DSGD DISCUSSION PAPER NO. 2

EXPLORING REGIONAL DYNAMICS IN SUB-SAHARAN AFRICAN AGRICULTURE

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ABSTRACT

Identifying growth poles in the SSA region, strengthening linkages and generating mutual benefits across African countries is an important part of the strategy to promote agriculture-led growth at the Africa-wide scale. Using agricultural trade data, this study focuses on identifying major countries that play important roles in regional agricultural trade and commodities in which African countries have a comparative advantage and where there is potential for more trade within the region.

There are 10 largest traders in the regions either as large agricultural exporters or importers and they seemingly have potential to become growth poles in Africa-wide growth led by promoting agricultural trade. However, at the present, intra-SSA trade only plays a marginal role and that official trade data often significantly underestimate the actual trade flows between countries. In order to avoid historical bias, we focus on the potential trade opportunities by investigating whether a group of commodities in which some countries have a comparative advantage matched with the group of commodities imported by other African countries. We find that foodstuffs are among the most dynamic products in regional agricultural trade, as value of the correlation between the staple good exports and imports is high and doubles over the two observation periods, up from 0.34 in the first period (1990-1995).

Poor infrastructure and institutional barriers are among the major reasons constraining African countries to exploit their comparative advantage and strengthen

their economic linkages. The model simulations show that opening the EU market is strongly in the common interest of African countries. Reducing African countries own trade barriers, both in agriculture and non-agriculture, can significantly increase intra-regional agricultural trade. However, the benefit of the globalization and agricultural trade liberalization to the African countries would be limited by poor market access conditions such as transportation and other infrastructure. Because of these, many African agricultural commodities can hardly reach domestic and regional markets, or be exported to the world. Without improving the efficiency of these non-agricultural sectors that provide critical inputs or services to agricultural production and trade, it is virtually impossible for the countries of SSA to increase their competitiveness in international markets.

EXPLORING REGIONAL DYNAMICS IN SUB-SAHARAN AFRICAN AGRICULTURE[1]

Xinshen Diao[2], and Yukitsugu Yanoma[3]

1. INTRODUCTION

Given the predominant role of agriculture in the livelihoods of most Africans, any strategy for slashing poverty and hunger in Africa must center on rapid growth in the agricultural sector. However, promoting agriculture-led growth at the Africa-wide scale will be difficult to achieve without strengthening linkages and generating mutual benefits across countries. There are also important efficiency gains to be captured from a regional approach. One important example is that greater economic gains might be realized for groups of countries by improving marketing channels across borders in a regionally integrated manner, either through road infrastructure or market information systems, rather than by taking a purely national perspective. Through more integrated and competitive markets, countries can also specialize in those products they have a comparative advantage in, improving economic efficiency and unleashing regional growth dynamics that will ultimately help reduce the incidence of hunger and poverty across the continent.

The purpose in this paper is to help identify a group of countries and a group of commodities that might act as regional growth poles. While other measures are

[1] The authors thank Peter Hazell for providing overall guidance and many helpful suggestions, and Michael John and Jock Anderson for helpful comments, suggestions and English editing. The authors also thank USAID for funding this research as part of IFPRI's analytical support to the U.S. Initiative to End Hunger in Africa (IEHA).
[2] Research Fellow, Markets, Trade and Institution Division, IFPRI.
[3] Senior Research Assistant, Market, Trade and Institution Division, IFPRI.

definitely important for such identification, in this study we focus solely on countries' agricultural trade performance and comparative advantages (or disadvantages) from an agricultural trade point of view. In the following section, we first identify who are large traders in Sub-Saharan Africa (SSA) agriculture, both in exports and imports. We mainly focus on countries' total agricultural trade in this section. We then look further at individual commodity trade and employ the *revealed comparative advantage* index to identify which commodities have strong growth potential in either international trade or trade within SSA. Some commodities are currently traded marginally among the countries in the region. Thus, the surely relevant questions to pose are whether those commodities in which some countries have a comparative advantage match more closely the imports by other countries in the region, and whether there exists potential for future regional trade. In the final analytical section, we will evaluate how trade barriers, including trade distortions in more-developed countries (especially in EU and U.S., which are major SSA export markets), trade barriers among the countries in the region, and high transportation costs, constrain SSA countries in realizing their comparative advantage. We evaluate the possible gains from reducing or eliminating such barriers, based on a series of simulations employing a global CGE model developed at IFPRI.

