultural exports of SSA increased from 4.3 to 11.1 percent during the same period. Exports of all other agricultural products from the region remained the same during this period.

b. Intra-Regional Trade[11]

In total, the officially reported intra-regional trade accounts for 10 percent of total SSA agricultural exports, and 18.5 percent of total SSA agricultural imports, averaging about $1.7 billion per year between 1996 and 2000 (tables 5 and 6.) Intra-regional trade in non-traditional crops accounted for more than 40 percent of total intra-regional trade, food crops accounted for about one-quarter, and the rest is traditional crops and others.

[11] The analysis of intra-regional trade presented here is based on the UNCOMTRAD database 5-digit, revision 3 (2002), that includes detailed bilateral agricultural trade flows (valued in U.S. dollars).

Table 5—Sub-Saharan African (SSA) major agricultural export commodities, 1996-2000 annual average

			(1) SSA to the world	(2) SSA excluding SACU to the world		(3) SSA to SSA	(4) SSA excluding SACU to SSA		Share of intra-regional trade
		Rank*	Value (Million $US)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Value (Million $US)	Share in (4) (%)	(3)/(1) (%)
Staples	Meat	*16*	335	120	0.9	94	33	2.9	28.1
	Livestock	*18*	123	115	0.8	19	13	1.1	15.1
	Other cereals	*19*	207	104	0.7	160	82	7.2	77.2
	Maize	*22*	287	66	0.5	150	55	4.9	52.1
	Beans	*24*	54	48	0.3	18	14	1.2	33.6
	Cassava	*28*	2	2	0.0	0	0	0.0	2.6
	Sub-Total		**1,007**	**454**	**3.3**	**440**	**197**	**17.3**	**43.6**
Non-traditional	Fish	*2*	2,403	1,841	13.2	209	171	15.0	8.7
	Vegetable&fruits	*6*	2,449	976	7.0	135	38	3.4	5.5
	Miscellaneous	*7*	777	610	4.4	83	71	6.2	10.7
	Oilseeds	*12*	317	271	1.9	30	23	2.0	9.6
	Oils and fat	*13*	359	270	1.9	140	89	7.8	39.1
	Processed food	*20*	159	100	0.7	110	63	5.5	69.1
	Beverages	*27*	334	27	0.2	82	20	1.7	24.5
	Sub-Total		**6,798**	**4,095**	**29.4**	**790**	**475**	**41.7**	**11.6**
Traditional	Cocoa bean	*1*	2,387	2,386	17.1	9	9	0.8	0.4
	Coffee green	*3*	1,844	1,831	13.2	44	43	3.8	2.4
	Cotton	*4*	1,459	1,421	10.2	102	101	8.9	7.0
	Tobacco	*5*	1,125	1,060	7.6	63	57	5.0	5.6
	Sugar	*8*	1,063	605	4.3	159	76	6.7	14.9
	Tea	*9*	646	592	4.3	60	55	4.8	9.2
	Cashew nuts	*14*	221	220	1.6	2	2	0.2	0.8
	Other nuts	*25*	44	31	0.2	6	5	0.5	13.4
	Other fibers	*26*	233	31	0.2	5	1	0.1	2.2
	Sub-Total		**9,022**	**8,177**	**58.7**	**450**	**350**	**30.7**	**5.0**
Others	Processed cocoa	*10*	492	470	3.4	21	12	1.0	4.3
	Animal skin	*11*	564	311	2.2	8	6	0.5	1.4
	Spices	*15*	157	139	1.0	8	4	0.4	5.4
	Feed stuffs	*17*	147	118	0.8	41	27	2.3	27.8
	Coffee roasted	*21*	105	100	0.7	29	24	2.1	27.4
	Cigarettes	*23*	108	60	0.4	82	44	3.8	76.5
	Sub-Total		**1,572**	**1,197**	**8.6**	**190**	**117**	**10.2**	**12.1**
TOTAL			**18,400**	**13,923**		**1,870**	**1,139**		**10.2**

* By share in sub-Saharan Africa total agricultural exports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural exports.

Source: UNCOMTRAD rev3, 2002

Table 6—Sub-Saharan African (SSA) major agricultural import commodities, 1996-2000 annual average

		Rank*	(1) SSA from the world	(2) SSA excluding SACU from the world		(3) SSA from SSA	(4) SSA excluding SACU from SSA		Share of intra-regional trade
			Value (Million $US)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Value (Million $US)	Share in (4) (%)	(3)/(1) (%)
Staples	Other cereals	*1*	2,572	2,218	27.7	160	135	8.7	6.2
	Meat	*3*	1,104	894	11.2	94	74	4.8	8.5
	Maize	*11*	272	226	2.8	150	138	9.0	54.9
	Beans	*17*	105	80	1.0	18	16	1.0	17.1
	Livestock	*24*	35	27	0.3	19	16	1.1	53.2
	Cassava	*28*	0	0	0.0	0	0	0.0	39.7
	Sub-Total		**4,089**	**3,444**	**43.1**	**440**	**379**	**24.7**	**10.8**
Non-traditional	Oils and fat	*2*	1,239	901	11.3	140	132	8.6	11.3
	Fish	*5*	787	709	8.9	209	203	13.2	26.6
	Processed food	*6*	554	480	6.0	110	99	6.4	19.8
	Beverages	*7*	456	315	3.9	82	75	4.9	18.0
	Vegetable&fruits	*8*	435	346	4.3	135	109	7.1	31.1
	Miscellaneous	*9*	333	182	2.3	83	65	4.2	25.0
	Oilseeds	*21*	56	33	0.4	30	20	1.3	54.3
	Sub-Total		**3,859**	**2,965**	**37.1**	**790**	**704**	**45.7**	**20.5**
Traditional	Sugar	*4*	797	756	9.5	159	135	8.8	19.9
	Tobacco	*13*	148	86	1.1	63	27	1.7	42.9
	Tea	*14*	130	111	1.4	60	46	3.0	46.0
	Cotton	*16*	119	63	0.8	102	51	3.3	86.0
	Coffee green	*19*	73	41	0.5	44	38	2.5	60.4
	Other fibers	*22*	44	27	0.3	5	4	0.3	11.7
	Other nuts	*25*	22	8	0.1	6	5	0.3	27.0
	Cocoa bean	*26*	12	5	0.1	9	2	0.1	70.2
	Cashew nuts	*27*	4	1	0.0	2	0	0.0	47.1
	Sub-Total		**1,349**	**1,097**	**13.7**	**450**	**308**	**20.0**	**33.4**
Others	Cigarettes	*10*	305	280	3.5	82	76	5.0	27.1
	Feed stuffs	*12*	224	66	0.8	41	21	1.4	18.2
	Animal skin	*15*	124	20	0.2	8	4	0.3	6.6
	Coffee roasted	*18*	76	69	0.9	29	28	1.8	37.9
	Processed cocoa	*20*	60	32	0.4	21	12	0.8	35.7
	Spices	*23*	41	21	0.3	8	5	0.4	20.6
	Sub-Total		**829**	**488**	**6.1**	**190**	**148**	**9.6**	**22.9**
TOTAL			**10,125**	**7,994**		**1,870**	**1,539**		**18.5**

* By share in sub-Saharan Africa total agricultural imports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural imports.

Source: UNCOMTRAD rev3, 2002

Among the four commodity groups, intra-regional trade in food crops accounts for a large share (44 percent) of SSA food exports: 52 percent of maize exports and 77 percent of other cereal (mainly rice) exports are imported by other SSA countries. Moreover, substantial evidence exists that sizeable unrecorded, "informal" intra-regional trade in maize, cassava, and some other food crops, (as well as livestock products) takes place, as well. However, as a food deficit region, intra-regional trade in food crops accounts for a quite small share of SSA total food imports (10.8 percent, table 6.)

Among the three regions within SSA, intra-regional trade takes place within each region, and cross-regional trade accounts for less than 20 percent of total intra-regional trade for each region. Shares of intra-regional trade in each region's total agricultural exports are quite different. Intra-regional trade was 780 million U.S. dollars in Southern Africa, 460 million in East Africa, and 440 million in West Africa per year on average over 1996-2000. Southern African intra-regional trade accounted for 15 percent of the region's total agricultural exports, while intra-regional trade only accounted for, respectively, 8 and 6 percent of East and West African total exports.

Intra-regional trade in food crops accounts for a large share (80 and 46 percent, respectively) of West African and southern African food exports, it accounts only 27 percent of East African food exports. Similarly, as food deficit regions, intra-region trade in food crops accounts for a small share of the three regions' food imports (3 to 18 percent, appendix I tables 1 – 6.)

TRADITIONAL EXPORT CROPS

Traditional commodity exports account for about 50 percent of SSA total agricultural exports (60 percent, excluding SACU). For some countries, the exports are highly concentrated in a single commodity. For example, tobacco accounts for 70 to 75 percent of Malawi agricultural exports, coffee accounts for 70 percent of Uganda agricultural exports, and cotton accounts for 65 percent of Mali agricultural exports. Traditional commodity export markets are mainly in the rest of world outside the region, in which share of SSA's exports has been declining in the past two decades. Recovering some lost market shares would help the region to increase farm income. However, an increased volume of traditional exports may (as examined below) have only limited

impact on export earnings and incomes, given the declining trend of prices for these commodities.

Traditional exports of all African countries, except for South Africa and Malawi, experienced negative global demand growth during 1995-99, and in some cases the declines were dramatic (Ng and Yeats, 2000). Empirical evidence suggests that the income elasticities of African traditional exports are well below unity. As such, continued reliance on traditional exports will significantly extend Africa's marginalization in world trade. This trend could be reversed, or the rate of marginalization slowed, if Africa achieved major competitive gains for the traditional export commodities to compensate for their relatively low demand growth. However, a recent analysis of Africa's supply capacities found no evidence that these competitive gains were occurring (Ng and Yeats, 2002).

a. Terms of Trade of Traditional Agricultural Exports

Fluctuations in the relative prices of coffee and cocoa are a major cause of the poor performance of traditional exports. While the overall trend during the past two decades was downward, there were ephemeral surges in commodity prices and terms of trade. World commodity markets experienced a major price cycle starting in 1993. The upward phase of this price cycle lasted two to five years depending on the commodity (UNCTAD, 2001). The commodity terms of trade, calculated on the basis of world prices of broad categories of primary commodities (agricultural raw materials, food, tropical beverages, vegetable oilseeds and oils, and minerals and metals), as well as prices of African coffee, cocoa, cotton, and copper exports, vis-à-vis unit export prices of manufactures of developed countries reflect a more volatile pattern than the overall terms of trade for Africa.

b. Trade Restrictions on Traditional Exports

While Africa generally maintained its ability to compete with other foreign suppliers of most traditional goods, a related question concerns the importance of government-imposed trade restrictions, which place Africa in competitive disadvantage.

Available data suggest that OECD protection facing most traditional products is generally low, although several agricultural products, such as cotton, sugar and tobacco, are important exceptions. In these cases, industrial countries have the opportunity to significantly improve market access conditions for specific traditional products. However, trade barriers facing Africa's traditional products in many developing countries are sufficiently high that their liberalization could improve the outlook for these goods.

c. Prospects for Traditional Export Crops

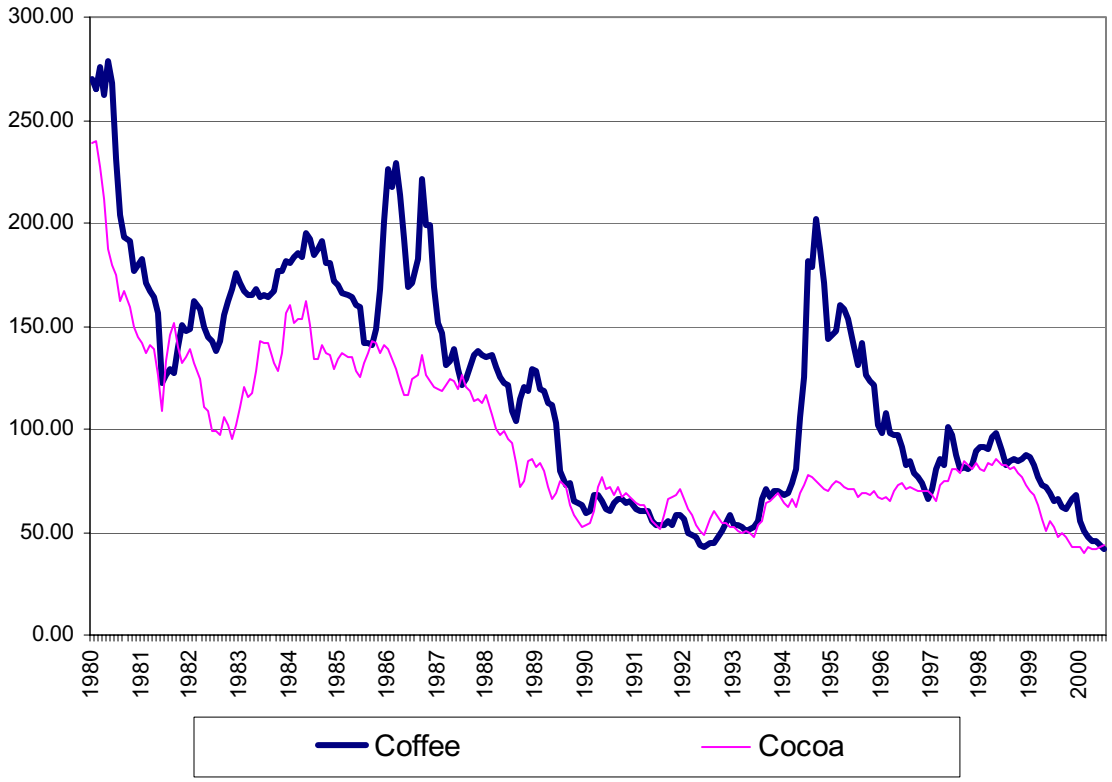
An "export growth prospect index" constructed by Ng and Yeats (2002) shows that Africa should expect its traditional exports' growth to fall well short of that for world trade. The numeric values for the index also suggests that the growth prospects for Africa's non-traditional exports are often more favorable than for traditional. However, non-traditional exports probably could not significantly improve the general short-term outlook for Africa's export since they normally constitute a very small share of most African countries' trade. It is also unlikely that major shifts in the composition of exports can occur in the short to medium-term.

Ng and Yeats (2002) conclude that Africa must diversify away from traditional exports or continue to experience serious negative trade effects including; (i) declining or relatively low growth in global demand for these goods, (ii) falling real prices for traditional products, (iii) very unstable prices and export earnings, (iv) a continued marginalization in world trade, and (v) diminished growth and industrialization prospects. Moreover, the removal of general anti-export biases in African countries' domestic policies, as well as initiatives to promote more competitive prices for traditional exports require immediate attention.

Traditional product price instability appears to be a major problem for SSA exporters. The historical trends show that the real prices for SSA traditional export commodities deteriorated over the past two decades. Figure 1 illustrates world monthly average real (deflated by US wholesale price index) prices for the two major traditional agricultural export items of the region - coffee, and cocoa over the period of 1980 to 2000. Coffee and cocoa enjoyed an upturn in their prices during the commodity price

booms of the 1970s, but the trends from the early 1980s have been downward (Figure 1). However, there were short-lived surges in coffee prices. While cocoa maintained a declining trend during the 1980s and 1990s, coffee experienced two major price cycles during 1985-87 and 1993-96, respectively. During the most recent upsurge, coffee price reached as high as 2 US dollars per pound. The downward phase, which started after 1996 has continued in the subsequent periods, reaching below 50 cents per pound in 2000.

Figure 1—Monthly averages real prices (cents per pound deflated by U.S. wholesale price index, 2000=100) of coffee and cocoa



NON-TRADITIONAL AGRICULTURAL EXPORTS

Non-traditional commodity exports are diverse. There are more than 80 commodity categories that are aggregated into "vegetables and fruits" and over 50 commodity categories aggregated into the "miscellaneous" (Table 6). About one-quarter

of non-traditional commodity exports have a quite large intra-regional trade share, for example, 70 percent of total exports of processed food, 40 percent of oil and fat, and 25 percent of beverages go to the regional market. Markets for the other three-quarters of non-traditional commodity exports are mainly outside the region, for example, intra-regional vegetable and fruit trade accounts for 5.5 percent of total vegetable and fruit exports. While most of non-traditional exports are high-value commodities, exports that have a high intra-regional trade share are often processed goods, for which farmers' income shares (as labor income and returns to land) are not as large.

a. Vegetables and Fruits

While vegetable and fruit exports rank first in total SSA agricultural exports,[12] excluding SACU, its rank falls to the 6th. More than 60 percent of regional vegetable and fruit exports are from SACU, mainly from South Africa. Excluding SACU, the rest of SSA only exports vegetables and fruits of about 980 million U.S. dollars per year on average, 38 million (accounting for 4 percent) within the region. Given that vegetable and fruit production is often labor intensive, many SSA countries are likely to have a greater comparative advantage than the Republic of South Africa in the future. It is possible that part of South African exports will be replaced by other countries in the region if market conditions are improved and marketing costs are reduced. [I am at a loss to understand the varying order of veg&frt vs frt&veg in this chapter and elsewhere in the draft]

The experiences of Kenya and Côte d'Ivoire in horticulture exports suggest that scope for substantial growth in vegetable and fruit exports is possible (Minot and Ngigi, 2002). Kenya's vegetable and fruit exports have grown from US$ 2-3 million at independence in the early 1960s (3 percent of total agricultural exports) to over US$ 150 million in 1999, (17 percent of total agricultural exports). According to national survey data from Kenya, almost all farmers, large and small, rich and poor, participate is some form of horticultural production. Minot and Ngigi's gross margin analysis suggests that horticultural production can produce substantially higher returns per hectare than staple food crop production. About 60 percent of the exported vegetables and fruits are

[12] Excluding exports of wood and products, ranked as the first in UNCOMTRAD data.

produced by smallholders, resulting in estimated direct benefits of US$ 46 million. Moreover, the indirect benefits to the economy associated with horticultural exports, such as employment generation, institutional development, marketing efficiency in the domestic supply chain, and multiplier effect of export income flow in the rural economy, are likely to be greater than its direct effects

The Ivorian horticultural sector, on the other hand, has not grown in a consistent manner. The value of vegetable and fruit exports from Cote d'Ivoire in 1999 was still below the levels it reached in the mid-1970s and the mid-1980s (Minot and Ngigi, 2002). Unlike in Kenya, the role of smallholders in the Ivorian vegetable and fruit sector is limited. Bananas, the largest horticultural export of Cote d'Ivoire, are produced mainly by large-scale farms and by vertically integrated multinational companies. Moreover, the success of the Ivorian banana sector is based on European trade policies that discriminate against Latin American producers.

However, the horticultural sector of Cote d'Ivoire was able to adjust to the loss of the canned pineapple exports by developing fresh pineapple exports to Europe. In addition, Ivorian horticultural exports showed positive growth (4.4 per cent per year) over the 1990s, including expansion of largely smallholder crops such as pineapple, mango, and papaya for export (Minot and Ngigi, 2002).

Several factors have contributed to the success of the Kenyan horticultural sector (and to the more limited success in Cote d'Ivoire), including favorable geography and climate, improvements in transportation infrastructure, limited direct government intervention in horticultural markets, an improved environment for private and international investment, macroeconomic stability and realistic exchange rates, investment in agricultural research and extension, institutional innovation,[13] and development of international commercial links.

McCulloch and Ota (2002) have examined the impact of export horticulture industry on poverty in Kenya using data from a survey undertaken explicitly to compare the incomes of urban and rural households involved in export horticulture with those who are not involved. They find evidence that households involved in export horticulture are better off than non-horticultural households, particularly in rural areas. Export

[13] In Kenya, several diverse private marketing institutions were developed, such as the Fresh Produce Exporters Association (FPEAK), local producer associations, self-help groups, and contract farming.

horticulture appeared to contribute to improvements in the economic situation of rural households in two ways. First, employment was generated on farms owned by the major exporters and on independent large farms producing for these exporters under contract. Second, smallholders producing for export horticulture companies benefited from both higher incomes and the access to credit and extension services which exporters provide. By contrast, non-horticultural smallholders in otherwise apparently similar circumstances were much worse off than households involved in export horticulture. A simulation exercise shows that enabling more households to participate in the sector could reduce poverty substantially in both urban and rural areas in Kenya (McCulloch and Ota 2002).

b. Fish Exports

Fish exports account for about 13 percent of total SSA agricultural exports, (whether or not SACU is included), ranking second (after vegetables and fruits, or after cocoa if excluding SACU) in total SSA agricultural exports. The EU is the largest importer of SSA fish and fishery products accounting for 75 to 85 percent by volume. The fact that total SSA exports of fish and fishery products is less than 8 percent of the EU imports suggests that this sector has tremendous potential of growth. However, entry to the EU market is restricted, to some extent, by strict non-tariff barriers such as health, sanitary, and environmental requirements. While the intra-regional trade currently only accounts for less than 10 percent of total fish exports, with growth in regional income, this trade could potentially rise. Some countries that have good resource conditions, such as Uganda, may get benefit from increased production and greater intra-regional trade in fish.

Over the past two decades, exports of fish and fishery products have grown steadily, both in terms of volume and value. Table 7 shows the volume and average real value of SSA countries' exports of fish and fishery products by major categories during 1981-2000. In terms of volume, exports of fish from SSA more than doubled in 1998-2000 (745 thousand metric tones) compared to that of 1990-92 (369 metric tones). During the same period, the average real value of fish exports from SSA also increased by almost the same magnitude.

Table 7—Export of fish and fishery products from SSA: 1981-2000

Quantity - 1000 mt.