2. WHO ARE MAJOR TRADERS IN SSA AGRICULTURE?

Regional linkages among SSA countries are mainly through trade flow, trade-related economic activities, e.g., transportation, and movement of labor. Capital flows and intra-regional investment activities have not yet played a critical role in

most regional linkages, given the similar economic development situation among most countries in SSA.[4] To explore the regional dynamics in SSA, it is important to know who are currently major traders in agriculture in the region, as agricultural exports and imports are the most important trade activities for many of these countries. We first focus on the exports.

SIX MAJOR EXPORTERS ACCOUNT FOR MORE THAN 70 PERCENT OF INTRA-SSA AGRICULTURAL TRADE

We selected 33 countries for this study.[5] These 33 countries together accounted for more than 90 percent of SSA total agricultural exports and almost 90 percent of SSA total agricultural imports in 1996-2000. Among the 33 countries, nine are in East Africa, accounting for, respectively, 95 and 86 percent of that region's agricultural exports and imports.[6] 14 are in West Africa similar accounting for 88 and 85 percent of respective regional totals, and 10 are from Southern Africa accounting for 94 and 87 percent of that region's respective totals.[7]

We first group countries according to their shares in SSA and regional agricultural exports in recent years (1996-2000). We define those countries with more than 2 percent of total SSA agricultural exports and more than 10 percent in regional agricultural exports as major SSA agricultural exporters, and the rest as

[4] South African foreign direct investments have significantly increased recently in the region and will be expected to play more important role in regional economic linkages.
[5] The 33 countries are Angola, Benin, Botswana, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. The other 14 more SSA countries are not included due to data constraints, but they are included in the regional total trade.
[6] The regional trade data include trade of those countries not in the study as individual countries.
[7] Due to data constraint, intra-SACU trade is not accounted.

small traders. By such classification, Kenya, Uganda, Tanzania, Ethiopia, and Madagascar are major exporters in East Africa. These five export US$ 3.6 billion agricultural goods each year (1996-2000), and account for more than 80 percent of this region's and 17 percent of SSA agricultural exports (Table 1). There are also five countries, Cote d'Ivoire, Cameroon, Ghana, Nigeria, and Senegal that are major exporters in West Africa. These five export US$ 7.2 billion agricultural goods each year, and account for 75 percent of this region's and 34 percent of SSA agricultural exports (Table 2). There are only two countries, South Africa and Zimbabwe that are major exporters in Southern Africa. These two export US$ 5.5 billion agricultural goods per year, and account for 75 percent of regional and 26 percent of SSA agricultural exports (Table 3). In total these 12 major exporters account for 76 percent of total SSA agricultural exports.

A large trader in total agricultural exports is not necessarily a large trader in intra-regional trade, if its market is mainly outside the region. While an outside market may be important for a country's agricultural development and income growth, it may not contribute much to promoting regional economic growth if the exports do not generate enough linkage effects within region. For this reason, we further group the 33 countries according to whether their exports account for more than 4 percent of total intra-SSA agricultural trade. In general, if a country is a small trader in terms of its export share in total SSA agricultural exports, it is also a small trader in intra-SSA trade. However, we observe an exception – Mauritania. While its total agricultural exports account for only 1.6 percent of SSA total agricultural

exports and 3.5 percent of West African agricultural exports, the country accounts for 5.4 percent of intra-SSA trade, because of the large fish exports to the region.

Among the 12 major agricultural exporters in SSA, there are only five countries, Kenya, Uganda, Cote d'Ivoire, South Africa, and Zimbabwe that are also major exporters in intra-SSA trade. In total these five countries' exports (plus exports of Mauritania) account for more than 70 percent of total intra-SSA agricultural trade, with South Africa ranking at the first with about 34 percent.

With geographical constraints and other economic reasons, intra-SSA trade is mainly intra sub-region's trade (Diao, et al., 2003). For this reason, we further look at which countries are major traders in intra sub-region's agricultural trade. We assume that a country whose agricultural exports to its region account for more than 10 percent of intra-regional agricultural trade is a major exporter in this sense. All the six largest agricultural exporters in SSA (Kenya, Uganda, Cote d'Ivoire, South Africa, Zimbabwe, and Mauritania) are also large exporters in intra-regional trade. Agricultural exports of Kenya and Uganda to East Africa account for 74 percent of intra East African agricultural trade; Cote d'Ivoire's and Mauritania's exports to West Africa account for 42.4 percent of intra West African agricultural trade; and South Africa's and Zimbabwe's exports to Southern Africa account for 84 percent of intra-regional agricultural exports (excluding intra-SACU trade).

Table 1—Large traders in SSA agricultural exports, East Africa

Big exporters in total agricultural trade
(total exports account for more than 2% of SSA total ag exports and more than 10% of sub-region's exports)

	Value million $	% of SSA total	% of sub-region total
Kenya	1,479	6.8	33.2
Uganda	619	2.9	13.9
Tanzania	524	2.4	11.8
Ethiopia	523	2.4	11.8
Madagascar	443	2.1	10.0

Small exporters

	Value million $	% of SSA total	% of sub-region total
Sudan	413	1.9	9.3
Congo, DR	124	0.6	2.8
Somalia	58	0.3	1.3
Rwanda	47	0.2	1.1

Big exporters in intra-SSA agricultural trade
(intra-SSA exports account for more than 4% of SSA intra trade)

	% of SSA intra
Kenya	8.4
Uganda	4.6

Small exporters

	% of SSA intra
Tanzania	1.5
Ethiopia	2.7
Madagdscar	0.7

Small exporters

	% of SSA intra
Sudan	0.1
Congo, DR	0.1
Somalia	0.1
Rwanda	0.1

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Kenya	48.5
Uganda	25.6

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Ethiopia	17.1

Small exporters

	% of sub-region intra
Tanzania	5.9
Madagascar	0.3

Major export commodities in intra-SSA trade
(% of each country's total intra sub-SSA exports)

	Kenya	Uganda	Ethiopia
Maize		10.2	
Vegetable and fruits	8.3		86.1
Oil and fats	14.7		
Processed food	11.0		
Tea	14.5	16.9	
Coffee beans		33.1	
Cigarettes	10.2		

Source: COMTRADE, 2002.

Table 2—Large traders in SSA agricultural exports, West Africa

Big exporters in total agricultural trade
(total exports account for more than 2% of SSA total ag exports or more than 10% of sub-region's exports)

	Value million $	% of SSA total	% of sub-region total
Cote d'Ivoire	3,554	16.5	36.7
Cameroon	1509	7.0	15.6
Ghana	1001	4.6	10.3
Nigeria	723	3.4	7.5
Senegal	422	2.0	4.4

Small exporters

	Value million $	% of SSA total	% of sub-region total
Mauritania	337	1.6	3.5
Benin	244	1.1	2.5
Mali	218	1.0	2.3
Togo	202	0.9	2.1
Burkina Faso	137	0.6	1.4
Chad	102	0.5	1.1
Gambia	34	0.2	0.3
Sierra Leone	31	0.1	0.3
Niger	9	0.0	0.1

Big exporters in intra-SSA agricultural trade
(intra-SSA exports account for more than 4% of SSA intra trade)

	% of SSA intra
Cote d'Ivoire	9.0

Small exporters

	% of SSA intra
Cameroon	1.6
Ghana	1.5
Nigeria	0.8
Senegal	1.6

Big exporters in intra-SSA ag trade
(intra-SSA exports account for more than 4% of SSA intra trade

	% of SSA intra
Mauritania	5.4

Small exporters

	% of SSA intra
Benin	1
Mali	0.5
Togo	1.0
Burkina Fas	0.8
Chad	0.1
Gambia	0.2
Sierra Leone	0.1
Niger	0.2

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Cote d'Ivoire	37.0

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 7% of total intra sub-regional trade)

	% of sub-region intra
Senegal	7.6

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Mauritania	25.7

Major export commodities in intra-SSA trade
(% of each country's total intra sub-SSA exports)

	Cote d'Ivoire	Mauritania	Senegal
Oil and fats	21.5		
Fish		99.6	69.9
Processed food	14.7		
Wood	11.7		
Roasted coffee	10.8		

Source: COMTRADE, 2002.