Item	1981-83	1990-92	1994-96	1998-2000[a]
Freshwater	4.84	17.25	45.85	57.17
Marine	169.12	255.46	392.09	498.24
Cephalopods	20.01	44.65	35.42	48.94
Crustaceans	20.36	29.50	34.25	42.68
Mollusks	0.09	0.62	2.22	3.06
Other (Fresh/Processed)	0.00	0.60	0.92	0.92
Fish & Fishery Prod Tot	214.41	348.08	510.75	651.00

Value- Real[b] Million US $

Item	1981-83	1990-92	1994-96	1998-2000[a]
Freshwater	6.80	35.37	96.19	128.67
Marine	309.71	451.54	930.58	979.82
Cephalopods	43.77	146.39	130.56	129.52
Crustaceans	159.08	222.24	241.27	271.85
Mollusks	0.20	1.87	5.41	6.67
Other (Fresh/Processed)	0.00	2.36	2.30	0.99
Fish & Fishery Prod Tot	519.56	859.77	1406.30	1517.50

Source: FAOSTAT

[a]Average for 1998-99 is used as the quantity and value of fish exports for 2000 are not available.

[b]Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index as deflator.

The main exporters are South Africa, Senegal, Mauritania, Cote d'Ivoire, Senegal, Madagascar and Mozambique. Between 75 to 85 percent of exports is directed to the EU (FAO Fisheries Department, 1996). This implies that SSA countries' share in total EU imports of fish is around 5 percent.

By major categories of fish, the main exports from the region remain marine fishes, followed by crustaceans, cephalopods and freshwater fishes (Table 7). In relative terms, the contributions of fresh water and marine fishes have tended to increase over time, while those of cephalopods and crustaceans have decreased. By commodity groups, the main export items are crustaceans (mostly shrimp), mollusks and cephalopods, followed by fresh, chilled/frozen, and canned fish (mostly tuna). Only limited amounts of dried/smoked fish and fish meals are exported. While the relative contribution of crustaceans, mollusks and cephalopods has tended to decrease, that of fresh, chilled/frozen, and canned fish has increased over time (FAO Fisheries Department, 1996).

The SSA exports of fish have been highly dependent on the European Union market. Under favorable access conditions, the EU imports accounts for about three-fourths of the total volume of fish exports from the SSA countries. In particular, the EU has been an important market for fresh water fish, predominantly Lake Victoria Nile Perch, from Kenya, Tanzania, and Uganda. For example, in 1996 the EU imported 88 percent of Kenya's export of fish and 85 percent of Uganda's exported chilled fish products by volume. This heavy dependency on the European market was disastrous for fish industries in these countries as three successive bans on fish exports imposed by the EU hit the East African countries during the period of 1997- 2000 (Table 8). The EU restrictions have had a significant impact on exports of fresh fillets, for which only a few alternative markets exist. The sector most immediately affected by the EU's restrictions is fish processing, both in terms of economic performance of individual companies and the manner in which the sector is organized (Henson, Brouder, and Mitullah, 2000).

Table 8—Summary of food safety restrictions of fish exports to the European Union

Dates	Restrictions	Products
April 1997-June 1998	Border testing of all consignments for *Salmonella*	Nile perch
Dec. 1997-June 1998	Export prohibited Border testing of all consignments for *Vibrio cholerae* and *Vibrio parahaemoliticus*	Fresh fish Frozen/processed fish not caught at sea and directly landed to the EU
April 1999-Aug 2000	Exports prohibited	Fish from Lake Victoria

Source: Henson et al. (2000)

Learning the lessons from bans on fish exports, most of the fish processors in Kenya, Tanzania, and Uganda have adopted Hazard Analysis and Critical Control Point (HACCP) procedures establishing their own laboratories, with technical support provided by FAO and UNIDO, and have already started regaining the confidence of importers. However, the sustainability of this sector depends on the capacities of the SSA countries to respond to health, sanitary, and environmental requirements set by the importers. Henson, Brouder, and Mitullah (2000), and Oyejide, Ogunkola, and Bankole (2000) show that, although traditional barriers to trade such as tariffs and quantitative restrictions are at least partially liberalized, other measures such as food safety requirements can equally act as barriers to trade. Moreover, poor infrastructure, inadequate processing and storage facilities, limited access to capital characterized by insufficient credit and financial facilities, and inadequate extension services and management are other impediments to further growth of fish exports from SSA.

A 1991 estimation carried out by INFOPECH showed that intra-regional trade only satisfied about 15 percent of regional import requirements for fish and fish products in SSA (FAO Fisheries Department). An example of potential intra-regional trade is the substantial development of trade in frozen fish between countries of Northwest Africa, where resources are relatively abundant and population densities low, and the Gulf of

Guinea, countries where population densities and demand for fish are high. But there are several major constraints to the development of intra-regional fish trade in SSA including high transport and storage costs, poor handling of fish, limited extent of networks, lack of harmonization and/or proper enforcement of trade regulations, and tariff and quota restrictions on imports within the geographical limits of sub-regional economic groups.

c. Cut Flowers

The world cut flower trade is characterized by a high degree of concentration by products, destinations and sources. Roses (47 percent) and carnations (20 percent) are the main traded products. Germany is the main importer, followed by the United States, the Netherlands, and Japan. The Netherlands is the world's leading exporter. It also re-exports a large proportion of its imported cut flowers (70 percent of all auctioned imports). Export from the Netherlands to Germany is a principal component of the world cut-flower trade (more than 40 percent). Switzerland, France, and the United Kingdom are the other main markets for Dutch-sold flowers. SSA and European countries are the principal suppliers to Europe's main markets (International Labor Organization, 1999).

Most imports into the EU originate in other European countries, although the share of developing countries is growing rapidly. In particular, cut flower exports from SSA to the EU markets have increased dramatically during the 1990s. From 146 million US dollars (1.27 percent of total SSA agricultural exports) in 1994, it has increased to 248.4 million US dollars (2.2 percent of total SSA agricultural exports) in 2000 (Table 9). In 2000, the extra-EU cut flower imports amounted to 565 million US dollars, including 553 million for fresh flowers and other 12 million for dried flowers. The SSA exports of cut flowers accounted for approximately 44 percent of total extra-EU cut flower imports in 2000.

At present, Kenya is the leading SSA exporter of cut flower to Europe (57 percent of the value of SSA exports in 2000), followed by Zimbabwe (24.6 percent), Zambia (6.5 percent) and Uganda (4 percent). Kenya is also the leading external supplier of cut

flowers and foliage to the EU. The Kenyan flower industry has grown steadily over the past two decades. The volume (in thousand tons) of cut flower and foliage exports from Kenya increased from 4 in 1981 to 14.4 in 1990, and to 30 in 1998 (Table 10). As the industry has continued to grow, Kenyan growers and exporters have kept themselves up to date with changing consumer preferences in terms of flower varieties, assortments, and colors. Currently, Kenya commercially produces over 30 different types of flowers, typically of several varieties each. However, the sector is highly dependent on a few varieties for its profitability and the top three flower types – roses, statice, and alstroemeria. The bulk of the industry's growth in the 1990s was accounted for by expanded rose production. Competitive pressures from Europe have weakened Kenya's position and profitability in the market for standard carnations, once the dominant focus of its industry (Thoen et al., 2001).

The rapid growth in market share of the developing country exporters is attributed to the supermarket controlled supply chain (International Labor Organization, 1999). A key driving process has been the decision by supermarkets to concentrate on their core retailing activities and to look for alternative ways to reduce costs by distributing the risks of procurement, processing, and quality to the other actors in the chain. Many functions, such as quality control, logistics, storage, distribution, transport, etc., which were previously performed by supermarkets have now been pushed up along the chain toward the importers and exporters. For SSA countries, these developments necessitated close relationships with European importers and substantial investment in value added activities (Thoen et al., 2001). Moreover, for quality and supply assurance the European supermarkets prefer to buy large quantities of cut flowers through long-term contracts, directly from known producers. However, buying directly and regularly through long-term contracts makes it difficult to source from the Netherlands where growers are obliged to sell their produce through the auctions. Being capable of producing large volumes and willing to sell directly at an agreed price, African producers are more attractive to many European supermarkets (International Labor Organization, 1999).

Table 9—Value of cut flower exports to the EU by top 12 countries (Real[a] million US dollars).

	1994	1995	1996	1997	1998	1999	2000	% of 2000
Kenya	85.92	105.66	110.81	117.22	131.27	143.77	141.23	56.85
Colombia	114.94	132.05	124.10	122.95	121.45	103.18	96.28	-
Israel	142.99	154.22	183.05	157.00	172.78	113.89	92.84	-
Ecuador	19.70	30.35	35.35	45.51	65.01	69.05	72.08	-
Zimbabwe	36.15	50.27	52.60	53.59	59.70	56.53	61.03	24.57
Thailand	27.04	28.60	24.28	22.41	19.62	17.80	16.89	-
Zambia	4.46	6.13	8.98	10.03	14.45	17.64	16.12	6.49
Uganda	1.33	2.97	4.22	5.21	5.68	6.20	9.81	3.95
South Africa	9.96	11.64	10.71	10.15	9.74	9.15	8.38	3.37
Tanzania	2.99	4.49	5.07	6.07	6.45	8.43	7.74	3.12
Cote D'Ivoire	2.49	2.11	2.16	2.14	2.26	2.26	2.57	1.03
Mauritius	2.50	2.28	1.82	2.15	2.26	1.67	1.52	0.61
SSA	145.79	185.54	196.37	206.57	231.80	245.65	248.41	100.00
Share in Total SSA Agr. Exp.	1.27	1.36	1.35	1.48	1.59	1.91	2.20	

Source: Eurostat, exchange rates - Federal Reserve Bank, NY

[a]Nominal values of exports in dollars are converted to real 2000 dollars using the US wholesale price index obtained from International Financial Statistics, IMF

Table 10—Export of cut flowers and foliage from Kenya and Uganda by Volume ('000 tons).

Year	Kenya	Uganda
1981	3.98	-
1985	7.47	-
1990	14.42	0
1995	29.37	0.13
1998	30.22	1.52
1999	-	1.56

Source: Thoen et al. (2001), Dijkstra (2001).

The emergence and growth of the Kenyan cut flower industry was predominantly due to private sector initiative. The role of the Kenyan government has wavered between one of facilitation and constraint. The international market environment (especially the EU) for cut flower suppliers has become more challenging over time. While the market was previously supply driven, it is now driven by demand and increasingly specific consumer preferences (Thoen et al., 2001). Quality, largely determined by vase life, and environmental standards (such as SPS) have become important concerns for European consumers. With the recent entry of many other new exporters, market supply is expected to outstrip demand, at least for the most common flower varieties. Average annual prices of cut flowers register a slow but steady decline. Moreover, there exist short term and seasonal price fluctuations. Thus, the sustainability of the cut flower sector depends upon improved efficiency, consistent quality, reliability, market innovation, and positioning oneself strategically in the supply chain.

Smallholders, however, face particular constraints in the production of cut flowers. In general they lack adequate credit, inputs, and technical capabilities, and suffer from logistical constraints related to limited transport, haulage, air-freight and cold storage facilities. This makes it difficult for smallholders to achieve the quality standards of the European market. Both HCDA and FPEAK have recently supported the development of smallholder schemes by providing inputs, training on crop management, pesticide application and quality control. Nevertheless, the requirements of the European market such as product consistency, quality, and compliance with health and safety requirements pose serious problems for exporters wishing to source from smallholders (Thoen et al., 2001).

The Kenyan experience well illustrates the dynamic nature of the industry and the ever-changing challenges to maintain international competitiveness. Kenya possesses a number of basic competitive factors, including a favorable climate, intra-annual consistency in daylight hours, and inexpensive and reasonably skilled labor (Thoen et al., 2001). Following Kenya, other countries with similar competitive advantages, have started commercial floriculture. Uganda started exporting flowers in 1992, and by 1999 the volume of its cut flowers exports reached 1.52 thousand tons earning more than 7 million US dollars (Table 10). The country is competitive in terms of capital and

operating costs, not only with the Netherlands but also with Kenya, Zambia, and Zimbabwe (Table 11). But, the major problems SSA countries are facing in this regard are poor infrastructure, lack of cold chain transport and storage facilities, limited air freight capacity, and high transport costs.

Table 11—Comparison of capital and operating costs of floriculture between Uganda and other competing countries

	Capital costs (US$ per sq. m.)	Operating costs (US$ per sq. m.)
Uganda	27.68	22.68-28.12
Kenya	29.56	39.93
Zambia	29.64	30.50
Zimbabwe	36.64	30.50
The Netherlands	108.50	50.70

Source: Dijkstra (2001)

The Kenyan cut flower experience offers several lessons for emerging market policy makers and investors, as well as other international stakeholders. First and most importantly, the cut flower industry is quite dynamic and cannot be led by public initiatives and government interventions. The primary roles of government should be facilitative. Second, the development of a competitive and sustainable cut flower industry requires collective actions in a number of areas by the main industry stakeholders, such as floricultural and supply chain training, developing environmental standards, packaging material standardization, cold chain facility investment, market information collection and dissemination, and floricultural research and advisory services. Third, there is a need for further clarification and harmonization of environmental standards and regulations and effective communication of guidelines to growers and exporters. A joint public-private initiative for technical support to help comply with such guidelines and regulations may be necessary.

SUMMARY

Currently, the agricultural export sector in SSA is small relative to both world agricultural exports and the regional total incomes, and agricultural exports of many SSA countries are concentrated on just a few commodities. These "traditional exports" (cocoa, coffee, cotton, tea, and tobacco) account for about one-half of SSA total agricultural exports (about $6.5 billion/year), but have suffered from declining terms of trade and substantial price instability. Moreover, low productivity and problems with maintaining quality have led to declining market shares of SSA countries, and future demand prospects do not appear promising.

Demand constraints for non-traditional exports do not appear to be as severe, and these products may offer the most promising opportunities for growth. However, to a large extent, non-traditional exports consist of numerous products that are targeted to niche markets. Even if the success achieved by a few countries in increasing non-traditional exports can be replicated for other commodities and by other countries, the magnitude of these export earnings may remain small relative to total trade and incomes.

The next chapter explores another major potential source of demand for agriculture: domestic demand for major food staples and livestock products. Using IFPRI's IMPACT model of agricultural supply and demand, we examine the magnitude of supply-demand balances for these products under alternative scenarios of agricultural productivity and income growth. Comparisons of the potential impacts of agricultural productivity growth in traditional export, non-traditional export, and food staples and livestock products, along with an analysis of non-farm linkages, using a more aggregated, but economy-wide, CGE model are presented in Chapter 5.

3. PROSPECTS FOR INCREASED MARKET FOOD DEMAND[14]

Unlike most traditional and non-traditional agricultural exports in SSA, domestic demand and production of food crops and livestock products far exceeds internationally traded quantities. Thus, changes in domestic incomes and prices can potentially have a large impact on overall demand for these commodities.

In this chapter we first examine the current size of the food crop and livestock markets in SSA. Then, in order to assess the extent to which demand may constrain productivity increases in these sectors and income growth, we use IFPRI's IMPACT model to simulate potential future demand and prices under alternative scenarios of productivity and income increases.

PRODUCTION, CONSUMPTION AND TRADE IN FOOD CROPS

We calculate annual average production, consumption and trade for three major tradable grain crops in SSA and in the three sub-regions of the SSA (Table 12). Besides these three crops, other grain crops and non-grain food crops, such as roots and tubers, are produced and consumed in the region. As their trade shares are small, we do not analyze and report on them here.

Among the three crops, maize dominates SSA grain production, as the region in total produced 36.5 million tons per year on average between 1996 and 2000, and accounted for about 70 percent of region's total grain production. Within each region, the situation is quite similar, i.e., in each region 60 to 85 percent of grain production is maize production. On the consumption side, while maize is still the most important food crop among grains, its share in total grain consumption is about 55 percent in an average year, much lower than its share in grain production. Among the three regions, share of maize in grain consumption varies, from the lowest (40 percent) in West Africa to the highest (73 percent) in Southern Africa.

[14] This chapter was written by Xinshen Diao and Paul Dorosh, with help from Siet Meijier, Mark Rosegrant, and Weibo Li.

Table 12—Sub-Saharan African major food crop demand and supply -- 1996-2000 annual average

REGIONS	Major commodities	Production	Exports	Imports	Consumption	Consumption per capita	Export share in production	Import share in consumption
		(Million tons)	(Million tons)	(Million tons)	(Million tons)	(Kgs)	(%)	(%)
East Africa	Maize	10.26	0.10	0.82	11.54	43.9	1.0	7.1
	Wheat	2.08	0.05	2.71	4.83	18.4	2.3	56.2
	Rice	3.71	0.01	0.77	4.54	17.3	0.3	16.9
	Sub-total	16.04	0.16	4.30	20.90	79.5	1.0	20.6
Southern Africa	Maize	16.01	1.59	1.41	16.35	146.4	9.9	8.6
	Wheat	2.57	0.29	1.85	4.31	38.6	11.4	42.9
	Rice	0.28	0.03	1.49	1.76	15.7	8.9	85.1
	Sub-total	18.86	1.91	4.75	22.42	200.8	10.1	21.2
West Africa	Maize	10.18	0.03	0.26	10.46	43.4	0.3	2.4
	Wheat	0.10	0.08	3.57	3.66	15.2	75.7	97.5
	Rice	7.34	0.01	4.47	11.95	49.6	0.2	37.4
	Sub-total	17.62	0.12	8.29	26.08	108.1	0.7	31.8
Sub-Saharan Africa	Maize	36.45	1.73	2.48	38.35	77.9	4.7	6.5
	Wheat	4.75	0.42	8.13	12.80	24.1	8.8	63.5
	Rice	11.33	0.05	6.73	18.24	27.5	0.4	36.9
	Sub-total	52.53	2.19	17.34	69.40	129.48	4.2	25.0

Source: FAO data

The SSA, and the three regions within it, are grain deficit regions, as regional production can only meet 75 percent of SSA's demand for the three grains in total. In terms of maize, production and consumption is almost balanced, with only a 5 percent deficit, less than 2 million tons per year on average. Such maize deficit is mainly in East Africa (1.5 million tons), while maize consumption and production are almost balanced in the other two regions. The situation for the other two grains, wheat and rice, is quite different. Given the level of wheat and rice production is quite low in the region, demand, especially for wheat, has to be satisfied by imports. Imports accounted for 37 percent of rice consumption and 64 percent of wheat consumption per year in SSA. Among the three regions, the shares of imports in total rice and wheat consumption vary. For example, rice imports only accounted for 17 percent of consumption in East Africa, but accounted for 85 percent in southern Africa.

According to UN trade data, intra-regional maize trade accounted for more than 50 percent of regional total maize imports (table 6). This ratio is high in East Africa (60 percent) and low in West Africa (23 percent). Moreover, intra-SSA regional trade is actually intra each region's trade, and the amount of the cross-sub-region's trade is low.

If unrecorded trade, mainly intra-regional trade, were taken into account, the ratio of intra-regional trade in total maize imports would be higher than the ratio calculated from the official data.

Putting production, consumption, and trade figures together tells us that, in total, potential grain trade opportunities, especially intra-regional trade, are quite small given current African countries' production structure. From the production side, maize seems to be most suitable for intra-regional trade. However, as maize is produced by most countries and almost all farmers in the region, market demand is limited if there is no other production opportunity to replace maize in some regions and to generate enough income for farmers or urban consumers to purchase maize from the market. Moreover, as more than 50 percent of current maize imports are already intra-regional trade, even if we assume that all imports can be replaced by intra-regional trade, given current low ratio of overseas imports to total consumption (5 percent of total consumption), the room left for using intra-regional imports to replace the imports from the countries outside the region is equivalent to only 2 to 3 percent of total consumption. There are potential trade opportunities for rice, especially in East and West Africa, as rice accounted for one-third of total grain imports and 37 percent of rice consumption in the region. According to other countries' experience, with income growth, we should expect food demand for rice and wheat to increase faster than food demand for maize (while feed demand for maize would increase the most rapidly among the grains).

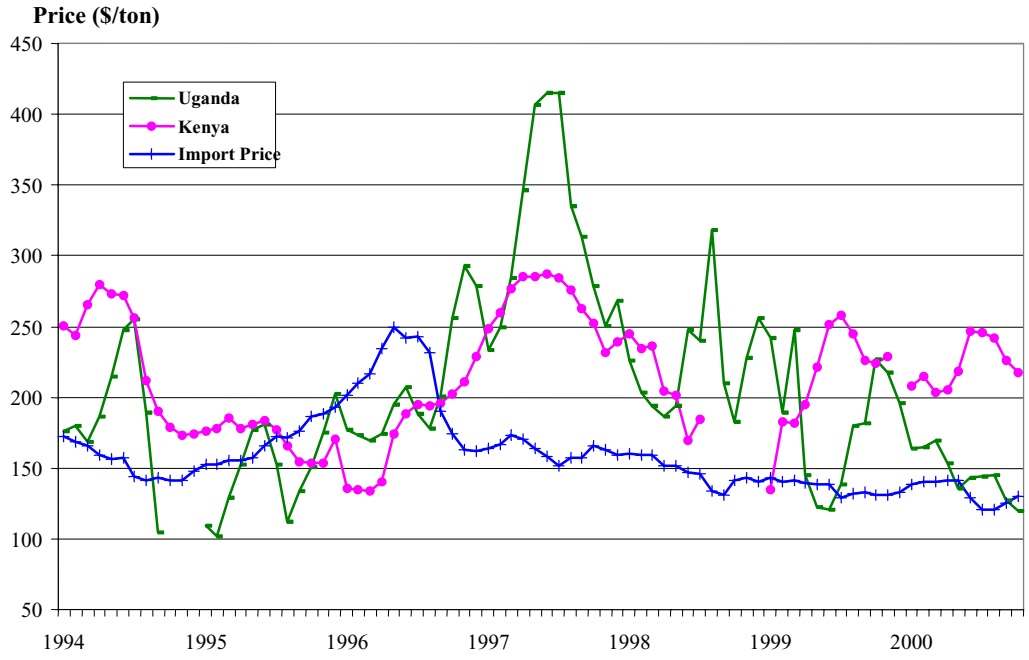
Table 13—Ratio of wholesale maize prices to import parity price: 1994-2002

	Uganda	Kenya	Zambia	Mozambique	Tanzania
1994	1.23	1.50	0.91		
1995	0.88	1.03	1.01		1.07
1996	1.04	0.88	0.75		1.04
1997	1.96	1.64	0.93		1.44
1998	1.54	1.37	1.03	1.90	1.50
1999	1.36	1.58	0.89	1.18	2.02
2000	1.08	1.68		1.35	
2001			1.52	1.67	
2002			2.82	2.02	

Note: The import parity price is estimated as the U.S. FOB yellow maize price plus $45.4 in shipping and other marketing costs to South African ports.
Source: FEWS data and USDA/ERS

Besides the demand-side constraint, lack of market competitiveness is the other constraint for increasing intra-regional trade. In table 13 we calculate the ratio of wholesale maize prices to an import parity price for selected SSA countries, and in figure 2 we further compare Uganda and Kenya maize wholesale prices with an import price over six recent years.[15] Significant price differentials among SSA countries seems to suggest potential for intra-regional maize trade, particularly in years of short supply (Dréze and Sen, 1989; Dorosh, 2001). However, as domestic wholesale prices in general are higher than the maize import parity prices, without improving SSA competitiveness, including reducing both production and marketing costs, it would be hard to increase intra-regional trade and reduce imports of cheap foreign sources of maize and other grain products.