Table 3—Large traders in SSA agricultural exports, Southern Africa

Big exporters in total agricultural trade
(total exports account for more than 2% of SSA total ag exports and more than 10% of sub-region's exports)

	Value million $	% of SSA total	% of sub-region total
South Africa	4,270	19.8	57.3
Zimbabwe	1278	5.9	17.1

Small exporters

	Value million $	% of SSA total	% of sub-region total
Malawi	409	1.9	5.5
Mozambique	229	1.1	3.1
Zambia	144	0.7	1.9
Botswana	262	1.2	3.5
Lesotho	2	0.0	0.0
Namibia	200	0.9	2.7
Swaziland	154	0.7	2.1
Angola	38	0.2	0.5

Big exporters in intra-SSA agricultural trade
(intra-SSA exports account for more than 4% of SSA intra trade)

	% of SSA intra
South Africa	33.5
Zimbabwe	13.2

Small exporters

none

Small exporters

	% of SSA intra
Malawi	1.3
Mozambique	1.0
Zambia	2.1
Botswana	2.1
Lesotho	0
Namibia	1.6
Swaziland	1.2
Angola	0.1

Big exporters in sub-region ag trade
(intra sub-region exports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
South Africa	56.3
Zimbabwe	27.8

Small exporter

none

Major export commodities in intra-SSA trade
(% of each country's total intra sub-SSA exports)

	South Africa	Zimbabwe
Maize	13.6	10.1
Vegetable and fruits	13.3	
Sugar	10.6	13.3
Cotton		9.8
Tobacco		12.9
Processed food	14.2	12.9

Source: COMTRADE, 2002.

However, there are countries that are not major exporters in intra-SSA trade, but are large exporters in intra sub-regional trade. Such countries include Ethiopia, whose agricultural exports to SSA account for 2.7 percent of intra-SSA trade, but whose exports to East Africa account for more than 17 percent of East African intra-regional trade, and Senegal, which is small in intra-SSA trade, but its exports to West Africa accounts for 7.6 percent of intra West Africa trade. Mauritania is also a major intra-West Africa trader, as its exports to the sub-region account for 25.7 percent of such trade.

In sum, there are 12 countries whose exports account for more than 2 percent of SSA and 10 percent of regional agricultural exports. Among them, 5 countries, plus Mauritania, are major traders in intra-SSA agricultural trade as exporters. These 6 countries, plus Ethiopia and Senegal, are the major exporters in intra each sub-regional agricultural trade.

We further look at what are major commodities that these countries export to the region. Among the 8 countries that are major exporters in intra-SSA or intra sub-regions' agricultural trade, there are three countries, Ethiopia, Mauritania, and Senegal, in which exports of a single commodity accounts for most of their intra-regional exports. For example, fish exports account for almost 100 percent of Mauritania's intra-SSA agricultural exports, and 70 percent of Senegal's intra-SSA exports. For Mauritania and Senegal, the total agricultural exports (to the world) are also concentrated on fish exports.

For the other five major exporting countries, exports to the region are relatively diversified, but still, exports of three or four commodity groups often account for more than 50 percent of their total intra-SSA agricultural exports. For most of these countries, structures of the exports to the region are not necessarily the same as their exports to the world. For example, almost one-third of Kenyan agricultural exports to the world are vegetables and fruits, but this commodity group only accounts for 8 percent of Kenyan exports to SSA. Cocoa beans account for more than 40 percent of Cote d'Ivoire total agricultural exports, but in terms of intra-regional exports, roasted coffee accounts for 11 percent of its total exports to the region, while cocoa beans are mainly exported to the Europe.