Figure 2—Maize wholesale prices —Comparison between selected African countries and import parity price



[15] The Import price is U.S. FOB yellow maize price plus $45.4 in shipping and other marketing costs to South African ports.

The potential market demand and trade opportunities are further quantitatively assessed by employing IFPRI's IMPACT model. Analysis of similar issues using a world CGE model is presented in the next chapter.

FUTURE DEMAND AND SUPPLY: IMPACT MODEL SIMULATION RESULTS

IFPRI's IMPACT model is a world model of agricultural supply, demand and prices covering 36 countries and regions, and 16 agricultural commodity groups, including all cereals, roots and tubers, and livestock products (a detailed commodity list is in Appendix III). The model simulates a competitive agricultural market for crops and livestock, with separate sets of supply and demand equations, and with domestic prices linked to world prices through fixed marketing margins and trade distorting policies (i.e., producer and consumer subsidy equivalents). World prices adjust to clear international markets (net exports or imports of the world are zero).[16]

a. The Baseline: Balanced Growth in SSA Food Demand and Production

The IMPACT baseline scenario models a "business as usual" growth in SSA food demand and production, with the growth rate varying across sub-regions. The exogenous annual growth rates of GDP are chosen as 3.2 to 3.8 percent for the four SSA regions between 1997 and 2015.[17] With a 2.4 percent annual population growth rate in the same period, per capita GDP annual grow rate is equivalent to 0.8 to 1.4 percent, close to the current situation in SSA. The annual growth rate of area cultivated of food crops is less than one percent, with an annual trend growth rate in yields exogenously set at one to two percent. The annual growth rate of the number of head of livestock is assumed to be two percent; the productivity growth rate (kg/head) is approximately one percent.

With these assumptions, the model generates a "balanced" growth situation for meat and cereal production and demand in SSA (table 14). Meat demand and production increase by 3.2 percent per year, and cereal demand and production increase by 2.8

[16] For further details of the IMPACT model see Rosegrant et al. (2002).
[17] The baseline annual GDP growth rate is exogenously assumed to be 3.3 percent for northern SSA, 3.8 percent of central and western SSA, 3.2 percent for southern SSA, and 3.5 percent for eastern SSA. Lists of the countries included in the four regions are in Appendix III.

percent. However, because rapid growth in meat demand and production leads to sharp increases in feed demand, growth in maize demand is faster than growth in maize production (2.7 versus 2.5 percent; Table 15).

Table 14—Baseline projection of meat and cereal production, demand and net imports in Sub-Saharan Africa

	Production		Demand		Net imports	
	1997	**2015**	**1997**	**2015**	**1997**	**2015**
			1000 mt			
All meat	5,407	9,527	5,505	9,692	153	164
All cereals	69,303	114,000	82,505	136,022	12,374	22,021
Maize	26,218	40,990	28,650	45,971	1,578	4,981
Calories available per capita per day						
1997	2,232					
2015	2,387					

Sources: 1997 are FAO data, 2015 are IMPACT baseline simulations.

Given that SSA was a food deficit region in 1997, the gap between food demand and production, (especially for cereals), widens by 2015 even though demand and production grow at a similar rate. There are marked regional differences in the patterns of growth in production and demand, however (Appendix I Table 7). Demand grows faster than production in eastern Africa, while production grows faster than demand in central and western SSA, implying increased opportunities for intra-regional trade (Appendix I Tables 8 – 11).

Table 15—Summary of projected annual growth rate of meat, maize and all cereal production, and demand in Sub-Saharan Africa

Scenario	Regional demand for			Regional production of			Calories per capita per day
	Meat	Maize	All cereal	Meat	Maize	All cereal	
	Annual growth rate						
1. Baseline	3.19	2.66	2.82	3.20	2.51	2.80	0.37
2. Optimistic	5.80	3.82	4.15	3.92	4.02	4.46	1.64
3. Optimistic plus livestock demand shift	6.55	3.81	4.14	3.94	4.02	4.47	1.69
4. Optimistic plus reducing marketing margins	6.34	4.15	4.45	4.50	4.43	4.80	1.85
5. Optimistic plus livestock demand shift and reducing marketing margins	7.08	4.14	4.44	4.52	4.44	4.81	1.90

Note: 1. In baseline, GDP growth rate is exogenously set at 3.2 – 3.8 percent.
2. In optimistic, GDP growth rate exogenously set at is 8.0 percent.

b. The optimistic scenario: High productivity and income growth result in per capita calorie availability of 2990/day

In the optimistic scenario, an exogenous annual growth rate of 8 percent for the total income (GDP) is chosen for the four SSA regions between 2000 and 2015. With a 2.4 percent population annual growth rate in the same period, per capita income growth rate is 5.6 percent per year.

With a much higher income growth assumption, total food demand of SSA significantly increases by 2015 in this scenario. Moreover, given the assumption that the income elasticity of demand for livestock products is higher than that for staple food, total SSA demand for meat is expected to almost triple by 2015, with an annual growth rate of about 5.8 percent. In contrast, demand for cereals will grow at a relatively slow

pace, by 4.15 percent per year through 2015. Per capita availability of calories increases by 1.64 percent per year to 2990 per day in 2015, up from 2232 in 1997.

On the production side, the optimistic scenario assumes a higher growth rate in yields: 1.3 percent annual growth rate for livestock and 3 percent annual growth rate for food crops. With these assumptions, total SSA food production is expected to double by 2015 relative to the level in 1997, the annual growth rate is 3.9 percent for livestock and 4.5 percent for cereal production.

Given that meat demand increases faster than livestock production, a significant gap appears between meat demand and production in SSA, implying a huge surge in livestock imports.[18] For cereals, although growth in production is expected to be slightly faster than the growth in demand, SSA is projected to remain a food deficit region, with cereal imports increasing over the period. For example, by 2015, total regional maize imports are expected to rise to 3 million tons, up from 1.6 million tons in 1997, and total cereal imports to 19 million tons, up from 12 million tons in 1997.

c. Optimistic growth plus livestock demand shift: Increased demand for meat has little impact on cereal production or calorie availability

In this scenario, we combine the assumptions of the optimistic scenario with much higher income elasticities of demand for livestock products (meat, milk and eggs); (a 20 percent increase, from an average of about 0.6 to 0.9 percent increases to 0.72 to 1.08 percent). As a result, demand for livestock products further increases by 13.5 percent over the optimistic scenario for 2015, and annual growth rate rises to 6.6 percent, from the 5.8 percent in the optimistic scenario. Since domestic prices are assumed to be linked to world prices with fixed marketing margins and implicit indirect taxes[19], there is little effect on domestic prices. Also, since no increase in livestock productivity is modeled, production remains almost unchanged relative to the base scenario. Instead, increased demand for livestock products leads to a large increase in livestock imports by

[18] Imports accounted for only about 3 percent of total consumption of livestock products in 1997.
[19] In the IMPACT model, the combined effects of government pricing policies and commodity trade restrictions are summarized as fixed percentages, in parameters for the producer subsidy equivalent and the consumer subsidy equivalent.

2015 (2011 thousand tons, 46 percent more than that in the optimistic scenario).[20] Given that both livestock and cereal production and hence farm income remain almost unchanged relative to the base scenario, increased demand for livestock implies demand for other food as well as for non-food consumption goods and services have to fall. With less food demand for cereal and unchanged feed demand, cereal imports fall by 2.4 percent and among the cereal imports, maize imports fall by 5.8 percent, compared with the optimistic scenario in 2015.

A limitation of these results is that the model structure constrains the increase in livestock demand from stimulating livestock production and hence feed demand. A more realistic view of the market constraints and the high costs of cold storages and transportation for meat imports suggests that domestic prices would respond to the increased demand and hence domestic supply of livestock products would be expected to rise. If we assume that all the increased livestock product demand can be met by domestic supply, cereal, especially maize, production would rise as feed demand would increase. Using the ratio of total feed demand to the total meat production in 1997, a 2 million tons increase in meat production implies 1.5 million tons increase in feed demand for cereals, of which, 970 thousand tons are increased feed demand for maize. Even if all these increased feed demands were met by domestic supply, domestic production of cereals would only increase by one percent (and maize production by 1.8 percent), relative to the optimistic scenario in 2015.

The weak livestock and grain sector linkage is mainly due to the low feed-to-meat ratio in SSA, even after taking into account the other crops, such as roots and tubers, used as feed. In other developing countries, increased meat demand would generate a strong and positive effect on grain production through rapid increase in derived feed demand. Using, for example, the feed-to-meat ratio for the poultry industry in China (2.5 to 3, USDA/ERS), a 2 million tons increase in meat demand implies a 5 to 6 million tons increase in feed demand. If SSA countries should reach such a feed-to-meat ratio, a 13 percent increase in livestock product demand would generate a derived feed demand

[20] This increase in SSA import demand (which accounts for only a small share of total world trade) results in only a small increase in world prices of livestock products, which is reflected in an identical percentage increase in domestic prices.

equivalent to 9 to 11 percent of maize production and 3 to 4 percent of all cereal production relative to the optimistic scenario for the region.

d. Optimistic growth with 40 percent reduction in marketing margins: Per capita calorie availability rises to 3103 calories/day

The previous simulations have shown that agricultural productivity growth alone will not lead to major increases in food demand, particularly given the assumptions of the model that essentially keep producer and consumer prices fixed.[21] Reducing the very high domestic marketing margins offers the potential, however, to enable both producers and consumers to gain from increased productivity. Thus, in this scenario, we combine the assumptions in the optimistic scenario with a 40 percent reduction in the marketing margins for both producers and consumers for all agricultural commodities. The initial base level marketing margin is 50 percent of the world price. In this scenario it is reduced to 30 percent of the world price. As a result, producer prices increase by 40 percent but consumer prices fall only by 13 percent.[22]

Given higher producer prices, livestock production rises by 10.6 percent in 2015 relative to that in the optimistic scenario, and the annual growth rate rises to 4.5 percent, up from its level of 3.94 percent in the optimistic scenario. Similarly, the annual growth rate of cereal production rises to 4.8 percent, up from 4.47 percent in the optimistic scenario. However, given the smaller percentage change in prices for consumers, they benefit less than producers from reduced marketing margins. Per capita calorie availability slightly increases from the level in the optimistic scenario and reaches 3,103 calories/day, a 1.85 percent annual growth rate between 1997 and 2015. Total SSA net imports of livestock products increase by 7.0 percent, since the absolute increase in demand is greater than the absolute increase in domestic production.

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[21] In the IMPACT model, domestic prices are linked to world prices through fixed trade margins. Since SSA accounts for only a small share of world trade for the products considered here, changes in SSA import demand do not have a significant effect on world prices (or domestic prices).

[22] Producer prices are equal to world prices less the producer market margin: PP = (1-prodmarg)*PW, so the price change is equal to PP'/PP = [(1-0.3)/(1-0.5)] = 1.4. Consumer prices are equal to world prices plus the consumer marketing margin: PC = (1+consmarg)*PW, so the consumer price change is equal to PC'/PC = (1+0.3)/(1+0.5)=0.867 (i.e. –13.3 percent).

e. Reductions in marketing margins with livestock demand shift: Per capita calorie availability rises to 3133 calories/day

Scenario 5 combines scenarios 3 and 4, i.e., we model both a livestock demand shift and reduced marketing margins. In this scenario, both production and demand for livestock products and food crops increase significantly. The annual growth rate of production rises to 4.5 percent for livestock products and 4.8 percent for cereal products, and annual growth rate of demand rises to 7.1 percent for livestock products and 4.4 percent for cereals. Demand increases faster than production in livestock sectors, resulting in an excess demand for livestock products equivalent to one-third of demand in 2015. For cereals, production increases faster than demand, net imports fall to 10 percent of the total regional demand by 2015, down from 15 percent in 1997. In the case of maize, the gap between demand and production falls to 3.6 percent of total regional demand by 2015, down from 5.5 percent in 1997. Due to reducing marketing margin and shifting in consumer demand preferences, per capita calorie availability increases to 3133 per day, (a 1.9 percent annual growth rate).

f. Summary of the Findings from the IMPACT Model

The optimistic scenario of the IMPACT model suggests that high income growth would generate strong growth in demand for both livestock and cereal products. Such increased demand supposes to create market opportunities for domestic supply. However, if domestic prices for livestock and cereal products are at or above the import price level, such as observed for maize in selected countries (table 13), rapid growth in demand would result in more rapid growth in imports. If some SSA countries had a comparative advantage in livestock or cereal production, there would be growing opportunities for intra-regional trade.

Several additional assumptions were then introduced to enhance the realism of the scenarios and to provide insight to the possible developments in SSA. Considering these modifications in the manner described enables understanding of the different components of growth prospects in the regions. For instance, shift in food demand preference from more cereal to more livestock products often accompanies income growth. The scenario designed to illustrate such change shows that increased livestock demand in SSA may

result in increased imports of livestock instead of increased domestic production. But even met by domestic production, the low feed-to-meat ratio observed in the region implies that the derived demand for maize would still be quite small. Changing this weak linkage between livestock and cereal sector requires significant improvements in livestock production technology as well as reduction in cereal production costs.

Lastly, reduced marketing margins, as modeled in the final two scenarios, have considerable potential to induce increases in supply and demand, potentially increasing calorie availability.

4. ECONOMY-WIDE ANALYSIS OF AGRICULTURAL PRODUCTIVITY AND TRADE OPPORTUNITIES[23]

The potential for investments and productivity increases in agriculture to increase real incomes and food consumption depends on the initial size of the sector, the size of the productivity shock, and the structure of production and demand. There are potentially important linkages across sectors through changes in relative prices, including changes in the real exchange rate.

In this chapter, we assess the possible impacts of changes in productivity of traditional export crops, non-traditional exports, cereals, and livestock on agricultural demand and production, and on total farm income and national income using a world computable general equilibrium (CGE) model that explicitly focuses on SSA . We also simulate the effects of reductions in marketing costs and exogenous increases in non-agricultural sector productivity to assess the importance of these sectors in raising real incomes and food consumption in SSA.

DESCRIPTION OF THE MODEL AND THE DATA

Our analysis of alternative growth scenarios for African agriculture uses a global general equilibrium model that includes six individual SSA countries: Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, and Uganda, and three aggregate SSA regions: southern African Custom Union; rest of southern Africa; and rest of SSA. While

[23] This chapter was written by Xinshen Diao and Paul Dorosh.

the model as specified is designed for this study of African agriculture, as a global model, it also includes countries in the rest of the world.[24]

We model 32 production sectors, 21 of which are agricultural or agriculture-related. Commodities produced by production sectors are either sold to the domestic markets, or exported to other countries/regions. World prices adjust to clear world export/ import markets for each commodity. International trade is traced by import destination and export sources, i.e., the bilateral and multilateral trade flows among countries/regions, instead of net trade or aggregate exports and imports, are included in the model. Thus, both intra-African regional and inter-regional trade are captured.

The model differs from the IMPACT model in several important ways.[25] First, it includes explicit equations for non-agricultural sectors and products, wages and household incomes. Second, major macroeconomic variables (notably, the real exchange rates of each country) are endogenous, and are determined in a consistent set of equations in a macroeconomic framework. However, the general equilibrium model does not contain the detail of the IMPACT model for determining agricultural supply, nor the detail in terms of commodity disaggregration.

Perhaps the most important difference between the models is how the relationship between domestic and international prices is specified. In the IMPACT model, domestic prices are linked directly to international prices through fixed exchange rates, exogenous tariffs (and taxes) and fixed marketing margins. Thus, for a small country such as a country in SSA, both producer and consumer prices are essentially exogenous, being given by the world market prices (even for non-traded commodities). In the world CGE model, domestic goods are treated as imperfect substitutes for international goods, and price transmission is muted, varying according to the elasticity of substitution and the share of traded goods in total supply or demand. Domestic prices of goods and services do not track world prices unless the share of exports (imports) in domestic production (consumption) is large.

Most data used to construct the model are drawn from Global Trade Analysis Project (GTAP) database version 5, which contains data for 1997. Given that the focus of

[24] According to the importance in its trade with SSA, the rest of world is aggregated into six countries/regions, including the U.S., the European Union, rest of the European countries as a group, North Africa, the Asian countries as a group, and the rest of the world.
[25] For further details of the world CGE model specification, see Diao and Somwaru (2001).

this study is to evaluate African countries' market (both domestic and international) constraints of alternative growth scenarios, we have modified the GTAP database, incorporating international trade transport margin data for African countries and regions through estimates of the ratios between c.i.f. (cost-insurance-freight) prices and f.o.b. (free-on-board shipping-point) prices.[26] We have also disaggregated the "vegetables and fruits" and "other crops" sectors between crops produced mainly for export (e.g., specialty export products, coffee and cocoa) and products that are sold mainly for domestic consumption, (e.g., most roots and tubers products).[27]

FINDINGS FROM THE WORLD CGE MODEL SIMULATIONS

In order to evaluate the possible market opportunities or constraints for African countries' agricultural growth, we design six growth scenarios. The first four scenarios show the effects of an exogenous increase in total factor productivity (TFP) in the non-traditional, agricultural export sector (Scenario 1); in the traditional export sector (Scenario 2); in the grain sector (Scenario 3); and in both the grain and livestock sectors (Scenario 4). Scenario 5 combines the effects of the productivity gains in agriculture with a reduction in marketing costs (through an increase in TFP of the transport sector). Finally, in scenario 6, we model an increase in TFP in selected non-agricultural sectors together with the increase in agricultural and transport sector productivity from scenario 5 to capture the effects of agricultural growth combined with expansion in the non-agriculture economy. Table 16 summarizes the main assumptions of each scenario. Major findings of the model simulations under each of the six scenarios are discussed below.

[26] We estimate the ratio of c.i.f. and f.o.b. prices for African countries, using data for this ratio for trade in various commodities between U.S. and Germany, multiplied by a transport cost factor provided by Limao and Venables (2002), appendix table V. According to Limao and Venables, if the c.i.f. and f.o.b. ratio is one for the trade between U.S. and Germany, then the ratio between U.S. and South Africa is 1.67, and is 2.58 between U.S. and Malawi or U.S. and Uganda.

[27] That is, for each African country/region, we create two "vegetable and fruits" sectors and two "other crops" sectors, one for exports and one for domestic market. Note that sales for the domestic market are often very large in comparison with exports. For example, the aggregate vegetable and fruit sector accounts for 60 percent of agricultural GDP in Uganda and 28 percent in Mozambique, while less than one percent of the sector's output is exported in Uganda and less than 5 percent is exported in Mozambique. Detailed sector classification and description of the base-year economic structure for the African countries and regions are set out in appendix IV.

a. High growth of non-traditional agricultural exports has only minimal impacts on SSA agricultural growth even without export market constraints

In Scenario 1, we increase TFP of the non-traditional, agricultural export sector by 6 percent per year for 12 years; the cumulative effect is equivalent to doubling the TFP level of this sector by year 12. (This growth rate approximates the per capita growth rate of Kenya's vegetable and fruit exports over the past ten years.) Given its larger base-year value of exports, a much lower (2 percent) annual TFP growth rate is chosen for South Africa.[28]

Table 16—Description of the world CGE model's scenarios

	Sub-Saharan Africa (Except SACU)	**SACU**
	(Sector TFP annual growth rate in percent)	
Scenario 1: High growth of non-traditional exports		
Vegetables and fruits	6.0	2.0
Scenario 2: High growth of traditional exports		
Cotton (Mozambique and Tanzania)	6.0	0.0
Sugar (Zambia)	3.0	0.0
Tobacco (Malawi and Zimbabwe)	0.0	0.0
Other crops, including tree crops (Uganda, Tanzania, Rest of SSA*)	4.0	0.0
Scenario 3: High growth of grains sectors		
Rice, wheat, and coarse grains	1.5	0.0
Scenario 4: High growth of grains and livestock		
Grains	1.5	0.0
Livestock**	4.0	2.0
Scenario 5: High growth in agriculture (scenarios 1,2 and 4) plus increased productivity of marketing		
Transport sector	4.0	2.0
Scenario 6: High growth in selected non-agr sectors (scenario 5 plus increased productivity of five non-agricultural sectors)		
Manufacturing and private services	4.0	2.0

*Rest of SSA is defined as all of SSA except southern Africa, Tanzania and Uganda.
**Capital stock is increased by the same percentage as TFP; exogenous increase in consumer demand for livestock products.

[28] For these model simulations, "South Africa" includes all the countries of the Southern Africa Custom Union.

In this scenario, where non-traditional exports face no significant market constraints,[29] non-traditional exports increase more than three-fold by year 12, (a 14 percent per capita annual growth rate, Table 18). Total agricultural exports increase by 25.5 percent, (an annual per capita growth rate of 1.9 percent, Table 17). This increase in exports is greater than the exogenous increase in TFP largely because additional land and labor resources are drawn to the sector because of its increased profitability.

Table 17—Agricultural growth scenarios: Sub-Saharan Africa macro results

	GDP	Real agr GDP	Total agr production	Food consumption	Total agr exports	Total agr imports	Level of food prices
Scenarios			*---- Per capita annual growth rate ----*				
1. High growth in non-traditional exports	0.05	0.21	0.27	0.08	1.90	0.44	0.06
2. High growth in traditional exports	0.06	0.37	0.48	0.06	2.76	0.72	0.09
3. High growth in grain sector	0.06	-0.07	0.29	0.26	0.10	-0.40	-0.23
4. High growth in grains and livestock	0.21	0.18	1.25	1.17	0.47	-0.87	-0.68
5. High growth in agriculture plus increased TFP in transportation	0.62	1.48	2.28	1.56	5.81	1.42	-0.39
6. High economy-wide growth	1.51	2.97	2.92	2.19	5.70	1.81	0.21

Source: IFPRI CGE simulations

[29] In the model simulations, increased non-traditional exports by SSA do not lead to a decline in world prices because of the region's very small initial share in total world trade in these products.

Table 18—Agricultural growth scenarios: Sub-Saharan Africa sector results

	Output	Consumer demand	Exports	Imports	Level of price
Scenarios	----- *Per capita annual growth rate* -----				
1. High growth in non-traditional exports					
Vegetables and fruits	9.6	0.3	14.1		-1.8
2. High growth in traditional exports					
Cotton, sugar & tree crops	2.9		5.2		-0.5
3. High growth in grain sector					
Maize	1.0	1.0	0.4	-2.7	-1.1
4. High growth in grains and livestock					
Livestock and products	3.1	3.1	6.7	-2.8	0.0
5. High growth in agriculture plus increased in TFP in transportation sector					
Vegetables and fruits	10.9	0.4	15.8		-1.8
Cotton, sugar & tree crops	3.1		5.4		-0.3
Maize	1.0	1.2	3.7	3.1	-0.5
Livestock and products	3.3	3.5	6.2	-1.1	-1.7
6. High economy-wide growth					
Vegetables and fruits	10.2	0.8	14.6		-1.5
Cotton, sugar & tree crops	3.7		5.6		0.1
Maize	1.5	1.6	4.5	4.4	0.2
Livestock and products	3.9	4.0	5.9	-0.6	-1.3

Source: IFPRI CGE simulations

For the entire SSA region, accelerated growth in non-traditional exports raises the region's per capita real GDP (measured by factor costs deflated by consumer price index) only 0.6 percent by 2015, compared with the level in 1997. Assuming a 2.4 percent annual growth rate in population over this period (the assumption used in IMPACT), the growth rate of real GDP increases from 2.4 percent in the base (no change in TFP, with capital and labor implicitly growing at the same rate as population) to 2.45 percent. Even if, in addition, we assume that a high growth non-traditional export sector would create

more employment opportunities for unskilled labor in the region,[30] per capita real GDP would increase from 0.6 percent to 1.6 percent in 12 years.

Agricultural income grows relatively rapidly, compared with GDP, but the growth rate is still very small. The real income per capita from agricultural activities (deflated by the same consumer price index) rises by 2.6 percent in 12 years, and equivalent to a 0.21 percent annual growth rate.

Thus, this simulation shows that given the small initial size of the sector, even a very rapid increase in exports does not contribute much to growth in total agricultural income or total GDP within 10 to 15 years for SSA as a whole. Not only because of the small initial size of the sector, which limits the sector's contributions to increased agricultural income, an export-oriented agricultural sector is often believed to have weak multiplier effects, as its linkages with domestic economies are not strong enough (e.g., Franco and Godoy, 1993). The calculated multipliers for non-traditional exports from our model support this opinion. A one unit (not one percent) of increase in the vegetable and fruit sector value-added (at the initial prices) can only generate 0.71 unit of increase in total GDP, which is one of the smallest multipliers calculated for all sectors included in the study (table 19, column 1). Moreover, if export demand were constrained by problems of market access or over-supply to niche markets, the increase in real GDP would be even smaller. However, as is discussed below, the positive effects of rapid growth in non-traditional exports may be larger for some individual countries.

Note also, technologies employed in many non-traditional production and trade are often relatively advanced, and hence, this simulation may underestimate the dynamics of the sector and its growth linkages effect through induced technological change and investment in non-agriculture, such as in processing, packaging, transporting, and marketing sectors. Both Kenya's experience of non-traditional agricultural exports and experiences of export-led growth in East Asia have shown much stronger export-growth linkages from non-traditional export sectors (both in agriculture and non-agriculture). These issues are addressed further in scenarios 5 and 6 below.

[30] This result is from a separate simulation that assumes flexible labor supply.

Table 19—Multipliers of the world CGE model simulations

	Vegetable & fruits	Traditional crops	Grains	Grains & livestock	Selected non-agr.	Transport	Total Agr.
	Change in Total GDP Resulting from an one-unit Increase in Selected Sectors' Value-added at the Initial Prices						
SACU	1.13	1.34	2.05	1.64	1.36	2.42	1.34
Malawi	0.63	1.75	1.50	1.42	1.32	2.73	1.40
Mozambique	0.70	0.76	1.23	1.22	1.17	2.25	1.08
Tanzania	0.64	0.87	1.40	1.24	1.36	2.03	1.13
Zambia	0.63	0.93	2.25	1.88	1.28	2.09	1.32
Zimbabwe	0.93	1.99	9.82	1.92	1.30	1.63	1.79
Rest of SADC	0.61	1.15	1.36	1.25	1.25	1.62	1.17
Uganda	0.60	0.98	1.20	1.04	1.26	1.85	1.06
Rest of SSA	0.64	0.91	1.96	1.69	1.27	1.96	1.24
Total SSA	**0.71**	**0.96**	**1.82**	**1.57**	**1.31**	**2.03**	**1.24**

Source: IFPRI CGE simulations

b. High growth of traditional agricultural exports has relatively small effects on income growth even under optimistic demand scenarios

In scenario 2, we simulate a recovery of lost markets for Africa's traditional agricultural exports, such as cotton, sugar, and tobacco, coffee, cocoa, and tea.[31] In this simulation, we increase TFP of traditional agricultural export sectors by 3 to 6 percent per year for 12 years. The TFP growth rate for a specific sector is chosen so that the country/region returns to its historically highest level of exports for this commodity.

Thus, the exogenous TFP annual growth rates vary by country and commodity: annual growth rates of TFP are as follows: cotton sector in Mozambique and Tanzania (6 percent); sugar sector in Zambia (3 percent); exportable tree crops (included as exportable other crops in the GTAP database) in Uganda, Tanzania, and the region of rest

[31] Note that we include sugar as a "traditional export" here. Tobacco, coffee, cocoa, and tea are aggregated into the "exportable other crops" sector in the GTAP database.

of SSA (4 percent). No additional productivity growth is modeled for tobacco in Malawi and Zimbabwe, since in these countries production and exports have grown steadily in the past two decades (though export prices have declined somewhat).

This optimistic scenario for traditional export crops produces somewhat disappointing results in terms of real GDP growth, however. The 3 to 6 percent TFP annual growth rate in the traditional export sectors modeled here increases SSA's real GDP per capita by a total of 0.74 percent, and total agricultural real income by 4.6 percent in 12 years, equivalent to per capita annual growth rate of 0.06 percent and 0.37 percent, respectively.

There are two major reasons why rapid growth in traditional exports fails to substantially increase real GDP in this scenario. First, for most SSA countries, the traditional export sectors account for a small share of total agricultural GDP, even though they account for a large share in a country's total agricultural exports. For example, cotton lint exports accounts for more than 30 percent of Mozambique total agricultural exports, but raw cotton production accounts for less than 2 percent of Mozambique agricultural GDP.

Second, this simulation does not assume a return of world prices to historical high levels. In fact, in the simulation, increased production and exports cause the world prices for the traditional commodities to fall slightly. Even though the model simulations assume exports from the countries outside the SSA are constant in per capita terms, the price of sugar, cotton, and tree crops still slightly fall by 0.5 percent. An increase in world prices to average levels of the mid-1970s (historical peak period for many crops) would increase the revenues generated from exports, but such a recovery in medium-term average prices seems unlikely.

Note that market opportunities and hence growth contributions of the traditional agricultural products can significantly increase if the quality of the products can be improved, or if the products can be processed (even just gone through primary processing) in the region. There exists substantial difference between a brand product, e.g., gourmet coffees, and non-brand products. By improving product quality, the same volume of production can generate more income to farmers, while processing the

products in the region will provide more employment opportunities, and improve the linkage effects to the whole Africa.

c. Grain production rises but farm income may fall

In Scenario 3, we increase African countries' maize, rice, and wheat TFP by 1.5 percent per year, approximately equal to the growth rate of yield for maize through 2015 in the "optimistic scenario," of the IMPACT model (chapter 3).[32]

In this scenario, grain production increases by 9.7 percent and maize production increases by 12.3 percent per capita by year 12, relative to the base, equivalent to 0.78 and 1.0 percent per capita annual growth rates, respectively. However, with more grain output, total GDP only increases slightly (by 0.67 percent in 12 years), and real agricultural income per capita falls slightly (by 0.07 percent per year).

Consumers as a whole benefit from growth in grain production, as domestic food prices fall by 2.7 percent in year 12, and per capita food consumption increases by 0.26 percent annually. Urban low-income households and rural landless households would benefit most from this reduction in real prices. Increased domestic grain supply also reduces total agricultural imports by 4.0 percent and grain imports by 27.8 percent in 12 year, which will help SSA countries in terms of trade balance (given most SSA countries are in food deficits). However, cereal demand is often income inelastic, unlike demand for many other food and non-agricultural products. With a low income elasticity, shifts in domestic terms of trade will be against agriculture and negate the income benefit of productivity improvement (Adelman, 1984). With no significant export opportunities that are mainly constrained by high market transaction costs (grain exports rise slightly, 1.3 percent, from its small initial value in this scenario), more grain production can lead to a decline in farmers' real income, although total GDP increases.[33]

[32] In these simulations, we implicitly assume a population growth rate of 2.4 percent per year, the same assumption .

[33] The sharp decline in Ethiopian maize prices in the first half of 2002 is one example of productivity increases leading to real price falls. See Gabre-Madhin, Barrett and Dorosh (2003).

d. Combining high growth livestock and grain sectors benefits consumers more

In Scenario 4, in addition to increasing TFP growth in the grains sectors (Scenario 3), we increase TFP and per capita capital stock in the livestock sector by 4 percent per year. We also increase minimum consumption level of livestock products by 50 percent in the consumer demand function to capture a shift in demand from grains to livestock products reflecting long-run changes in consumer tastes and livestock product availability not captured with income and price elasticities. As in the other simulations, we model a much lower TFP and per capita capital stock growth rate (2 percent per year) for South Africa, along with a smaller shift (15 percent) in its consumer demand function.

In this simulation, with high growth in the grain sector combined with high growth in the livestock sector, per capita real GDP increases by 2.54 percent (0.21 percent per capita annually), and agricultural real income grows at the same speed as GDP (0.21 percent per capita annually). The positive effect on total GDP in this scenario is much larger than in the first three scenarios, largely because of greater linkage effects with food processing and other sectors.

Consumers have much larger benefits than that in the first three scenarios, as food prices fall by 7.8 percent, and total food consumption increases by 14.9 percent per capita in year 12 (equivalent to a 1.2 percent per capita annual growth rate). Regional domestic supply replaces more imports, and total agricultural imports fall by 9.9 percent, and livestock imports fall by 12 percent in year 12. In contrast to scenario 3, (high growth in the grain sector only), total agricultural exports increase by 5.7 percent and livestock exports more than double in 12 years from their low initial level.

e. Growth linkages with non-agriculture

Results of these first four scenarios suggest only limited impacts of rapid agricultural growth on real GDP. In part, this is due to the small size of these agricultural sub-sectors (particularly non-traditional exports) in the overall economies of SSA . The results involving gains in productivity of grains (simulations 3 and 4) also suggest that investments and productivity gains outside the agricultural sector may be needed to maximize growth linkages and overall benefits of agricultural growth, however.

Numerous earlier studies have concluded that agriculture, especially food crops, have strong growth linkages, i.e., increased agricultural (or food crop) production would generate a disproportionably large increase in the country's total GDP both through increased demand for inputs (backward linkages) and increased demand for consumer goods as a result of higher agricultural incomes (forward linkages).[34]

In order to compare our results with these earlier findings of strong linkages emanating from agricultural growth, we calculate value-added growth multipliers deriving from TFP shocks in different agricultural and nonagricultural sectors. Here, multipliers are defined as the total increase in real GDP divided by the increase in the shocked sector's value-added, both measured at the initial (base-year) level of the value-added prices.

The resulting multipliers derived using a CGE model are in general relatively smaller than the standard fixed-price multipliers, but similar in magnitude to other multipliers using CGE models.[35] As shown in Table 19, grain sector multipliers are in general larger than those for the non-traditional and traditional sectors. For SSA as whole, a one unit increase in grain sectors' value-added (in terms of base-year prices) results in a 1.82 unit increase in total real GDP, higher than that of non-agricultural sectors (1.31), except for the transportation sector (2.03).

The multiplier for the grains sector is also significantly higher than that for non-traditional exports. However, in the non-traditional export sector, additional capital and labor are drawn into the sector as productivity increases. Thus, a one percent increase in TFP in the non-traditional export sector generates a 1.9 percent increase in output. In contrast, as productivity increases in the grains sector, grain prices fall[36] because there is insufficient demand generated through income effects. Land and labor are released for production in other sectors, increasing the multiplier effects, but limiting the impact of the one percent increase in TFP in the grain sector to only a 0.34 percent increase in grain

[34] See Bell and Hazell (1980) for an early methodological discussion of alternative multiplier models used in growth linkage analysis, and the discussion of Haggblade, Hammer, and Hazell (1991) on the improvement in the multiplier models with limited price endogeneity.
[35] See Dorosh and Haggblade (2003) for a comparison of CGE and fixed-price multipliers for several sub-Saharan African countries.
[36] The price fall for grains is especially steep because demand for grains is price inelastic, i.e. holding income and population constant, a one percent decrease in price results in a less than one percent increase in demand. Thus, for any given percentage increase in (per capita) supply, an even greater percentage decrease in market price is required to raise (per capita) demand to equilibrate the market.

output (Table 20). Because the change in grain output is small, the total effect on GDP of a one percent increase in productivity in grains is small, even with a high value-added multiplier.[37]

Table 20—Change in SSA land returns and wage rate -- Normalized by consumer price index

	Returns to land	Wage rate		Elasticity of sector output w.r.t. sector TFP shock
		Skilled labor	Unskilled labor	
Scenarios	*Cumulative change at year12*			*Annual percent*
	---- Percent per capita ----			
1. High growth in non-traditional exports Vegetable and fruits	2.85	0.33	1.19	1.94
2. High growth in grain sector Grains	-2.00	0.69	0.39	0.34
3.High growth in agriculture plus increased TFP in transport sector	20.42	4.56	7.79	
7. High growth in selected agriculture and nonagricultural sectors	34.87	7.75	13.94	

Source: IFPRI CGE simulations

Relatively small impacts of agricultural productivity growth on overall GDP in spite of multiplier effects contrasts somewhat from earlier findings showing strong demand linkage effects of an agricultural-demand-led-industrialization (ADLI) strategy, (Adelman, 1984). [38] This earlier analysis differs substantially, however, with regard to the structure of the economies (South Korea versus SSA), the construction of the simulations, and assumptions about foreign capital flows and labor market. In particular, the Adelman (1984) simulation of an ADLI strategy assumes substantial increases in agricultural

[37] The total change in GDP is 0.62 percent, equal to the 0.34 percent increase in grain value added times the multiplier of 1.82.
[38] See also the analysis of agricultural growth in Bolivia (Franco and Godoy, 1993).

productivity, open unemployment of unskilled labor (that enhances potential multiplier effects), and constant domestic terms of trade for grain through "a grain trading facility which buys up the excess domestic supply" for import substitution and for exports.[39] The smaller impact of increased agricultural productivity on overall GDP growth in the case of SSA as modeled in this paper, results in large part from differences in the relative sizes of the agricultural sub-sectors (the SSA analysis does not include productivity increases in the large non-traded agricultural product sub-sector), and the assumptions on agricultural productivity growth, and the labor market (fully employed labor).

Most important, though, is that the simulations of South Korea's economy were constructed so that agriculture faced no marketing or demand constraints, and agricultural prices did not fall. As noted above, price declines in grains due to lack of demand in domestic market and export opportunities significantly dampen the positive effects on farmer incomes of productivity increases in the SSA simulations. Such negative terms of trade effects have actually been pointed out by Adelman (1984), that is, "… the improvement in agricultural productivity will actually reduce the incomes to farmers" if increased production of agriculture causes "the shifts in domestic terms of trade against agriculture" (Adelman, 1984, p. 945).

f. Reducing marketing costs is critical

Spurring additional market demand is thus a key condition for enabling increases in agricultural production to lead to substantial increases in real farmer incomes. Scenario 5 explores the implications of enhancing effective demand for agricultural products through reductions in marketing costs. In this scenario, in addition to modeling the productivity gains in non-traditional exports, traditional exports, grain and livestock (combining scenarios 1, 2, and 4), we also increase TFP in the transport sector by 4 percent per year, increasing marketing efficiency and thus reducing marketing costs.[40]

[39] Adelman, (1984), p. 941. Note also that because agricultural capital was a significant input into Korean agriculture, simulating increased agricultural investment further accelerated the simulated agricultural growth.

[40] As in the other simulations, we model a lower productivity gain for South Africa (2 percent per capita annual TFP growth).

This increase in TFP in the transport sector lowers marketing costs for both agricultural and non-agricultural products and for both domestic and international trade.

When high growth in agriculture is combined with a more efficient transport sector, both total GDP and agricultural GDP increase sharply: total GDP per capita in year 12 is up by 7.7 percent (a 0.62 percent per capita annual growth rate), and real agricultural GDP increases by 19.3 percent, equivalent to a 1.48 percent per capita annual growth rate. Total agricultural exports increase by 97 percent per capita in year 12 (a 5.8 percent per capita annual growth rate), and imports increase by 18 percent per capita (a 1.4 percent per capita annual growth rate). Producer prices for food commodities fall less than in simulations 3 and 4, and total food consumption would increase 20 percent per capita in year 12 relative to the base scenario (a 1.56 percent annual growth rate).

g. Agricultural growth combined with non-agricultural growth produces large benefits

Another major potential source for increased market demand for agricultural products is through growth in non-agricultural incomes. One avenue for increased non-agricultural incomes is through multiplier effects emanating from agricultural growth, (which were captured to some extent in the earlier simulations).[41] A second major avenue for increasing demand is through investments and increases in TFP in non-agricultural activities, (independent of growth linkage effects from agricultural growth).

Scenario 6 captures some of these inter-linkages between agriculture and the rest of the economy by combining the exogenous productivity shocks included in scenario 5, with an increase in some non-agricultural sectors' TFP growth by 4 percent per year.[42] Specifically, a 4.0 percent TFP growth is assumed for manufacturing sectors (e.g., textile and machinery industries) and some private service sectors, (including trade, transportation, and other business-related private services). TFP for the natural resource dependent sectors, such as mining, and government services is assumed to be constant in

[41] The CGE model used in this analysis, however, does not include the dynamic role of the regional and international market demand for stimulating growth, aspects which are better modeled in endogenous growth models (see Diao, 1999).
[42] Again a low TFP growth rate (2 percent) in the similar sectors is assumed for South Africa.

the scenario. In total, the non-agricultural sectors modeled with high TFP growth account for slightly less than 40 percent of national income for SSA, almost double the share of agriculture in SSA total GDP (20 percent).[43]

The simulation results illustrate the importance of demand effects and the inter-linkages between agriculture and non-agriculture. Improving growth performance of manufacturing and private services not only boosts total GDP (up 20 percent in year 12 and 1.51 percent per capita annually), but also allows spurs agricultural growth through increased demand for agricultural products. Regional real agricultural GDP increases by 42 percent in year 12, equivalent to a 2.97 percent per capita annual growth rate. Total food consumption increases by 30 percent per capita in year 12 (a 2.2 percent per capita annual growth rate, faster than growth rate of total GDP). Agricultural exports are also stimulated, up 95 percent in year 12, (a 5.7 percent per capita annual growth rate).

The 4 percent TFP annual growth in selected manufacturing and services in the model may be overly optimistic given investment, technology, and institutional constraints that inhibit growth in SSA. Such cross-sector growth linkages can be induced by increased investment and improved production efficiencies in agriculture, especially in exportable non-traditional agriculture, or can be a result of investment directly in labor-intensive non-agriculture, such as textile and trade-related private services. Though the mechanisms for achieving high productivity growth in non-agriculture are not specified, this scenario does highlight the role of demand constraints on agricultural growth and the importance of growth in non-agriculture for achieving growth in total income.

h. At the country and sub-regional levels, non-traditional agricultural exports may have larger growth effects

The above analysis is based on the model simulation results for SSA as a whole. When we further look at the effects in a single country or a sub-region under the same

[43] The structure of national economies differs by country, however. For South Africa, Malawi, and Mozambique, the share of these non-agricultural sectors in GDP is higher (40 to 45 percent), while agriculture's share of GDP is 7, 37, and 35 percent, respectively. For Uganda, however, the non-agricultural sectors modeled with high TFP growth account for less than 20 percent of GDP, while agriculture accounts for more than 50 percent.

scenarios, we find that some countries show much stronger agriculture and growth linkages (Appendix I tables 12 – 17).