Although maize is mainly an intra-regionally traded product,[8] only in three large exporting countries, Uganda, South Africa, and Zimbabwe, do maize exports account for more than 10 percent of their intra-SSA exports. Processed agricultural commodities account for a large share in the major traders' intra-SSA exports. There are four countries, Kenya, Cote d'Ivoire, South Africa, and Zimbabwe, in which processed food accounts for more than 10 percent of intra-SSA exports. In addition, other processed agricultural goods, such as sugar, oil and fats, cigarettes, and roasted coffee, account for a large share of these four countries' intra-SSA exports. There are three countries, in which vegetables and fruits account for a big share of their intra-SSA exports, and among these, 86 percent of Ethiopian intra-SSA agricultural

[8] More than 50 percent of SSA maize exports are intra-regional trade.

exports are vegetables and fruits, although the country is mainly a coffee exporter in terms of total agricultural trade.

In sum, processed agriculture plays a more important role than primary agriculture in large traders' intra-regional exports. For each country, intra-regional primary agricultural trade is concentrated on a few commodities. In total, fish, maize, vegetables and fruits are relatively important for these countries' intra-regional primary agricultural exports.

SIX MAJOR IMPORTERS ACCOUNT FOR LESS THAN 50 PERCENT OF INTRA-SSA AGRICULTURAL TRADE

Analyzing regional market opportunities is equally important for understanding regional dynamics in SSA. For this reason, we employ a similar measure to inspect where are the major markets for agricultural trade. The 33 countries are first grouped according to their import share in total SSA agricultural imports from the world, i.e., if a country accounts for more than 2 percent of SSA total agricultural imports or more than 10 percent of a region's imports, then the country is identified as a major importer. According to this standard, we identify12 countries as large agricultural importers,[9] accounting for 65.6 percent of total SSA agricultural imports. Among the 12 major SSA agricultural importers, Kenya, Nigeria, South Africa, Zambia, Zimbabwe, Mozambique, and Angola are large importers in terms of intra-SSA agricultural trade. Kenya, South Africa, and

[9] Except for Tanzania, Mozambique, Botswana, and Angola, the other eight countries are also large exporters.

Zimbabwe import 28 percent of agricultural products traded among SSA countries, where their exports account for 55 percent of intra-SSA agricultural trade, implying they are large net exporters in intra-regional trade.

At the intra sub-regional trade level, the six of the above seven countries (excluding Zambia), plus Tanzania, Uganda, Sudan, and Cote d'Ivoire are major importers in terms of their shares being more than 10 percent of total intra sub-regional trade. Kenya, Tanzania, Uganda, and Sudan in East Africa, import 54 percent of regional agricultural goods (Table 4), Nigeria and Cote d'Ivoire with 36 percent of regional agricultural imports (Table 5), and South Africa, Zimbabwe, Mozambique, and Angola are both large importers in intra-SSA trade and in intra Southern African trade (Table 6).

We now look at what are major commodities that these 10 countries import from the region. In general, import markets are more diversified in terms of commodities than are exports, as there are 11 commodities for which the intra-regional imports share is quite significant for the large importers. As in the case of exports, fish is mainly an intra-regionally traded good, fish imports accounting for, respectively, 72 and 63 percent of total agricultural imports from SSA for Nigeria and Cote d'Ivoire. The second important good is maize, as 38 and 21.4 percent of intra-regional imports by Kenya and Zimbabwe, respectively, are imports of maize.