The simulation results for the southern African region are almost identical with the results for SSA. However, at a country level, high growth in non-traditional agricultural exports generates a larger effect on Mozambique agricultural GDP. The cumulative growth effect reaches 8.2 percent per capita in year 12, equivalent to 0.66 percent annual per capita growth. For Mozambique, non-traditional agricultural exports (including fish) account for more than 80 percent of Mozambique total agricultural exports in recent years (1998 – 2000, Appendix II Table 1), equivalent to more than two percent of total GDP. Vegetable and fruit exports account for 2.2 percent agricultural GDP in the base year. A 4 percent TFP annual growth in exportable vegetable and fruit sectors allows Mozambique vegetable and fruit exports grow at 20 percent per year, which generates the highest agricultural GDP growth (0.66 percent per capita annually) among the four agricultural growth scenarios.

On the other hand, the high growth in non-traditional agricultural exports seems unable to stimulate Uganda's economic growth. Although a 4 percent TFP annual growth rate in non-traditional agricultural export sector allows Uganda vegetable and fruit exports grow at 28.5 percent per year from its small initial value, the resulting growth rate in agricultural GDP is only 0.12 percent per year due to the small share of non-traditional exports in Uganda agricultural GDP (table A2-1 in Appendix II).

While a high TFP growth rate in grain sector does not generate agricultural income growth for SSA as a whole, the model suggests a different case for individual countries included in the data. There are seven countries and sub-regions of SSA in which per capita real agricultural GDP falls slightly in the grain growth scenario, and two countries, Mozambique and Uganda in which a slightly positive effect on the per capita real agricultural GDP is observed. The grain sector accounted for 25 percent and 12 percent of agricultural GDP in the Mozambique and Uganda, respectively. Due to demand side constraints in domestic market as discussed above, farmers as a group (represented by agricultural GDP) see little benefit from more grain production.

Results from the non-agricultural high growth (Scenario 6) at the country level are also different. With 4 percent TFP growth rate in selected non-agricultural sectors, there

are five countries or sub-regions, Malawi, Mozambique, Tanzania, Zimbabwe, and the rest of southern Africa, in which per capita annual growth rate of real agricultural GDP reaches 3.0 to 3.4 percent, while in Uganda, the growth rate is below 2 percent. These differences in export – growth linkages and agriculture – non-agriculture linkages at the country level imply a diversified economic structure and other situations among SSA countries and indicate a need for further research at the country level.

i. Findings of IMPACT and CGE models are comparable

Table 21 summarizes the major results of two scenarios: scenario 5 of the IMPACT, (optimistic growth plus livestock demand shift and reducing marketing margins), scenario 6 of the world CGE model, (selected agricultural and non-agricultural sectors' TFP growth plus livestock demand shift). Although the IMPACT and world CGE models differ in model structures and parameters, the simulation results are comparable.

Table 21—Comparison of the IMPACT and CGE model results

	IMPACT		CGE	
	Baseline	**Sim5**	**Baseline**	**Sim6**
	-------- Per capita annual growth rate -------			
Maize production	0.11	2.04	0.00	1.55
Maize price	0.12	0.12	0.00	0.22
Cereal production	0.40	2.41	0.00	1.87
Agricultural GDP	--	--	0.00	2.97
Calories per day	0.37	1.90	--	--
Food consumption	0.54	3.20	0.00	2.19
GDP	1.5*	5.6*	0.00	1.51

* Exogenous in IMPACT
Sim5 in IMPACT: optimistic growth plus livestock demand shift and reducing marketing margin
Sim6 in CGE: 4 percent annual TFP growth in selected sectors except for grains with 1.5 percent annual TFP growth
Sources: Results of IFPRI IMPACT and the world CGE model simulations

Per capita annual growth of cereal production and food consumption is slightly less in the CGE model scenario, relative to the results of IMPACT. The main reason is that the per capita GDP growth rate (which is exogenous in IMPACT) is much higher in IMPACT (5.6 percent) than in the CGE model (1.5 percent).[44]

Another reason why growth in food consumption in the CGE model is less than that in the IMPACT simulation is that in the IMPACT model, domestic producer and consumer prices are exogenously linked with world prices, so there is essentially no increase in market prices to partially offset income-led increases in market demand. By taking into account market differentiation, producer and consumer prices are endogenous in the CGE model. With increased incomes and increased market demand, food prices rise (e.g., the domestic maize price increases by one percent per year), reducing consumer food demand.

j. Summary of the major findings from the world CGE model

Results from the world CGE model of alternative growth scenarios indicate that an export-led agricultural growth strategy, without substantial reduction in marketing costs and increase in non-agricultural productivity, is unlikely to generate substantial overall income growth.

Doubling the TFP level of the non-traditional exports in SSA (except in South Africa) over a 12-year period (approximating the per capita growth rate of Kenya's vegetable and fruit exports over the past ten years), results in only a 2.6 percent increase in per capita agricultural real income by 2015. Simulations of a recovery of lost markets for SSA's traditional agricultural exports result in a 4.6 percent of increase in per capita agricultural income by 2015, still quite small.

Likewise, accelerated productivity growth in grains and livestock leads only to a 2.1 percent of increase in per capita agricultural income by 2015 as depressed agricultural output prices reduce farmer income gains of productivity growth, although total GDP

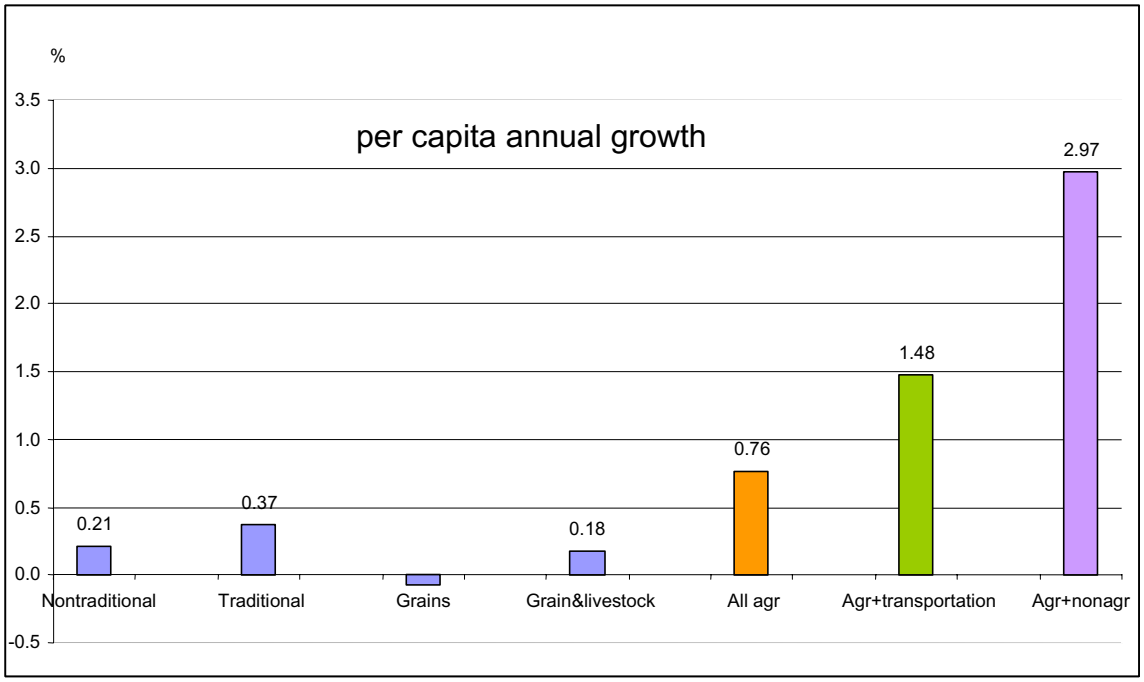
[44] Note that the endogenous GDP growth rate in the CGE model is derived from an assumed 4 percent increase in the TFP growth rate for the selected agricultural and non-agricultural sectors with a constant (per capita) capital stock. Historically, rapid GDP growth (e.g., 6-8 percent annual growth in East Asia during 1970 to 1997 and 8-10 percent growth in China in the past two decades) has been associated with rapid growth in capital investment. Growth in total factor productivity is closely associated with foreign capital investment.

increases by 2.5 percent in the same period. Consumers gain, however, from a fall in food prices and total food consumption increases by 15 percent per capita, (a 1.2 percent per capita annual growth rate). Income growth rates are small even with accelerated productivity growth in all of these agricultural sectors, (traditional and non-traditional exports, grain, and livestock): annual growth rates of real per capita GDP and per capita agricultural incomes are only 0.32 and 0.71 percent, respectively.

When high growth across agricultural sectors is combined with a more efficient transport sector, both total GDP and agricultural GDP increase sharply: total GDP per capita grows at 0.62 percent and agricultural real income grows at 1.5 percent annually. The time to double an African farmer's income shortens to 25 years, instead of more than 50 years as in the first case. Reducing transaction costs through investment in transport sector, eliminating trade (domestic and regional) barriers and improving market efficiency appear to be critical for achieving African agricultural income growth.

At least as important as increased agricultural productivity and lowering market costs, however, is increased productivity and output of the non-agricultural sectors. Since domestic demand of cereal and livestock products far exceed internationally traded quantities, increased market demand for food crops and livestock products also reflects the growth in the incomes generated from non-food agricultural and non-agricultural activities. Some of the growth in non-agricultural productivity can be spurred by growth linkages, including those deriving from additional farm household spending of higher agricultural income. Simulation results suggest that, combined with non-agricultural productivity growth, per capita agricultural real income can grow at 2.97 percent annually, which implies that the time to double an African farmer's income shortens to 13 years. Agricultural can thus indeed serve as an engine of income growth when it is linked to the economy-wide growth (Figure 3).

Figure 3—Impact of TFP growth on agricultural real income



Source: IFPRI CGE simulations.

5. CONCLUSIONS[45]

This paper has addressed two major questions. First, how constraining will demand be for future agricultural growth in Africa? Second, under realistic scenarios of productivity growth, which agricultural sub-sectors (e.g., traditional exports, non-traditional exports, cereals, and livestock) have the best potential for raising real incomes and increasing food consumption?

Our analysis suggests that demand need not constrain rapid agricultural growth, particularly for non-traditional exports. Given small current levels of production and a minute share of world trade, non-traditional export agriculture (including fish in some countries) offers perhaps the most promising opportunities for growth. Nonetheless, to a large extent, non-traditional exports consist of numerous products that are targeted to niche markets. Some countries have achieved notable success (e.g., Kenya's horticultural

[45] This chapter was written by Xinshen Diao and Paul Dorosh.

product exports), but this success may not be so easily replicated, particularly where macroeconomic or political instability make private investment in export activities highly risky. Moreover, even under optimistic assumptions about productivity growth in non-traditional export crops, (i.e., 6.0 percent annual growth of sector's TFP through 2015, equivalent to the growth rate of Kenya's non-traditional exports during the 1990s), simulations with a CGE model suggest that acceleration of growth in this sector alone will have only a tiny effect on real GDP growth (potentially raising SSA per capita GDP by only about 0.05 percent per year).

Traditional export crops face more severe demand constraints on the world market, given SSA's relatively large trade share (12 percent of total world cocoa, coffee, cotton, tea, and tobacco exports) and highly variable world prices. A recovery of the volume of exports of traditional export crops to historic levels would have only a slightly larger impact on real incomes in 2015 than would rapid growth in non-traditional exports, with the overall gain in SSA real per capita GDP only about 0.06 percent per year. A major reason for the small impact of this increase in traditional exports is that they accounted for only 2.0 percent of total GDP in SSA in 1996-2000. Unfortunately, world prices of these commodities are currently rather low, and a recovery in world prices to levels of the early 1990s is unlikely.

Simultaneous productivity growth in grains and livestock offer more potential for major impacts on food consumption. Raising annual productivity growth to 1.5 percent in cereals alone could raise per capita GDP by 0.05 percent per year. Real prices of grain fall, limiting the effect on agricultural GDP, but benefiting poor consumers. Combined with a 4.0 percent expansion in livestock, increased productivity growth in grains could enable per capita GDP to rise by 0.2 percent per year, but real price declines of grain still limit increases in farm incomes and the overall magnitude of positive growth linkages effects on non-agriculture and overall GDP.

Even with accelerated productivity growth in all of these agricultural sectors, (traditional and non-traditional exports, grain, and livestock), annual growth rates of real per capita GDP and per capita agricultural incomes are only 0.32 and 0.71 percent, respectively. At these slow rates of growth, it would take more than 100 years to double per capita GDP as a whole and more than 50 years to double per capita farm income, far

too long to make a significant contribution toward achieving the goal of eliminating poverty and hunger in Africa in the next 10 to 20 years.

One of the most important mechanisms to achieve significant increases in real incomes and food consumption is not productivity growth in agriculture, however, but reducing transaction costs through investments in marketing infrastructure, (roads and bridges, ports, storage facilities, electricity, etc.) and development of market institutions (e.g., Kherallah et al., 2002).[46] Both IMPACT and CGE simulation results suggest the importance of reduction in marketing costs. In the CGE simulation reduced marketing margins combined with agricultural productivity growth can limit the decline in real producer prices that otherwise might result from increased production (4.4 vs. 7.6 percent). Growth in per capita GDP would rise to 0.6 percent per year. The time to double an African farmer's income shortens to 25 years, instead of more than 50 years as in the first case.

At least as important as increased agricultural productivity and lowering market costs, however, is increased productivity and output of the non-agricultural sectors (Barrett, Reardon and Webb, 2001). Some of the growth in non-agricultural productivity can be spurred by growth linkages, including those deriving from additional farm household spending of higher agricultural incomes.[47] Agriculture can thus serve as an engine of some growth, but economy-wide growth will likely require more than one engine. Simulation results suggest that, combined with non-agricultural productivity growth, agricultural real income can grow at 2.97 percent annually, which implies the time to double an African farmer's income shortens to 13 years. Thus, agriculture can serve as a strong engine of growth only when it combines with non-agricultural growth, which results in significant stimulation of overall growth and increased food consumption.

Two important caveats to the above results, however, should be noted. The analysis presented here has explicitly focused on demand issues and has assumed that agricultural supply increases can be achieved. This paper has not assessed the technology feasibility of increased agricultural productivity growth. While some agricultural

[46] Withdrawal of the state from African agricultural markets in the 1980s and early 1990s has generally not led to efficient private markets. Significant efforts are needed to help develop market institutions. See Kherallah et al., 2002.

[47] See Haggblade, Hazell and Brown, 1989; Dorosh and Haggblade, 2003.

scientists and knowledgeable observers are optimistic about technological potential, and some notable successes have been achieved, it is by no means certain that suitable technological packages that are well adapted to diverse local conditions are available, nor that agricultural information services will be effective in disseminating this technology. Moreover, other factors could limit agricultural productivity growth, as well, including severe labor constraints related to widespread HIV/AIDS in some areas, governance problems and civil strife. If rapid agricultural productivity growth should prove not to be feasible, however, the issue of demand constraints may not even arise.

Second, this analysis has not considered impacts of various alternative productivity shocks on income distribution and poverty. Though the simulations presented here provide information on the effects on labor earnings, agricultural incomes, and food consumption in aggregate, there are inevitably going to be significant differences in effects for various types of households across countries. Productivity increases in grains and other major food staples, in particular, are likely to have larger effects on poverty and food consumption than on total GDP. Given that reduction in poverty and hunger is a major development objective, the analysis should be extended beyond consideration of impacts on economic growth and aggregate consumption.

IMPLICATIONS FOR AN AGRICULTURAL DEVELOPMENT STRATEGY

The structure of agriculture, the potential for agricultural exports, and many other economic and political factors vary enormously across countries in SSA. This paper (particularly the simulations of alternative growth scenarios) has focused mainly at the regional level, with less emphasis on specific features of individual countries. Further work is needed at the country level to assess the potential of alternative agricultural development strategies. Nonetheless, the results presented here have clear implications for the design of agricultural development and long-term food security strategies.

First, overall demand constraints need not constrain agricultural productivity growth for non-traditional exports in the medium-term. There is also some scope for increased effective demand for food grains, especially in conjunction with programs that expand the livestock sector. Trade restrictions and domestic pricing policies are

particularly important, and better regional integration of regional markets could provide important outlets for increased grain production in some countries.

Second, there is a high payoff to reducing transaction costs in agricultural markets. In the short-run, rapid increases in agricultural production can lead to sharp price declines where markets are thin and under-developed. Reduced marketing costs are crucial to reducing consumer food prices, while raising producer incomes in the longer run as well. Operationally, public investments in marketing infrastructure (roads, electricity, telecommunications) involve tough choices and will require rigorous cost-benefit analysis to assess priorities for investment across regions (e.g., near urban centers and ports to promote international trade versus building roads in more isolated areas) and types of investment (e.g., building feeder roads versus main roads). Policy frameworks that encourage private investments in cold storage and agricultural processing activities are also needed. Thus, well-designed investments in infrastructure and policy reforms that lead to reductions in transaction costs have the potential to benefit a wide spectrum of agricultural (and non-agricultural) activities, and avoid the problem of requiring the government to pick "winners" among competing crops or agricultural activities.

Finally, without growth in the non-agricultural sector, gains in overall incomes and calorie consumption for SSA as a whole will be limited. Thus, investments in agriculture and other efforts to promote higher agricultural productivity growth need to be complemented with policies and investments to spur non-agricultural growth. Moreover, investments in rural infrastructure can help to maximize positive linkage effects of agricultural growth. Agricultural growth can play a major role in increasing food production, but sustained increases in incomes and reductions in poverty are likely to require a combination of labor-intensive growth in both agricultural and non-agricultural activities.

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APPENDIX I: APPENDIX TABLES

Appendix I Table 1— East African major agricultural export commodities – 1996- 2000 annual average

			(1) E. Africa to the world		(2) E. Africa to SSA		(3) E. Africa to E. Africa		Share of intra-regional trade
		Rank*	Value (Million $US)	Share in (1) (%)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Share in (3) (%)	(2)/(1) (%)
Staples	Livestock	*9*	111	2.5	2	0.4	1	0.3	1.4
	Other cereals	*15*	50	1.1	28	7.9	26	8.8	55.7
	Beans	*16*	44	1.0	13	3.6	11	3.6	28.9
	Meat	*17*	38	0.8	4	1.1	3	1.1	10.0
	Maize	*18*	30	0.7	27	7.7	19	6.4	90.0
	Cassava	*28*	0	0.0	0	0.0	0	0.0	7.0
	Sub-Total		**274**	**6.1**	**73**	**20.6**	**61**	**20.3**	**26.9**
Non-traditional	Fish	*3*	474	10.5	13	3.6	6	2.1	2.7
	Miscellaneous	*4*	342	7.6	49	13.8	48	15.9	14.4
	Vegetable&fruits	*5*	330	7.3	15	4.3	13	4.3	4.6
	Oilseeds	*7*	162	3.6	3	0.9	3	0.9	1.9
	Oils and fat	*12*	87	1.9	34	9.5	33	11.1	39.1
	Processed food	*22*	19	0.4	17	4.9	17	5.7	90.3
	Beverages	*24*	11	0.2	8	2.3	8	2.6	77.3
	Sub-Total		**1,426**	**31.7**	**140**	**39.2**	**128**	**42.6**	**9.8**
Traditional	Coffee green	*1*	1,406	31.3	35	9.7	25	8.2	2.5
	Tea	*2*	524	11.6	38	10.7	34	11.2	7.3
	Cotton	*6*	226	5.0	11	3.2	7	2.4	5.0
	Tobacco	*11*	100	2.2	10	2.7	3	1.0	9.5
	Cashew nuts	*13*	81	1.8	0	0.0	0	0.0	0.2
	Sugar	*14*	80	1.8	17	4.9	17	5.7	21.7
	Other fibers	*19*	30	0.7	1	0.3	0	0.0	3.9
	Cocoa bean	*24*	13	0.3	0	0.0	0	0.0	0.1
	Other nuts	*27*	7	0.2	0	0.0	0	0.0	1.2
	Sub-Total		**2,467**	**54.9**	**112**	**31.5**	**86**	**28.6**	**4.6**
Others	Animal skin	*8*	159	3.5	3	0.7	1	0.3	1.6
	Spices	*10*	110	2.5	2	0.4	1	0.3	1.4
	Feed stuff	*20*	24	0.5	4	1.0	1	0.4	15.3
	Cigarettes	*21*	20	0.5	18	5.1	18	5.9	89.9
	Coffee roasted	*23*	14	0.3	3	0.9	3	1.1	23.5
	Processed cocoa	*26*	2	0.0	1	0.4	1	0.4	78.8
	Sub-Total		**330**	**7.3**	**31**	**8.6**	**26**	**8.5**	**9.3**
TOTAL			**4,496**		**357**		**300**		**7.9**

* By share in East African total agricultural exports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural exports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 2—East African major agricultural import commodities – 1996-2000 annual average

		Rank*	(1) E. Africa from the world		(2) E. Africa from SSA		(3) E. Africa to E. Africa		Share of intra-regional trade
			Value (Million $US)	Share in (1) (%)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Share in (3) (%)	(2)/(1) (%)
Staples	Other cereals	*1*	621	29.0	56	11.0	26	8.8	9.0
	Meat	*4*	148	6.9	17	3.2	3	1.1	11.1
	Maize	*5*	113	5.3	67	13.0	19	6.4	59.1
	Beans	*12*	53	2.5	11	2.2	11	3.6	21.0
	Livestock	*23*	5	0.2	1	0.3	1	0.3	30.0
	Cassava	*28*	0	0.0	0	0.0	0	0.0	99.4
	Sub-Total		**941**	**43.9**	**152**	**29.8**	**61**	**20.3**	**16.2**
Non-traditional	Oils and fat	*2*	406	18.9	46	8.9	33	11.1	11.2
	Processed food	*6*	112	5.2	28	5.5	17	5.7	25.3
	Miscellaneous	*7*	81	3.8	50	9.8	48	15.9	61.5
	Vegetable&fruits	*8*	76	3.5	24	4.7	13	4.3	31.7
	Fish	*9*	70	3.2	12	2.4	6	2.1	17.4
	Beverages	*10*	68	3.2	23	4.6	8	2.6	34.6
	Oilseeds	*19*	8	0.4	4	0.8	3	0.9	50.2
	Sub-Total		**820**	**38.3**	**187**	**36.6**	**128**	**42.6**	**22.8**
Traditional	Sugar	*3*	185	8.6	60	11.7	17	5.7	32.4
	Tea	*13*	42	1.9	35	6.8	34	11.2	83.2
	Coffee green	*14*	27	1.3	25	5.0	25	8.2	92.3
	Cotton	*17*	10	0.5	9	1.8	7	2.4	86.3
	Tobacco	*16*	14	0.7	8	1.5	3	1.0	54.6
	Other fibers	*21*	5	0.2	0	0.0	0	0.0	4.5
	Other nuts	*25*	1	0.0	0	0.0	0	0.0	12.2
	Cocoa bean	*26*	0	0.0	0	0.0	0	0.0	12.3
	Cashew nuts	*27*	0	0.0	0	0.0	0	0.0	19.2
	Sub-Total		**285**	**13.3**	**137**	**26.8**	**86**	**28.6**	**48.1**
Others	Cigarettes	*11*	57	2.6	23	4.4	18	5.9	39.9
	Feed stuff	*15*	17	0.8	3	0.5	1	0.4	16.6
	Processed cocoa	*18*	10	0.5	3	0.6	1	0.4	29.8
	Coffee roasted	*20*	7	0.3	4	0.7	3	1.1	57.4
	Spices	*22*	5	0.2	1	0.3	1	0.3	26.0
	Animal skin	*24*	3	0.1	1	0.2	1	0.3	40.1
	Sub-Total		**98**	**4.6**	**35**	**6.8**	**26**	**8.5**	**35.4**
TOTAL			**2,143**		**511**		**300**		**23.8**

* By share in East African total agricultural imports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural imports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 3—West African major agricultural export commodities – 1996-2000 annual average

			(1) W. Africa to the world		(2) W. Africa to SSA		(3) W. Africa to W. Africa		Share of intra-regional trade
		Rank*	Value (Million $US)	Share in (1) (%)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Share in (3) (%)	(2)/(1) (%)
Staples	Other cereals	*16*	23	0.3	19	4.5	19	5.1	82.3
	Meat	*19*	15	0.2	10	2.2	9	2.5	64.9
	Livestock	*21*	10	0.1	10	2.2	10	2.6	98.3
	Maize	*25*	2	0.0	2	0.5	2	0.5	88.7
	Cassava	*26*	2	0.0	0	0.0	0	0.0	0.4
	Beans	*28*	1	0.0	1	0.2	1	0.2	67.2
	Sub-Total		**52**	**0.7**	**41**	**9.6**	**40**	**11.0**	**79.8**
Non-traditional	Fish	*2*	1,122	15.8	136	31.5	135	37.1	12.1
	Vegetable&fruits	*4*	551	7.8	11	2.6	11	3.0	2.0
	Oils and fat	*7*	195	2.8	45	10.4	44	12.2	23.0
	Miscellaneous	*8*	172	2.4	15	3.5	1	0.4	8.9
	Oilseeds	*11*	82	1.2	6	1.5	5	1.4	7.7
	Processed food	*14*	62	0.9	32	7.4	31	8.6	51.5
	Beverages	*20*	12	0.2	7	1.7	7	1.9	59.6
	Sub-Total		**2,194**	**31.0**	**252**	**58.6**	**234**	**64.5**	**11.5**
Traditional	Cocoa bean	*1*	2,321	32.8	9	2.0	1	0.4	0.4
	Cotton	*3*	1,028	14.5	57	13.2	30	8.1	5.5
	Coffee green	*5*	534	7.5	3	0.6	1	0.4	0.5
	Cashew nuts	*10*	102	1.4	1	0.1	0	0.1	0.6
	Sugar	*15*	53	0.8	11	2.7	11	3.0	21.5
	Other nuts	*17*	22	0.3	6	1.3	5	1.4	25.2
	Tobacco	*22*	8	0.1	1	0.3	1	0.4	17.4
	Tea	*24*	3	0.0	1	0.3	1	0.3	49.1
	Other fibers	*27*	1	0.0	0	0.0	0	0.1	14.2
	Sub-Total		**4,072**	**57.5**	**89**	**20.6**	**51**	**14.1**	**2.2**
Others	Processed cocoa	*6*	450	6.3	10	2.4	2	0.5	2.3
	Animal skin	*9*	144	2.0	2	0.4	2	0.5	1.2
	Coffee roasted	*12*	78	1.1	17	4.0	17	4.6	22.1
	Feed stuffs	*13*	70	1.0	6	1.5	5	1.3	9.2
	Cigarettes	*18*	18	0.3	12	2.9	12	3.3	68.1
	Spices	*23*	6	0.1	0	0.1	0	0.1	7.6
	Sub-Total		**765**	**10.8**	**48**	**11.2**	**38**	**10.4**	**6.3**
TOTAL			**7,084**		**430**		**363**		**6.1**

* By share in West African total agricultural exports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural exports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 4—West African major agricultural import commodities – 1996-2000 annual average

		Rank*	(1) W. Africa from the world		(2) W. Africa from SSA		(3) W. Africa to W. Africa		Share of intra-regional trade
			Value (Million $US)	Share in (1) (%)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Share in (3) (%)	(2)/(1) (%)
Staples	Other cereals	*1*	1,306	29.4	26	5.8	19	5.1	2.0
	Meat	*3*	543	12.2	15	3.5	9	2.5	2.8
	Maize	*16*	21	0.5	5	1.1	2	0.5	23.0
	Livestock	*17*	15	0.3	10	2.2	10	2.6	64.4
	Beans	*20*	11	0.3	1	0.3	1	0.2	10.2
	Cassava	*28*	0	0.0	0	0.0	0	0.0	90.0
	Sub-Total		**1,897**	**42.8**	**57**	**12.8**	**40**	**11.0**	**3.0**
Non-traditional	Fish	*2*	545	12.3	157	35.3	135	37.1	28.8
	Oils and fat	*5*	347	7.8	46	10.3	44	12.2	13.2
	Processed food	*6*	288	6.5	34	7.7	31	8.6	11.9
	Vegetable&fruits	*8*	173	3.9	17	3.9	11	3.0	10.1
	Beverages	*9*	152	3.4	10	2.3	7	1.9	6.7
	Miscellaneous	*10*	71	1.6	3	0.7	1	0.4	4.4
	Oilseeds	*19*	12	0.3	5	1.2	5	1.4	44.4
	Sub-Total		**1,588**	**35.8**	**273**	**61.5**	**234**	**64.5**	**17.2**
Traditional	Sugar	*4*	485	10.9	19	4.4	11	3.0	4.0
	Tea	*11*	59	1.3	4	0.8	1	0.3	6.2
	Tobacco	*12*	50	1.1	4	0.9	1	0.4	8.3
	Cotton	*14*	39	0.9	30	6.8	30	8.1	76.2
	Coffee green	*21*	10	0.2	7	1.5	1	0.4	65.7
	Other fibers	*24*	9	0.2	0	0.1	0	0.1	4.3
	Other nuts	*25*	6	0.1	5	1.1	5	1.4	89.0
	Cocoa bean	*26*	4	0.1	1	0.3	1	0.4	31.1
	Cashew nuts	*27*	1	0.0	0	0.1	0	0.1	80.5
	Sub-Total		**663**	**14.9**	**71**	**16.1**	**51**	**14.1**	**10.8**
Others	Cigarettes	*7*	182	4.1	15	3.4	12	3.3	8.3
	Coffee roasted	*13*	48	1.1	17	3.9	17	4.6	35.9
	Feed stuff	*15*	28	0.6	6	1.3	5	1.3	20.2
	Processed cocoa	*18*	12	0.3	2	0.5	2	0.5	19.4
	Spices	*22*	10	0.2	0	0.1	0	0.1	4.8
	Animal skin	*23*	9	0.2	2	0.4	2	0.5	20.1
	Sub-Total		**289**	**6.5**	**43**	**9.6**	**38**	**10.4**	**14.8**
TOTAL			**4,437**		**444**		**363**		**10.0**

* By share in West African total agricultural imports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural imports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 5—Southern African major agricultural export commodities – 1996-2000 annual average

			(1) southern Africa to the world	(2) S. Africa excluding SACU to the world		(3) S. Africa to SSA	(4) S. Africa excluding SACU to SSA		(5) S. Africa to S. Africa		Share of intra-regional trade
		Rank*	Value (Million $US)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	(Million $US)	Share in (4) (%)	Value (Million $US)	Share in (5) (%)	(3)/(1) (%)
Staples	Meat	*7*	287	65	2.6	80	18	5.3	62	7.9	28.0
	Maize	*10*	258	37	1.5	120	30	9.0	70	9.0	46.5
	Other cereals	*11*	143	37	1.5	112	34	10.0	76	9.8	78.0
	Livestock	*19*	16	8	0.3	11	6	1.6	11	1.4	70.6
	Beans	*21*	13	6	0.2	8	2	0.7	7	0.9	58.5
	Cassava	*27*	0	0	0.0	0	0	0.0	0	0.0	1.9
	Sub-Total		**718**	**153**	**6.2**	**331**	**90**	**26.6**	**226**	**29.0**	**46.1**
Non-traditional	Fish	*3*	777	228	9.3	48	11	3.3	23	2.9	6.2
	Miscellaneous	*5*	266	96	3.9	16	4	1.2	12	1.6	6.0
	Vegetable&fruits	*6*	1,520	78	3.2	100	10	3.0	82	10.6	6.6
	Oilseeds	*15*	67	23	0.9	21	14	4.2	19	2.5	31.0
	Processed food	*18*	74	10	0.4	54	9	2.6	40	5.2	73.6
	Oils and fat	*20*	95	7	0.3	57	6	1.8	44	5.7	60.3
	Beverages	*22*	298	7	0.3	70	5	1.6	52	6.6	23.5
	Sub-Total		**3,096**	**450**	**18**	**366**	**60**	**18**	**273**	**35.1**	**11.8**
Traditional	Tobacco	*1*	973	943	38.4	54	45	13.2	46	5.9	5.5
	Sugar	*2*	933	491	20.0	121	46	13.6	70	9.0	12.9
	Cotton	*4*	211	186	7.6	48	47	14.1	47	6.0	22.9
	Tea	*8*	99	51	2.1	15	11	3.3	13	1.7	15.3
	Coffee green	*9*	63	49	2.0	5	3	1.0	4	0.6	7.2
	Cashew nuts	*12*	35	35	1.4	1	1	0.3	1	0.2	3.4
	Other nuts	*23*	14	3	0.1	1	0	0.1	1	0.1	5.4
	Other fibers	*25*	217	0	0.0	4	0	0.0	4	0.5	1.8
	Cocoa bean	*28*	1	0	0.0	0	0	0.0	0	0.0	0.8
	Sub-Total		**2,546**	**1,759**	**71.6**	**248**	**154**	**45.6**	**187**	**24.0**	**9.8**
Others	Animal skin	*13*	286	29	1.2	6	3	0.8	6	0.7	2.0
	Feed stuffs	*14*	58	25	1.0	32	16	4.9	30	3.8	55.1
	Spices	*16*	39	22	0.9	6	2	0.6	6	0.7	15.7
	Cigarettes	*17*	62	18	0.7	47	12	3.4	39	5.0	75.7
	Coffee roasted	*24*	6	1	0.0	5	1	0.2	4	0.6	84.8
	Processed cocoa	*26*	22	0	0.0	10	0	0.1	8	1.0	44.6
	Sub-Total		**472**	**96**	**3.9**	**105**	**34**	**10.0**	**92**	**11.9**	**22.3**
TOTAL			**6,832**	**2,457**		**1,051**	**338**		**777**		**15.4**

* By share in southern African (excluding SACU) total agricultural exports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural exports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 6—Southern African major agricultural import commodities – 1996-2000 annual average

			(1) southern Africa from the world	(2) S. Africa excluding SACU from the world		(3) S. Africa from SSA	(4) S. Africa excluding SACU from SSA		(5) S. Africa from S. Africa		Share of intra-regional trade
		Rank*	Value (Million $US)	Value (Million $US)	Share in (2) (%)	Value (Million $US)	Value (Million $US)	Share in (4) (%)	Value (Million $US)	Share in (5) (%)	(3)/(1) (%)
Staples	Other cereals	*1*	645	274	19.7	77	52	9.3	76	9.8	12.0
	Meat	*2*	426	206	14.8	62	43	7.7	62	7.9	14.5
	Maize	*6*	156	90	6.4	78	61	10.9	70	9.0	49.9
	Beans	*15*	53	22	1.6	9	5	1.0	7	0.9	16.8
	Livestock	*18*	20	11	0.8	11	9	1.6	11	1.4	57.4
	Cassava	*28*	0	0	0.0	0	0	0.0	0	0.0	11.7
	Sub-Total		**1,301**	**603**	**43.3**	**237**	**171**	**30.5**	**226**	**29.0**	**18.3**
Non-traditional	Oils and fat	*3*	508	152	10.9	44	37	6.6	44	5.7	8.8
	Beverages	*4*	246	106	7.6	52	43	7.7	52	6.6	21.1
	Vegetable&fruits	*5*	183	103	7.4	84	66	11.8	82	10.6	46.3
	Processed food	*8*	144	71	5.1	41	32	5.6	40	5.2	28.3
	Fish	*9*	143	64	4.6	28	21	3.8	23	2.9	19.3
	Miscellaneous	*12*	178	25	1.8	27	9	1.7	12	1.6	15.4
	Oilseeds	*17*	45	13	0.9	21	11	1.9	19	2.5	46.3
	Sub-Total		**1,446**	**532**	**38.2**	**297**	**219**	**39.1**	**273**	**35.1**	**20.6**
Traditional	Sugar	*7*	124	89	6.4	70	53	9.4	70	9.0	57.0
	Cotton	*11*	90	26	1.9	77	23	4.0	47	6.0	86.0
	Tobacco	*14*	84	23	1.7	52	18	3.2	46	5.9	62.3
	Other fibers	*16*	32	14	1.0	5	4	0.7	4	0.5	14.2
	Tea	*23*	22	4	0.3	16	3	0.6	13	1.7	74.2
	Coffee green	*24*	39	4	0.3	10	3	0.6	4	0.6	25.0
	Other nuts	*25*	15	2	0.1	1	0	0.1	1	0.1	8.4
	Cashew nuts	*26*	3	0	0.0	1	0	0.0	1	0.2	48.9
	Cocoa bean	*27*	8	0	0.0	7	0	0.0	0	0.0	97.6
	Sub-Total		**417**	**162**	**11.6**	**241**	**104**	**18.6**	**187**	**24.0**	**57.8**
Others	Cigarettes	*10*	61	41	2.9	40	37	6.6	39	5.0	65.1
	Feed stuffs	*13*	184	24	1.7	34	13	2.3	30	3.8	18.2
	Processed cocoa	*19*	37	11	0.8	16	7	1.2	8	1.0	42.3
	Animal skin	*20*	116	9	0.7	7	3	0.5	6	0.7	6.2
	Spices	*21*	25	6	0.4	6	4	0.6	6	0.7	25.1
	Coffee roasted	*22*	12	6	0.4	5	4	0.7	4	0.6	36.4
	Sub-Total		**437**	**96**	**6.9**	**107**	**66**	**11.9**	**92**	**11.9**	**24.6**
TOTAL			**3,600**	**1,393**		**883**	**560**		**777**		**24.5**

* By share in southern African (excluding SACU) total agricultural imports.

Note: Excluding wood products, rubber, and textile exports, which are included in the UN definition of agricultural imports.

Source: UNCOMTRAD rev3, 2002

Appendix I Table 7—Baseline Projection of meat and cereal production, demand and net imports in the four Sub-Saharan African regions

	Production		Demand		Net imports	
	1997	**2015**	**1997**	**2015**	**1997**	**2015**
	1000 mt					
All meat						
Northern SSA	1,648	2,972	1,633	2,834	-12	-138
Central-West SSA	846	1,598	972	1,792	141	193
Southern SSA	914	1,555	893	1,501	16	-55
Eastern SSA	913	1,570	913	1,615	-1	45
All cereals						
Northern SSA	20,532	33,681	22,676	37,796	2,290	4,114
Central-West SSA	9,417	17,222	13,930	23,934	4,519	6,712
Southern SSA	9,779	15,590	12,287	19,270	2,278	3,679
Eastern SSA	8,967	14,503	10,817	17,524	1,315	3,022
Maize						
Northern SSA	3,800	5,633	3,694	5,930	76	297
Central-West SSA	4,725	8,233	4,909	8,245	169	12
Southern SSA	6,638	10,212	7,640	11,862	755	1,650
Eastern SSA	5,672	8,846	6,686	10,698	579	1,852

Calories available per capita per day		
	1997	**2015**
Northern SSA	2,168	2,272
Central-West SSA	2,186	2,326
Southern SSA	2,029	2,174
Eastern SSA	1,987	2,121

Source: IFPRI IMPACT model simulations.

Appendix I Table 8—Projected annual growth rate of meat, maize and all cereal production, and demand in northern Sub-Saharan Africa

Scenario	Regional demand for			Regional production of			Calories per capita per day
	Meat	Maize	All cereal	Meat	Maize	All cereal	
	Annual growth rate						
1. Baseline	3.11	2.66	2.88	3.33	2.21	2.79	0.26
2. Optimistic	5.72	3.43	4.15	4.11	3.56	4.52	1.43
3. Optimistic plus livestock demand shift	6.40	3.42	4.14	4.14	3.57	4.52	1.51
4. Optimistic plus reducing marketing margins	6.26	3.76	4.48	4.69	3.98	4.84	1.70
5. Optimistic plus livestock demand shift and reducing marketing margins	6.95	3.75	4.47	4.71	3.99	4.85	1.79

Source: IFPRI IMPACT model simulations.
Note: 1. In baseline, GDP growth rate is exogenously set at 3.3%.
2. In optimistic, GDP growth rate is exogenously set at 8.0%.

Appendix I Table 9—Projected annual growth rate of meat, maize and all cereal production, and demand in central and western Sub-Saharan Africa

Scenario	Regional demand for			Regional production of			Calories per capita per day
	Meat	Maize	All cereal	Meat	Maize	All cereal	
	Annual growth rate						
1. Baseline	3.46	2.92	3.05	3.60	3.13	3.41	0.35
2. Optimistic	5.93	4.04	4.42	4.39	5.02	5.39	1.38
3. Optimistic plus livestock demand shift	6.63	4.03	4.41	4.41	5.03	5.39	1.40
4. Optimistic plus reducing marketing margins	6.43	4.36	4.67	4.94	5.47	5.76	1.53
5. Optimistic plus livestock demand shift and reducing marketing margins	7.14	4.34	4.66	4.96	5.48	5.77	1.55

Source: IFPRI IMPACT model simulations.
Note: 1. In baseline, GDP growth rate is exogenously set at 3.8%.
2. In optimistic, GDP growth rate is exogenously set at 8.0%.

Appendix I Table 10—Projected annual growth rate of meat, maize and all cereal production, and demand in southern Sub-Saharan Africa

Scenario	Regional demand for			Regional production of			Calories per capita per day
	Meat	Maize	All cereal	Meat	Maize	All cereal	
	Annual growth rate						
1. Baseline	2.93	2.47	2.53	3.00	2.42	2.62	0.38
2. Optimistic	5.77	3.85	4.07	3.66	3.75	4.08	2.05
3. Optimistic plus livestock demand shift	6.59	3.84	4.06	3.69	3.76	4.09	2.13
4. Optimistic plus reducing marketing margins	6.27	4.20	4.37	4.30	4.26	4.55	2.28
5. Optimistic plus livestock demand shift and reducing marketing margins	7.10	4.19	4.36	4.32	4.27	4.56	2.36

Source: IFPRI IMPACT model simulations.
Note: 1. In baseline, GDP growth rate is exogenously set at 3.2 percent.
2. In optimistic, GDP growth rate is exogenously set at 8.0 percent.

Appendix I Table 11—Projected annual growth rate of meat, maize and all cereal production, and demand in eastern Sub-Saharan Africa

Scenario	Regional demand for			Regional production of			Calories per capita per day
	Meat	Maize	All cereal	Meat	Maize	All cereal	
	Annual growth rate						
1. Baseline	3.22	2.65	2.72	3.06	2.50	2.71	0.36
2. Optimistic	5.87	3.93	4.09	3.76	3.94	4.25	1.59
3. Optimistic plus livestock demand shift	6.66	3.92	4.08	3.79	3.95	4.26	1.64
4. Optimistic plus reducing marketing margins	6.40	4.23	4.37	4.44	4.39	4.67	1.80
5. Optimistic plus livestock demand shift and reducing marketing margins	7.20	4.22	4.36	4.48	4.40	4.67	1.85

Source: IFPRI IMPACT model simulations.
Note: 1. In baseline, GDP growth rate is exogenously set at 3.5 percent.
2. In optimistic, GDP growth rate is exogenously set at 8.0 percent.