Table 4—Large traders in SSA agricultural imports, East Africa

Big importers in total agricultural trade
(total imports account for more than 2% of SSA total ag imports and more than 10% of sub-region's imports)

	Value million $	% of SSA total	% of sub-region total
Kenya	501	4.7	24.2
Tanzania	236	2.2	11.4

Small importers

	Value million $	% of SSA total	% of sub-region total
Sudan	199	1.9	9.6
Uganda	188	1.8	9.1
Congo, DR	173	1.6	8.4
Ethiopia	158	1.5	7.6
Madagascar	136	1.3	6.6
Somalia	104	1.0	5.0
Rwanda	77	0.7	3.7

Big importers in intra-SSA agricultural trade
(intra-SSA imports account for more than 4% of SSA intra trade)

	% of SSA intra
Kenya	6.4

Small importer

Tanzania	3.8

Small importers

	% of SSA intra
Cogo, DR	3.0
Uganda	2.9
Sudan	1.8
Ethiopia	0.8
Madagascar	1.0
Somalia	1.5
Rwanda	0.8

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Kenya	15.0

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Tanzania	14.5

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Uganda	13.8
Sudan	10.9

Major import commodities in intra-SSA trade
(% of each country's total intra sub-SSA imports)

	Kenya	Uganda	Tanzania	Sudan
Wheat		18.4		
Maize	38.2			
Oil and fats		15.5	19.1	
Processed food			28.8	
Tea	12.3			42.4
Sugar	12.3	19.7	15.5	
Cotton				
Coffee beans				28.1
Cigarettes				12.0

Source: COMTRADE, 2002.

Table 5—Large traders in SSA agricultural imports, West Africa

Big importers in total agricultural trade
(total imports account for more than 2% of SSA total ag imports and more than 10% of sub-region's imports)

	Value million $	% of SSA total	% of sub-region total
Nigeria	1,442	13.4	30.6
Cote d'Ivoire	618	5.8	13.1
Senegal	417	3.9	8.8
Ghana	374	3.5	7.9
Cameroon	268	2.5	5.7

Small importers

	Value million $	% of SSA total	% of sub-region total
Benin	193	1.8	4.1
Mauritania	154	1.4	3.3
Togo	108	1.0	2.3
Mali	103	1.0	2.2
Burkina Faso	103	1.0	2.2
Gambia	85	0.8	1.8
Niger	74	0.7	1.6
Sierra Leone	44	0.4	0.9
Chad	24	0.2	0.5

Big importers in intra-SSA agricultural trade
(intra-SSA imports account for more than 4% of SSA intra trade)

	% of SSA intra
Nigeria	6.3

Small importers

	% of SSA intra
Cote d'Ivoire	2.7
Senenal	1.8
Ghana	2.3
Cameroon	1.8

Small importers

	% of SSA intra
Benin	1.0
Mauritania	0.3
Togo	1.0
Mali	0.9
Burkina Faso	1.7
Gambia	0.2
Niger	1.6
Sierra Leone	0.2
Chad	0.2

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Nigeria	25.4

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
Cote d'Ivoire	10.9

Small importers

	% of sub-region intra
Senenal	7.8
Ghana	7.9
Cameroon	6.5

Major import commodities in intra-SSA trade
(% of each country's total intra sub-SSA imports)

	Nigeria	Cote d'Ivoire
Fish	71.7	63.3
Cotton	12.2	

Source: COMTRADE, 2002.

Table 6—Large traders in SSA agricultural imports, Southern Africa

Big importers in total agricultural trade
(total imports account for more than 2% of SSA total ag imports and more than 10% of sub-region's imports)

	Value million $	% of SSA total	% of sub-region total
South Africa	1,859	17.3	47.3
Zimbabwe	222	2.1	5.6
Mozambique	235	2.2	6.0
Botswana	394	3.7	10.0
Angola	466	4.3	11.8

Small importer

Botswana	3.2

Small importers

	Value million $	% of SSA total	% of sub-region total
Malawi	64	0.6	1.6
Zambia	86	0.8	2.2
Swaziland	69	0.6	1.8
Namibia	28	0.3	0.7
Lesotho	1	0.0	0.0

Big importers in intra-SSA agricultural trade
(intra-SSA imports account for more than 4% of SSA intra trade)

	% of SSA intra
South Africa	15.1
Zimbabwe	6.5
Mozambique	6.9
Angola	4.4

Big importers in intra-SSA ag trade
(intra-SSA imports account for more than 4% of SSA intra trade)

	% of SSA intra
Zambia	3.5

Small importers

	% of SSA intra
Malawi	2.8
Lesotho	0
Namibia	0.2
Swaziland	0.6

Big importers in sub-region ag trade
(intra sub-region imports account for more than 10% of total intra sub-regional trade)

	% of sub-region intra
South Africa	28.5
Zimbabwe	14.6
Mozambique	16.3
Angola	10.4

Major import commodities in intra-SSA trade
(% of each country's total intra sub-SSA imports)

	South Afric	Zimbabwe	Mozambique	Angola
Maize		21.4		
Meat			12.9	
Vegetable and fruits	7.7	8.5	8.3	26.8
Oil and fats		10.8		
Fish		6.6		
Processed food			13.9	22.1
Sugar	13.2		21.4	
Cotton	9.5			
Cigarettes	10.6			16.0

Source: COMTRADE, 2002.

The four Southern African importers are relatively important markets for vegetables and fruits traded within SSA, as vegetables and fruit imports account for 8 to 8.5 percent of total agricultural imports from the region for South Africa, Mozambique, and, Zimbabwe, and 26 percent for Angola.

In sum, there are 10 large traders in intra-SSA trade either as major exporters, or major importers (three countries are both). The six large exporters account for more than 70 percent of intra-SSA trade from the export side, and the seven large importers account for less than 50 percent of intra-SSA trade from the import side. Import markets are more diversified than exports both in country and commodity concentration. Moreover, as most countries in SSA are agricultural net exporters, the market size of large importers, in terms of trade value, is on a smaller scale than that of the large exporters in terms of export value.

3. ANALYZING COMPARATIVE ADVANTAGE OF KEY AGRICULTURAL COMMODITIES

To foster regional economic linkage through promoting intra-regional trade, it is important to identify in what commodities countries have a comparative advantage, whether different countries have comparative advantages in different commodities, and whether there exists potential for exploit countries' comparative advantage and increasing their trade. We utilize a statistical indicator called *"revealed" comparative advantage* to assess these issues.

The revealed comparative advantage index was initially developed by Balassa (1965). He contended that comparative advantage can be "revealed" through

examination of real-world country/commodity trade patterns because actual exchange "reflects relative costs as well as differences in non-price factors." Many applied economists have attempted to approximate comparative advantages, using various indicators derived from real-world post-trade observation. The indicator used here is based on the work of Vollrath (1991). Specifically, for any country, the *revealed comparative advantage* (RCA) for commodity *i* has the following structure:

$$RCA_i = \frac{s_i^x}{S_i^w} - \frac{s_i^m}{S_i^w} = \frac{s_i^x - s_i^m}{S_i^w},$$

where $s_i^x = x_i / x_T$ and $s_i^m = m_i / m_T$ are the shares of commodity *i*'s exports and imports in a country's total exports and imports, respectively. $S_i^w = x_{world,i} / x_{world,T}$, is the share of commodity *i*'s trade in world total trade (since in the world exports equal to imports for each commodity). If the value of RCA_i is positive (negative), the share of commodity *i*'s exports in the country's total exports is greater (less) than the share of the same commodity's imports in the country's total imports.

We use 5-digit SITC data from United Nation COMTRADE database to derive an average RCA for each agricultural commodity for each of 27 SSA countries[10] over the two periods, 1990-1995 and 1996-2000. If the value of RCA_i is greater than 4.0 for a country, we take it to mean that the country has a strong comparative advantage in commodity *i*. If the value of RCA_i is less than –4.0, the country is taken to have a strong comparative disadvantage in producing commodity

[10] Data are not available for six of 33 countries discussed in the previous section, namely, Sudan, Rwanda, Botswana, Lesotho, Namibia, and Swaziland.

i. That the value of RCA_i is greater (less) than 4.0 (-4.0) means export (import) share of commodity *i* in a country's total exports (imports), net the imports (export) share of the same commodity in the country's total imports (exports), is at least four times as high as the share of the same commodity in world total trade. In order to reduce the likely biasing influence of oil trade (since in a few African countries, oil exports account for more than 90 percent of total exports), we elect to take non-oil exports and imports as total exports and imports. Moreover, to check whether the measures of the indicator correctly capture countries' comparative advantage and disadvantage, we also derived another indicator called the *Contribution to Trade Balance* (Lafay, 1990) that is also often used in measuring comparative advantage. As the results from the two measures were consistently close, we draw our discussion here only from the results for RCA.