Appendix I Table 12—Agricultural growth scenarios: Southern Africa macro results

	GDP	Real agr GDP	Total agr production	Food consumption	Total agr exports	Total agr imports	Level of food price
Scenarios			*---- Per capita annual growth rate ----*				
1. High growth in non-traditional exports	0.03	0.18	0.24	0.11	1.55	0.33	0.07
2. High growth in traditional exports	0.02	0.14	0.12	0.05	0.58	0.30	0.05
3. High growth in grain sector	0.02	-0.07	0.16	0.15	0.08	-0.22	-0.13
4. High growth in grains and livestock	0.16	0.13	1.32	1.14	0.74	-0.70	-0.91
5. High growth in agriculture plus increased TFP in transportation	0.44	1.05	1.98	1.56	3.77	0.86	-0.74
6. High economy-wide growth	1.15	2.24	2.50	2.02	3.85	1.19	-0.35

Source: IFPRI CGE simulations

Appendix I Table 13—Agricultural growth scenarios: Mozambique macro results

	GDP	Real agr GDP	Total agr production	Food consumption	Total agr exports	Total agr imports	Level of food price
			---- Per capita annual growth rate ----				
Scenarios							
1. High growth in non-traditional exports	0.22	0.66	0.84	0.18	6.06	1.44	0.94
2. High growth in traditional exports	0.05	0.17	0.50	0.04	3.10	0.62	0.32
3. High growth in grain sector	0.11	0.06	0.35	0.33	0.08	-0.36	-0.28
4. High growth in grains and livestock	0.30	0.39	1.41	1.11	0.35	-0.67	-0.57
5. High growth in agriculture plus increased TFP in transportation	0.88	1.63	2.58	1.47	8.44	3.10	0.89
6. High economy-wide growth	2.16	3.33	3.09	1.75	9.14	3.50	1.53

Source: IFPRI CGE simulations

Appendix I Table 14—Agricultural growth scenarios: Uganda macro results

	GDP	Real agr GDP	Total agr production	Food consumption	Total agr exports	Total agr imports	Level of Food Price
			---- Per capita annual growth rate ----				
Scenarios							
1. High growth in non-traditional exports	0.11	0.12	0.14	0.08	1.34	0.39	0.14
2. High growth in traditional exports	0.16	0.22	0.52	0.06	4.64	-0.02	0.32
3. High growth in grain sector	0.09	0.06	0.18	0.18	-0.07	0.00	-0.09
4. High growth in grains and livestock	0.42	0.55	1.19	1.35	-0.21	0.00	-0.32
5. High growth in agriculture plus increased TFP in transportation	0.91	1.40	1.91	1.44	6.45	-0.03	0.79
6. High economy-wide growth	1.38	1.99	1.95	1.48	5.79	-0.03	1.72

Source: IFPRI CGE simulations

Appendix I Table 15—Agricultural growth scenarios: Southern Africa sector results

	Output	Consumer demand	Exports	Imports	Level of price
Scenarios		*---- Per capita annual growth rate ----*			
1. High growth in non-traditional exports					
Vegetables and fruits	4.6		9.0		-1.2
2. High growth in traditional exports					
Cotton, sugar & tree crops	0.7		1.4		-0.2
3. High growth in grain sector					
Coarse grains (maize)	0.8	0.9	0.3	-2.3	-1.0
4. High growth in grains and livestock					
Livestock and products	2.3	2.0	5.9	-2.5	-1.7
5. High growth in agriculture plus increased in TFP in transportation sector					
Vegetables and fruits	5.3		10.2		-1.2
Cotton, sugar & tree crops	1.1		1.7		-0.1
Coarse grains (maize)	1.3	1.2	3.7	1.8	-0.5
Livestock and products	2.5	2.3	5.9	-1.4	-1.6
6. High economy-wide growth					
Vegetables and fruits	5.0		9.1		-1.1
Cotton, sugar & tree crops	2.0		2.5		0.0
Coarse grains (maize)	1.9	1.7	4.6	2.3	0.0
Livestock and products	3.0	2.7	5.7	-0.9	-1.4

Source: IFPRI CGE simulations

Appendix I Table 16—Agricultural growth scenarios: Mozambique sector results

	Output	Consumer demand	Exports	Imports	Level of Price
Scenarios	---- *Per capita annual growth rate* ----				
1. High growth in non-traditional exports					
Vegetables and fruits	17.9		20.3		-3.7
2. High growth in traditional exports					
Cotton, sugar & tree crops	14.2		16.0		-3.0
3. High growth in grain sector					
Maize	1.3	1.2	1.4	-2.5	-1.4
4. High growth in grains and livestock					
Livestock and products	5.3	5.2	7.9	-3.5	-3.6
5. High growth in agriculture plus increased in TFP in transportation sector					
Vegetables and fruits	18.9		21.4		-3.1
Cotton, sugar & tree crops	10.2		11.7		-2.0
Maize	0.7	1.4	2.4	7.0	0.2
Livestock and products	5.4	5.5	5.8	0.4	-2.1
6. High economy-wide growth					
Vegetables and fruits	18.4		20.8		-3.0
Cotton, sugar & tree crops	12.5		13.8		-2.2
Maize	1.1	1.8	2.4	8.6	0.8
Livestock and products	5.9	5.8	8.6	0.3	-1.4

Source: IFPRI CGE simulations

Appendix I Table 17—Agricultural growth scenarios: Uganda sector results

	Output	Consumer Demand	Exports	Imports	Level of Price
Scenarios		*---- Per capita annual growth rate ----*			
1. High growth in non-traditional exports					
Vegetables and fruits	20.0		28.5		-5.4
2. High growth in traditional exports					
Cotton, sugar & tree crops	5.6		5.6		-2.6
3. High growth in grain sector					
Maize	1.2	1.2	1.5	-7.1	-1.4
4. High growth in grains and livestock					
Livestock and products	6.2	6.1	14.9	-5.8	-3.7
5. High growth in agriculture plus increased in TFP in transportation sector					
Vegetables and fruits	14.3		20.8		-4.2
Cotton, sugar & tree crops	6.4		6.4		-0.3
Maize	0.8	1.2	2.3	10.5	0.0
Livestock and products	6.0	6.2	8.4	1.4	-1.7
6. High economy-wide growth					
Vegetables and fruits	12.8		18.4		-3.4
Cotton, sugar & tree crops	5.9		5.9		0.1
Maize	1.0	1.3	2.0	12.1	0.8
Livestock and products	6.1	6.2	6.9	1.8	-1.3

Source: IFPRI CGE simulations

APPENDIX II: COUNTRY CASE STUDIES[48]

A.1. AGRICULTURAL EXPORT PERFORMANCE OF MOZAMBIQUE: 1981-2000

Since the end of the civil war in 1992, Mozambique has embarked on a series of impressive changes. The government initiated reforms in the civil sector and in structural policies, and capacity building in the area of macroeconomic policy. With control over inflation since 1996, the country was able to record a remarkable rate of economic growth until 1999. Between 1994-96 and 1998-2000, the average annual growth of GDP was 6.35 percent. The average export growth during the same period was about 12.65 percent. The main source of economic growth was the post-civil war recovery of smallholder agriculture, as well as the expansion of the service sector (Berthelemy et al., 2002). The development process of Mozambique has proved vulnerable to natural disasters, however. A catastrophic flood hit the southern and central parts of the country in 2000 and the northern part in 2001. As a consequence, the growth of GDP slowed down to 1.6 percent in 2000, and export growth to 1.4 percent (Appendix II table 1).

In terms of GDP, agriculture is the most important economic sector of Mozambique. The sector comprises a large smallholder sector that generates around 95 percent of value-added in agriculture. The smallholder sector accounts for nearly one-half of the total production by volume, particularly in basic foods where the share is 78 percent (IMF Staff Team). Smallholders are also important in the production of export crops, particularly cashew nuts and cotton. Excluding sugar, almost three quarters of export crops are produced by smallholders (IMF Staff Team, 2001).

[48] Appendix II was written by Shaikh Mahfuzur Rahman.

Appendix II Table 1—Agricultural exports from Mozambique, 1981-2000

	Average 1981-83	% of Total	Average 1990-92	% of Total	Average 1994-96	% of Total	Average 1998-2000	% of Total
Population (mill.)	12.74		14.42		15.82		17.32	
GDP (constant 1995 US$, mill.)	1841.91		1975.31		2333.75		3267.52	
GDP per capita (constant 1995 US$)	144.54		136.98		147.49		188.66	
GDP growth (annual %)	..		-0.59		1.86		6.35	
Exports (constant 1995 US$, mill.)	233.85		216.70		370.53		596.59	
Exports (% of GDP)	12.70		10.97		15.88		18.26	
Agr. val. added (const. 1995 US$, mill)	651.61		704.91		794.02		1089.54	
Agriculture, value added (% of GDP)	35.38		35.69		34.02		33.34	
Agricultural Exports								
Value (real[a] mill. US$)	205.97		121.42		130.59		126.99	
% of GDP	11.18		6.15		5.60		3.89	
% of Total exports	88.08		56.03		35.24		21.29	
% of SSA agricultural exports[b].	1.71		1.19		0.99		0.98	
Traditional (real[a] mill. US$)	55.90	27.1	11.31	9.3	19.11	14.6	11.87	9.3
Tea	25.27	12.3	0.57	0.5	0.23	0.2	0.15	0.1
Textile fibers	30.63	14.9	10.74	8.8	18.74	14.4	11.60	9.1
Food and animals (real[a] mill. US$)	83.06	40.3	35.23	29.0	36.04	27.6	31.84	25.1
Vegetables and fruits	57.44	27.9	21.71	17.9	15.24	11.7	16.57	13.1
Sugar and honey	22.98	11.2	12.73	10.5	19.54	15.0	12.24	9.6
Fish & fish products (real[a] mill. US$)	56.94	27.6	68.27	56.2	69.24	53.0	76.08	59.9
Other (real[a] mill. US$)	10.07	4.9	6.61	5.4	6.21	4.8	7.20	5.7
Total (real[a] mill. US$)	205.97	100.0	121.42	100.0	130.59	100.0	126.99	100.0

Source: World Development Indicators, World Bank, and FAOSTAT.

[a]All values are deflated by U. S. wholesale price index (2000=100) obtained from International Financial Statistics, IMF.

[b]SSA agricultural exports also includes cut flowers, fish and fishery products. However, values of cut flower exports from Kenya, Zimbabwe, Zambia, Uganda, South Africa, Tanzania, Cote d'Ivoire, and Mauritius are added to obtain SSA countries'

Appendix II table 1 shows that during 1998-2000, fish (mainly shrimp and prawn) accounted for about 60 percent of Mozambique's total agricultural export earnings. In real terms, the value of export earnings from fish increased from 57 million US dollars in 1981-83 to 68 million in 1990-92, to 76 million US dollars in 1998-2000. Exports of food and animal products, the second largest agricultural export sub-sector, accounted for 25 percent of the total agricultural export earnings in 1998-2000, of which vegetables and fruits accounted for 13 percent and sugar and honey accounted for 9.6 percent. The value of exports of food and animal products declined from 83 million in 1981-83 to only 32 million US dollars in 1998-2000 as the export values of cashew nuts and sugar declined drastically during the period. The value and share of Mozambique's traditional agricultural exports (mainly cotton and tea) also declined significantly. The increase in the export earnings from fish and fishery products was not sufficient to compensate for the losses in cashew, cotton, and sugar. As a result, the total value of agricultural exports declined from 206 million in 1981-83 to 127 million US dollars in 1998-2000 (Appendix II table 1).

Cashew Nuts

Cashew nuts are a very important sub-sector of the economy of Mozambique, with approximately 27 million trees in the coastal areas, covering around one third of national territory. According to 1999 estimations, about a million smallholder farmers, whose food security partially depends on it, are involved in cashew production, and about 10,000 workers were employed in the processing industries by 1998 (Mole and Weber, 1999). The smallholder farmers are the main cashew nuts producers and contribute around 92% of the production in Cabo-delgado, Nampula, Zambezia, Sofala, Inhambane and Gaza (Freitas and Fatissone, 2001).

In the late 1960s and early 1970s, production of cashew nuts in Mozambique grew rapidly, and the country became the world's largest cashew nuts producer in 1972, with 50.8% of world production (Freitas and Fatissone, 2001). At that time the country exported significant amounts of both raw and processed cashew nuts. Since the latter part of the 1970s, the volume of production had decreased gradually (Appendix II Table 2),

and in 1998 Mozambique contributed only 6.3% of total world production (Freitas and Fatissone, 2001). The decline in production was due to the incidence of the *Oidium Anacardium* disease on existing cashew trees, the lack of mechanisms to control the problem, weak incentives for farmers to invest in new plantings, and the lack of genetically improved seeding materials (Mole and Weber, 1999).

Appendix II Table 2—Producer and export prices of cashew nuts in Nampula, Mozambique, 1996-1999

Years	% of Producer Price Over the Export Price
1996-97	44.8
1997-98	52.0
1998-99	48.3

Source: Mole and Weber (1999).

In 1978, a ban on the export of raw cashew nuts was imposed, and the ban was in place until 1994. Even with the export ban, production constraints in the smallholder sector and in the processing industry persisted. In its 1995 country assistance program, the World Bank laid down a condition that liberalizing the trade in raw cashew nuts was one of the necessary conditions for about $400 million worth of loans. The government yielded, and new measures were taken. The export of raw cashew nuts was again allowed, opening the sector to international trade in an attempt to raise producer prices, and thereby creating some of the required incentives for new plantings and improvement of the existing trees. The ban on the exports of raw cashew nuts was replaced by an export tax of 30-40 percent of the fob price in 1995, which was reduced to 20 percent in 1996 and to 14 percent in 1997 (IMF Staff Team, 2001). These measures confronted the domestic processing industry with its most direct competitor in the world market, the Indian processing industry. The domestic processing industry complained about high producer prices and not being able to compete with their counterpart (the Indian processing industry). Following protests from the domestic industry, a bill titled “Bill for the Cashew Sub-sector Re-industrialization in Mozambique” was proposed in the

parliament of Mozambique. The bill proposed to ban the export of raw cashew nuts, to give priority to first supplying the local processing industry, and to set market prices at the producer level. When the bill was passed in 1999, the export tax was raised again to 18-22 percent and local processors were given the first right to purchase raw nuts. However, in practice, the government has maintained the export tax at 18 percent and refrained from enforcing the first right to purchase (IMF Staff Team, 2001).

The impact of the liberalization has been to stimulate the export of raw nuts to India, and to close down most of Mozambique's own processing factories. As exports of raw cashew nuts resumed, prices both at the producer and wholesaler levels rose in the districts of the Nampula province (Mole and Weber, 1999). Using Agricultural Market Information System data, Mole and Weber (1999) show that producer prices increased from 8 to 15% between 1997/98 and 1998/99 harvest seasons. Moreover, the share of smallholders price in the world price increased from 44.8% in 1996 to 52% in 1997 and to 48.3% in 1998 (Appendix II Table 2). At the industry level, the net impact of liberalization was negative. While some processing plants with high fixed and operating costs were closed down, there was evidence that other plants were restructuring and that there were also new firms entering the industry (Mole and Weber, 1999). Before the liberalization, there were 12 processing firms with a total production capacity of 30,500 tones. In 1997, the number of factories increased to 15 with a production capacity of 54,500 tones. Ultimately, these firms could not survive. Out of 15, only two, both in the northern province of Nampula, are still functioning.

A.2. AGRICULTURAL EXPORT PERFORMANCE OF UGANDA: 1981-2000

On an average, Uganda's GDP grew annually by 7.4 percent and 6.5 percent during the first and the second half of the 1990s, respectively. The share of total exports in the country's GDP averaged about 12 and 15.5 percent respectively during the same periods. For most of the second half of the 1990s, macroeconomic stability was maintained with annual inflation rates below 5 percent per year (Synthesis Report, USAID, 2002). Average income per capita rose from US$254 in 1990-92 to US$341 in 1998-2000 (Appendix II Table 3). The share of agricultural value added in GDP declined

from 56.5 percent in 1981-83 to 40.24 percent in 1998-2000. In real terms, the absolute value of Uganda's agricultural exports declined from 451.4 million in 1981-83 to 409 million US dollars in 1998-2000. As a share of GDP, agricultural exports registered a sharp decline during the past two decades. However, during the 1990s it accounted for a little over 3 percent of the total agricultural exports from SSA (Appendix II Table 3).

Appendix II Table 3 also shows Uganda's agricultural exports by major product categories. By far the most important traditional export crop of Uganda is coffee (96 percent of total agricultural exports in 1981-83 and 77.5 percent in 1998-2000), with the remainder including textile fibers, tea and tobacco. Due to the upsurge in prices during the late 1970s and the early 1980s, the average value of coffee exports from Uganda amounted to 433 million US dollars in 1981-83. However, it experienced a drastic decline during the late 1980s and early 1990s following the price cycle. Despite another upsurge in coffee prices during 1993-96, the export value remained well below that of 1981-83. As the boom disappeared, the export value declined further during 1998-2000.

Compared to that of the early 1990s, the export value of food and animal products (mainly vegetables and fruits) increased more than five times by the mid-1990s. However, the value of exports of vegetables and fruits declined by about 70 percent in 1998-2000, compared to that of 1994-96. Exports of fish and fishery products from Uganda registered a gradual increase during the past decade, from only 5 million in 1990-92, to 34 million US dollars during 1998-2000. Another non-traditional export, hides and skins, also registered a significant increase during the past two decades. From virtually nothing in 1981-83, the export value of hides and skins increased to 5.6 million US dollars in 1990-92, and to 8.1 million US dollars in 1998-2000.

Appendix II Table 3—Agricultural exports from Uganda, 1981-2000

	Average 1981-83	% of Total	Average 1990-92	% of Total	Average 1994-96	% of Total	Average '98-2000	% of Total
Population (mill.)	13.34		16.90		19.22		21.62	
GDP (constant 1995 US$, mill.)	3236.25		4303.18		5731.80		7379.66	
GDP per capita (constant 1995 US$)	242.60		254.63		298.22		341.28	
GDP growth (annual %)	--		3.22		7.43		6.52	
Exports (constant 1995 US$, mill.)	--		389.33		689.97		1147.43	
Exports (% of GDP)	--		9.05		12.04		15.55	
Agr. value added (const. 1995 US$, mill)	1828.12		2207.21		2595.77		2969.63	
Agriculture, value added (% of GDP)	56.49		51.29		45.29		40.24	
Agricultural Exports								
Value (real[a] mill. US$)	451.41		184.94		411.71		408.97	
% of GDP	13.95		4.30		7.18		5.54	
% of Total exports	--		47.50		59.67		35.64	
% of SSA agricultural exports[b].	3.75		1.81		3.12		3.16	
Traditional (real[a] mill. US$)	442.48	98.0	156.09	84.4	300.85	73.1	316.98	77.5
Coffee	433.13	96.0	134.32	72.6	281.45	68.4	249.60	61.0
Food and animals (real[a] mill. US$)	8.93	2.0	9.59	5.2	52.94	12.9	19.33	4.7
Vegetables and fruits	0.00	0.0	4.70	2.5	22.13	5.4	6.27	1.5
Fish & fish products (real[a] mill. US$)	0.00	0.0	4.97	2.7	29.44	7.2	33.99	8.3
Other (real[a] mill. US$)	0.00	0.0	14.29	7.7	28.48	6.9	38.67	9.5
Hides and skins	0.00	0.0	5.57	3.0	10.27	2.5	8.10	2.0
Total (real[a] mill. US$)	451.41	100.0	184.94	100.0	411.71	100.0	408.97	100.0

Source: World Development Indicators, World Bank, and FAOSTAT.

[a]All values are deflated by U. S. wholesale price index (2000=100) obtained from International Financial Statistics, IMF.

[b]SSA agricultural exports also includes cut flowers, fish and fishery products. However, values of cut flower exports from Kenya, Zimbabwe, Zambia, Uganda, South Africa, Tanzania, Cote d'Ivoire, and Mauritius are added to obtain SSA countries' export of cut flowers.

Cut Flowers

Uganda started exporting flowers, mainly roses, in 1993. In 1998, there were nineteen flower farms, all but one growing roses, and the area under flowers was 80 hectors (Dijkstra, 2001).

There is a significant growth potential for export of Ugandan floriculture. Currently, EU floricultural imports are valued at more than US$1 billion in which Uganda has less than 2 percent of market share (USAID, 2002). Because of its abundant supplies of water, lower production cost, and year-round uniform production conditions,

Uganda has distinct competitive advantages over with Kenya, Zimbabwe and Zambia for certain types of roses, garbera?? foliage, tropical flowers, and chrysanthemum plant cuttings (USAID, 2002). However, the growth of Uganda's flower industry has been below the expectation. Following Kenya, the rose growers in Uganda chose the tea hybrids. The tea hybrids grow well in Kenya and fetch high prices in the European markets, but do not flourish in Uganda which is more humid and where night-time temperatures are higher. Compared to the roses grown in Kenya, the Ugandan roses are small, the stems are thinner and the buds have fewer petals (Dijkstra, 2001). As a result, at auctions in the Netherlands, the Ugandan tea hybrid roses get lower prices than anticipated. Another problem of the Ugandan flower industry is the inappropriate handling of flowers at Entebbe airport (Dijkstra, 2001). In 1995 a USAID-funded cold store was built at Entebbe airport but it has remained unused for several reasons. The third and final problem facing the Ugandan flower industry is inadequate cargo space and high airfreight charges. It can be said that Uganda has a bright prospect in exporting flowers if (i) Ugandan rose farmers can make the switch from tea hybrids to sweethearts, (ii) flower handling at Entebbe airport is improved, and (iii) sufficient cargo space is available at competitive rates (Dijkstra, 2001).

Fresh Vegetables and Fruits

Ugandan weather is well suited for growing vegetables and fruits (Dijkstra, 2001). The exports of Uganda's fresh vegetables and fruits have been growing steadily. Between 1995 and 1998, export volumes of fresh produce doubled from approximately 800 to 1,600 metric tons (FAO). In the same period, the value of these exports increased from US$1.9 million to US$6 million (FAO). In 2000, the export earnings from fresh vegetables and fruits amounted to US$7 million. The most important export commodities are matooke, apple banana, hot pepper, chilies, okra, green beans and passion fruit. Others include ginger, avocado, sweet potato, pineapple, sugar cane, mango, yam, papaya, and peas. The prime destination of all fresh produce is the UK where the main importers are British Asians who target the so-called ethnic market. In addition to the UK, Uganda's fresh produce is exported to countries such as the Netherlands, France, Belgium, and Germany. So far Uganda has been maintaining a competitive advantage in

the high value (nutrient value per unit of weight) vegetables and fruits. Uganda's Domestic Resource Cost Ratios (DRC) for producing fresh vegetables and fruits are well below the unity (Dijkstra, 2001). Still the prospect of this sub-sector depends on (i) fierce international competition, (ii) seasonality of supply and demand, (iii) perishability and demand for high quality, and (iv) volatile contract coordination in the supply chain.

Fish and Fish Products

The surface area (69,000 sq. km.) of Lake Victoria is shared by Uganda (45%), Tanzania (49%) and Kenya (6%). Over the past two decades, these three countries have developed into major exporters of Lake Victoria fish, mainly Nile Perch. The fish exporting industry first developed in Kenya, and Uganda and Tanzania have followed the Kenyan example.

The government-owned Uganda Fisheries Enterprise Ltd. first started operation in 1990 (Dijkstra, 2001). By 1996, Uganda had 11 fish processing industries, exporting US$46 million worth of fish and fish products, about 7 percent of Uganda's total exports. Uganda is heavily dependent on the European Union for its fish sales. In 1996, the EU imported 85 percent of Uganda's exported chilled fish products, and 24 percent of its frozen products. The Netherlands, Belgium, and the United Kingdom were the biggest European importers of Ugandan fish. Outside the EU, only Australia and Israel were major consumer markets. This heavy dependency on the European market appeared to be disastrous for Ugandan fish industry as three successive bans on fish export hit the East African Countries in the second half of 1990s.

Learning the lessons from bans on fish exports, most of the fish processors of Uganda have adopted Hazard Analysis and Critical Control Point (HACCP) procedures establishing their own laboratories. FAO and UNIDO are also providing technical supports on sanitary and health requirements for fish exports both through the provision of a central laboratory and upgrading facilities at 18 key landing beaches (USAID, 2002). As a result, Ugandan fish exporters have already started regaining the confidence of the importers.

However, the sustainability of Uganda's fish export is still in question. The optimal harvest of fish is not determined yet because the actual stock of fish in Lake

Victoria and their Natural Carrying Capacity are unknown and the government estimate of the Maximum Sustainable Yield (MSY) is not reliable. As a result, it is very likely that over fishing will exhaust the potential for fish exports soon. Moreover, enforcement of property rights over the fish of Lake Victoria among Uganda, Tanzania and Kenya is another issue.

Hides and Skins

On an average, Uganda produces 1 million cattle hide and 3.4 million goat/sheep skins annually, most of which are exported (Dijkstra). Uganda's exports of hides and skins more than doubled between 1995 and 2000. During the same period, the export value of Uganda's hides and skins increased from US$ 9.92 million to US$ 13.72 million. This is mainly because of the volatile price movements on the international market with a depression in the period of 1998-2000.

Three-fourths of Uganda's export of hides and skins are destined to countries in the Far East with large industries producing cheap footwear for export (Dijkstra). In 1998 Pakistan was the largest importer of Ugandan hides and skins, followed by China. By 1999, China had taken over as the most important trading partner. Within Africa, Kenya is the main importer, where hides and skins are used for leather industry (USAID, 2002). However, Uganda's hides and skins have little demand in the European market as European industries increasingly prefer wet blue (half-finished leather) instead of dried or salted hides and skins. With the exception of 1997, at least 95 percent of exports by weight were raw hides and skins (salted or dried) while the rest consisted of wet blue hides and skins.

Ugandan hides and skins obtain the lowest grades and prices in the international market because of poor quality (USAID, 2002). The Uganda Leather and Allied Industries Association (ULAIA) has estimated that the average loss due to flay damages in Uganda varies between 60 to 80 percent. Lack of skilled manpower is another reason for poor quality leather production (USAID, 2002). Export earnings from hides and skins could be substantially increased through quality improvement alone.

Export Promotion Policies

Over the period 1994/95-1998-99, Uganda's exports performed admirably, growing on an average annual basis in volume terms by about 15.5 percent, with non-coffee exports growing by over 27 percent. This favorable export performance may be attributed to Uganda's market oriented production and marketing base, liberal trade regime, and macroeconomic stability (IMF Staff Country Report No. 99/116).

The Ugandan government has been very pro-active in promoting export growth and diversification. There is no state intervention in production and marketing of goods in Uganda. An open trade regime has been maintained with the rest of the world, contributing to the competitiveness of exports. According to the IMF's 10-point index of overall trade restrictiveness, at present Uganda has a rating of 2. There are no export restrictions in Uganda.

The Uganda Export Promotion Board (UEPB), established in 1996, promotes diversification of Uganda's exports, particularly into high value added products. The UEPB replaced the tedious and cumbersome export licensing system by a system of renewable export certificates, which enabled the holder to export any commodity (not included in the list of restricted items) without any value limitation.

The Uganda Investment Authority (UIA), a "non-stop" investment clearing agency, was established in 1991. The UIA promotes, facilitates and supervise investment in Uganda. It aims to:

i. initiate and support measures that enhance the investment climate,
ii. promote investment,
iii. grant permission for the commencement of new business,
iv. provide and disseminate information on incentives available to the investors,
v. assist new and existing investors by providing support services, and
vi. recommend to the government national policies and programs to promote investment in the country.

For the assistance of the exporters, The Bank of Uganda has established an Export Financing Scheme, Export Guarantee Facility, and an Export Promotion Fund. However, these facilities have not been utilized extensively.

Macroeconomic Policies

In 1991, tax and revenue systems were rationalized by the newly established Uganda Revenue Authority (URA). In the same year, a new law, the Investment Code was passed. Under this code, business enterprises have the benefit of duty exemption on capital and construction materials and are eligible for a subsidy on start-up costs. A simple duty drawback system has been used to reimburse exporters for import duties paid on their inputs (Dijkstra, 2001).

Over the period of 1994/95 –1998/99, the Uganda shilling has depreciated by about 19.4 percent in terms of the U.S. dollar. Uganda's consumer price index (CPI) based real effective exchange rate (REER) vis-à-vis its major trading partners remained relatively stable during 1994/95-1997/98 (International Monetary Fund). This suggests that Uganda's competitiveness remained relatively stable during this period. However, since 1997/98 there has been a market depreciation (IMF Staff Country Report).

A.3. AGRICULTURAL EXPORT PERFORMANCE OF KENYA: 1981-2000

As a whole the Kenyan economy registered a dismal performance in the 1990s. Table 1 shows that the growth rate of Kenya's GDP gradually declined during the past decade. Moreover, it slumped to –0.2 percent in 2000 compared with 1.3 percent in 1999. The decline in economic activity in 2000 was reflected in all the major sectors of the economy. Bad weather conditions, poor international prices of agricultural commodities and poor infrastructure contributed to the decline (Barthelemy et al., 2002). However, Kenya has maintained a liberalized trade and exchange rate regime since 1993 and has progressively reviewed its trade tariffs downwards to the current top rate of 22 percent (Barthelemy et al., 2002). In spite of this, the export sector of Kenya performed poorly during the second half of the past decade. The composition of Kenya's exports of goods has also changed, particularly away from one of its traditional exports, coffee, toward non-traditional products such as horticulture.

Kenya's traditional exports include coffee, tea and crude vegetable materials while non-traditional agricultural exports include food and animal products, fish, and others such as hides and skins and live animals. The values and percent shares of Kenya's

major traditional and non-traditional agricultural exports over the past two decades are presented in the lower half of Appendix II Table 4.

Compared to that of 1981-83, the value of Kenya's traditional agricultural exports decreased significantly by 1990-92. The export earnings from coffee were particularly high during this period because of the price boom. There was another upsurge in coffee prices during 1993-96. As a result, the export value of coffee increased by more than fifty percent by 1994-96. Following the upsurge, there was a sharp decline in coffee prices during the late 1990s. Moreover, production of coffee in Kenya was affected by a drought in 1997. Due to the long growing season for coffee, the effects of drought took place with a lag reflecting declined production in 1999. Consequently, the value of coffee exports as well as its share in total agricultural exports declined significantly in 1998-2000. However, the value of Kenya's traditional exports and its share in the country's total agricultural exports increased during the 1990s as both the value and share of tea exports increased significantly. For tea, the effect of drought was mitigated by high world prices (IMF Staff Team, 2002). The performances of some major non-traditional agricultural exports of Kenya are discussed below.

Horticulture

Large-scale horticultural production in Kenya started during World War II in order to meet the demand for food of the Allied forces stationed in East Africa (McCulloch and Ota, 2002). Since then Kenya's exports of horticultural products grew rapidly. Between 1968 and 1986, the volume of fresh horticultural exports of Kenya rose almost 25-fold (Schapiro and Wainaina, 1991). By 1986 it was the third largest source of foreign exchange among agricultural exports and accounted for over 3 percent of the value of all exports, as against 0.3 percent in 1968 (Schapiro and Wainaina, 1991). In 1990 the value of horticultural exports of Kenya was about US$162 million. By 1998 the value had almost doubled to US$319 million.

Appendix II Table 4—Agricultural exports from Kenya, 1981-2000

	Average 1981-83	% of Total	Average 1990-92	% of Total	Average 1994-96	% of Total	Average 98-2000	% of Total
Population (million)	17.9		24.0		26.7		29.4	
GDP (constant 1995 US$, million)	5908.2		8418.0		9362.0		9849.8	
GDP per capita (constant 1995 US$)	330.1		350.5		350.8		334.9	
GDP growth (annual percent)	--		4.0		2.7		1.3	
Exports (constant 1995 US$, million)	1516.2		2479.4		3074.7		2792.9	
Percent of exports in GDP	25.7		29.5		32.8		28.4	
Agricultural value-added (constant 1995 US$, million)	1856.1		2339.3		2382.9		2562.1	
Percent of agricultural value-added in GDP	31.4		27.8		25.5		26.0	
Agricultural Exports								
Value (real[a] million US$)	852.7		841.5		1251.2		1216.4	
Percent of GDP	14.4		10.0		13.4		12.3	
Percent of total exports	56.2		33.9		40.7		43.6	
Percent of SSA agricultural exports[b]	7.1		8.3		9.5		9.4	
Traditional (real[a] million US$)	613.3	71.9	533.9	63.4	736.3	58.9	768.0	63.1
Coffee	348.5	40.9	182.4	21.7	306.6	24.5	195.0	16.0
Tea	229.6	26.9	322.0	38.3	387.5	31.0	533.5	43.9
Food and animals (real[a] million US$)	167.3	19.6	183.8	21.8	274.2	21.9	250.2	20.6
Vegetables and fruits	104.1	12.2	120.1	14.3	148.9	11.9	174.9	14.4
Sugar and honey	28.4	3.3	12.8	1.5	39.0	3.1	18.8	1.5
Fish & fish products (real[a] million US$)	2.9	0.3	30.4	3.6	45.8	3.7	32.9	2.7
Others (real[a] million US$)	69.3	8.1	93.4	11.1	194.9	15.6	165.3	13.6
Hides and skins	20.3	2.4	4.5	0.5	11.0	0.9	4.9	0.4
Total (real[a] million US$)	852.7	100.0	841.5	100.0	1251.2	100.0	1216.4	100.0

Source: World Development Indicators, World Bank, and FAOSTAT.
[a]All values are deflated by U. S. wholesale price index (2000=100) obtained from International Financial Statistics, IMF.
[b]SSA agricultural exports also include cut flowers, fish and fishery products. However, values of cut flower exports from Kenya, Zimbabwe, Zambia, Uganda, South Africa, Tanzania, Cote d'Ivoire, and Mauritius are added to obtain SSA countries' export of cut flowers.

In 1999 the production as well as export performance of the horticultural products was adversely affected by bad weather conditions. On top of the list of fresh horticultural crops exported annually are cut flowers, tomatoes, French beans, runner beans, snow peas, Asian vegetables, pineapples, mangoes, paw paws and passion fruit, with cut flowers accounting for the largest component. Kenya is now the largest exporter of vegetables and cut flowers to the European Union (Dolan et. al., 2002).

The success of the Kenyan export horticulture industry can be attributed in part to its climate. Kenya's location on the equator enables round the year production of tropical, semitropical, and temperate vegetables and fruits, for which there is a large demand during the winter in Europe (McCulloch and Ota, 2002). In addition, Kenya has an ample supply of underemployed agricultural workers available for labor-intensive horticultural production (Schapiro and Wainaina, 1991).

The Kenyan government recognized the potential of horticultural exports in the 1960s. In 1967 the government established the Horticultural Crops development Authority (HCDA). However, unlike the tea and coffee sub-sectors, the government's intervention was limited. Research and training may be the most important of the government activities. While direct public assistance has been rather small, the government has spent large amounts on improving the infrastructure essential for horticulture exports, including expanding the road network and constructing a new airport in Nairobi (Schapiro and Wainaina, 1991). The major activities of the HCDA have been the licensing of all exporters of horticultural produces, the allocation of air cargo space, the standardization of containers, the establishment of warehouses for smallholders in different areas, the development of marketing information system along with the International Trade Center (ITC), and the guidance of the Ministry of Agriculture's efforts to meet the industry's extension and research needs.

A number of problems must be resolved for horticultural production and exports to continue to rise as rapidly as they have done so far. First, about 25 percent of all produce is currently wasted as a result of storage, packing, transportation, and handling problems (Schapiro and Wainaina, 1991). Second, according to Kenya's Ministry of agriculture, yields of horticultural crops are consistently below their potential. This is mainly due to the lack of proper irrigation, poor crop maintenance, and the use of

inappropriate seeds and fertilizers. Other constraints include crop disease and pest incidence, inadequate technical information at the small-scale farm level, and unpredictable weather conditions. Finally, the overseas markets insisted that fresh horticultural exports re-adjust their regulations on the pesticide Maximum Residue Levels (MRLs) to analytical zero (Kenya Flower Council). The implication is that there will be no tolerance of the residue on produce. This new requirement could be lead to a ban of most of the fresh produce from Kenya if action is not taken as a matter of urgency.

Fresh and Frozen Fish

Along with horticultural products, fish have been recognized as having great potential as an export-oriented sub-sector in Kenya. Kenyan fish exports grew from just under US$ 1 million in 1980 to US$ 50 millions in 1996 (Mitullah, 2000). This remarkable performance was a result of opening of new markets for fresh and frozen fish in developed countries such as the EU. The main export product was Nile perch, which accounted for 88% of exports by volume in 1996, predominantly from lake Victoria (Henson, Brouder, and Mitullah, 2000). However, fish exports from Kenya started declining in 1998. By 1999, the export earnings from fish exports slid down to US$32 million. This was due to three successive bans on fish exports from Kenya, Uganda and Tanzania (Table 8). In January 1997, two people died in Spain after eating fish infected with Salmonella that had been exported from Uganda. Spain immediately imposed a ban on Nile perch from East Africa. The European commission reacted in May by imposing a compulsory check for salmonella on Nile perch from Uganda, Kenya, and Tanzania. By the end of 1997 a cholera epidemic broke out in Kenya, Tanzania, Uganda, and Mozambique as a result of heavy rains caused by El Nino. The EU imposed the second ban on all fish from these four countries. On July 1, 1998 the ban on chilled fish was lifted as the cholera threat was no longer in effect. In March 1999 three Kampala resident died of eating fish suspected of having been caught by poisoning. In March 30 the EU imposed the third ban on all lake Victoria fish. However, after several inspections of the remedial measures taken by the governments of Kenya, Uganda, and Tanzania, the EU lifted the ban by the end of 2000.

Kenya's fish exports were not really affected by the first ban. But, the second and the third ban had a significant effect on exports. During 1998, when exports of fresh fish were prohibited for a period of six months, the volume of exports declined by 29% relative to the 1996 level, while exports to the EU were 69% lower (Henson, Brouder, and Mitullah 1159-69). Similarly, in 1999 total fish exports were 21% lower than in 1996, while exports to the EU were 64% lower (Henson, Brouder, and Mitullah, 2000). However, Kenyan exporters were able to partially offset the impact of the EU restrictions by pursuing alternative markets, in particular Israel, Singapore, Japan, and the United Arab Emirates. Despite this trade diversion, the total value of fish exports was significantly lower in 1998 (26%), 1999 (35%), and 2000 (28%) than in 1996 (Appendix II Table 5).

Appendix II Table 5—Change in Kenya's value of fish exports, 1996-2000

	1996	1997	1998	1999	2000
Value (Million US$)	50.4	52.3	37.3	32.4	36.1
Change (% of 1996)	0.0	3.8	-26.0	-35.7	-28.4

Source: FAO, ITC.

The bans of the EU have had particularly significant impact on exports of fresh fillets, for which it accounts for over 95% of exports and only a few alternative markets exist. Conversely, in the case of frozen fillets, for which the EU accounted for 60% of exports in 1996, the decline in exports to the EU due to the restrictions was progressively offset by increased exports to other markets (Henson, Brouder, and Mitullah, 2000). The sector most immediately affected by the EU's restrictions on exports is fish processing, both in terms of the economic performance of individual companies and the manner in which the sector is organized (Henson, Brouder, and Mitullah, 2000). First, the performance of fish processing companies declined as the processors had little alternative but to switch to the production of frozen fillets. Second, many processors had to invest significant sums to upgrade their processing facilities and to improve their procedures,

i.e. upgrading equipments and laboratories, implementing HACCP (Hazard Analysis Critical Control Points) plans, training of staffs, etc., so as to meet the EU's hygiene requirements, which increased their fixed costs. Third, the fish processing sector has also been forced to invest to improve its supply chain by upgrading cold storage facilities on the landing beaches and routinely providing ice for use by traders and for the transportation of fish to their factories, which increased the variable cost of processing. As a consequence a number of processing plants subsequently suspended operations and some went to receivership.

The restrictions of the EU had a deleterious effect on the fishing community who were directly or indirectly associated with the Lake Victoria fisheries. The closure and/or reduction in output of industrial fish processing plants led to a decline in the supply of skeleton and waste products. This had significant consequences for those individuals, mainly women, who build up a livelihood around the processing of these products (Henson, Brouder, and Mitullah, 2000).

Currently there is no restrictions on fish exports from Kenya. But the sustainability of this sector is still in question as falling fish supplies have been an issue in the Lake Victoria fisheries since the early twentieth century. A number of reasons have been given for the diminishing catch, which include over-fishing, illegal fishing gears and trawlers which destroy nursery grounds, the Nile perch poaching on most small fishes, and water hyacinth weeds spreading and interfering with the water system (Mitullah, 2000).The optimal harvest of fish is not determined yet because the actual stock of fish in Lake Victoria and their Natural Carrying Capacity are unknown and the government estimate of the Maximum Sustainable Yield (MSY) is not reliable. As a result, it is very likely that over fishing would exhaust the potential for fish exports soon. Moreover, enforcement of property rights over the fish of Lake Victoria among Uganda, Tanzania and Kenya is another issue.

APPENDIX III: LIST OF COMMODITIES AND COUNTRIES IN THE FOUR SUB-SAHARAN AFRICAN REGIONS IN THE IMPACT MODEL

Commodity list

1. Maize
2. Wheat
3. Rice
4. Other coarse grain
5. Potatoes
6. Sweet potatoes and yams
7. Cassava and other roots and tubers
8. Soybeans
9. Oilseed meals
10. Vegetable oils
11. Beef
12. Pork
13. Sheep and goat
14. Poultry
15. Eggs
16. Milk

Northern Sub-Saharan Africa

1. Burkina Faso
2. Chad
3. Djibouti
4. Eritrea
5. Ethiopia
6. Mali
7. Mauritania
8. Niger
9. Somalia
10. Sudan

Central and Western Sub-Saharan Africa

1. Benin
2. Cameroon
3. Central African Republic
4. Comoros Island
5. Congo Democratic Republic
6. Congo Republic
7. Gabon
8. Gambia

9. Ghana
10. Guinea
11. Guinea-Bissau
12. Ivory Coast
13. Liberia
14. Sao Tome and Principe
15. Senegal
16. Sierra Leone
17. Togo

Southern Sub-Saharan Africa

1. Angola
2. Botswana
3. Lesotho
4. Madagascar
5. Malawi
6. Mauritius
7. Mozambique
8. Namibia
9. Reunion
10. Swaziland
11. Zambia
12. Zimbabwe

Eastern Sub-Saharan Africa

1. Burundi
2. Kenya
3. Rwanda
4. Tanzania
5. Uganda

Nigeria stands alone as a region in the IMPACT model.

APPENDIX IV: COUNTRY AND SECTOR AGGREGATION IN THE WORLD CGE MODEL

Country/region groups

1. Malawi
2. Mozambique
3. Tanzania
4. Zambia
5. Zimbabwe
6. Uganda
7. Southern African Custom Union
8. Rest of southern Africa
9. Rest of sub-Saharan Africa
10. The United States
11. European Union and European Free Trade Area
12. Other Europe
13. North Africa
14. Asia
15. Rest of world

Sector/commodity groups

1. Paddy rice
2. Wheat
3. Other grains (mainly maize)
4. Exportable vegetables and fruits
5. Domestic vegetables and fruits
6. Oilseeds
7. Sugar cane sugar beet
8. Plant-based fibers (mainly cotton)
9. Exportable other crops (mainly tree crops)
10. Domestic other crops
11. Bovine cattle, sheep, goats, and horses
12. Animal products
13. Raw milk
14. Forestry
15. Fishing
16. Bovine cattle, sheep and goat meat products
17. Other meat products
18. Vegetable oils and fat
19. Dairy products
20. Processed rice

21. Sugar
22. Processed food products
23. Beverages and tobacco products
24. Energy products
25. Minerals
26. Textile and clothing
27. Heavy industrial products
28. Machinery and equipment
29. Electricity, water, and urban utility supply
30. Wholesale and retail trade services
31. Transportation
32. Water and air transportation
33. Other services
34. Public administrative, education, and health services