It should be pointed out that major distortions in trade affect the results of revealed comparative advantage. Ideally, the revealed comparative advantage should be measured in an environment in which neither external trade constraints distort individual country export profiles, nor domestic market interventions have sectoral effects or a general anti-export bias. The effects of trade distortions and other trade barriers on SSA agricultural trade are analyzed in the next section.

NUMBERS OF COMMODITIES WITH COMPARATIVE ADVANTAGE INCREASE OVER TIME

In general, countries with different RCA index profiles should have more mutually beneficial trade opportunities than those where a high degree of similarity

exists. For this reason, we first look at the numbers of agricultural commodities in which the 27 countries have a comparative advantage.

Table 7 shows the number of agricultural commodities (at 5-digit SITC classification) for each of the 27 countries for which the value of RCA is greater than 4.0, i.e., the number of commodities a country has strong comparative advantage in. In order to capture partially the dynamic change of countries' comparative advantage over time, we present the numbers for two periods: 1990-1995 and 1996-2000. Interestingly, the number is, in general, bigger for the large exporters than for the small ones, which implies that agricultural exports of the large exporters are more diversified than the small ones are. Also, it is not necessary that a big country should have a large number. For example, the number for South Africa is 37 in the first period and 47 in the second period,[11] both lower than the number for most of other countries that are also large exporters. Although the highest numbers do not change much in both groups, there are many countries (9 among large exporters and 10 among small exporters) in which the number increases in the second period, compared with the first period. This implies that SSA agricultural exports in which countries have a strong comparative advantage have become relatively diversified in recent years, indicating the potential for mutual benefits from promoting intra-regional trade.

While a big number in Table 7 implies that the group of commodities in which a country has a comparative advantage is quite broad, if many countries share

[11] Due to data limitations, we again use data for SACU to represent South Africa. Since intra-SACU trade is included in both exports and imports, it may underestimate South Africa's RCA for some commodities.

the comparative advantage in a similar group of commodities, it still does not imply that there exists potential for more intra-regional trade. For this reason, we further look at the total number of agricultural commodities in which any SSA country has a comparative advantage. Since the large exporters play more important roles in intra-regional trade, we focus on the 12 large traders for this analysis. In total, there are 260 agricultural commodities (at 5-digit SITC classification) in which at least one of the 12 large exporters has a strong comparative advantage in the first period (1990-1995). This number increases to 299 in the second period (1996-2000). There are 118 commodities in the first period in which only one of the 12 countries has a comparative advantage and 124commodities in the second period. There are 56 and 62 commodities, respectively, in which two of the 12 countries have a comparative advantage. There are only 24 and 36 commodities, respectively, in which more than four of the 12 countries have a comparative advantage in the first and second periods (Table 8). These results tell us, indirectly, and within the agricultural sector, that SSA countries (at least the large agricultural exporting countries) have different comparative advantage in a wide range of diversified agricultural commodities. With improvement in infrastructure and reduction in trade barriers in SSA, there is potential to increase agricultural trade across countries in the region. These results contradict the findings of the many other studies that utilize quite aggregate data and look at total trade instead of agricultural trade only. Most of these studies (e.g., Yeats, 1998; and Foroutan and Pritchett, 1993) conclude that African exports are highly concentrated in a very few products and hence significant increase in intra-regional trade will not occur in the foreseeable future. It is true that many SSA

countries export a small range of commodities at the aggregate level, and it is also true that, from a long-run point of view, the growth in intra-regional trade would likely not be sustainable if the region trades in agricultural goods only. However, given the predominant role of agriculture in the livelihoods of most Africans at the current development stage, our results show that it is possible to promote agricultural-led growth through intra-regional agricultural trade, which will help in strengthening linkages and in generating mutual benefits across countries.

Table 7—Number of comparative advantage cases among agricultural commodities (For selected 27 SSA countries, 5-digit SITC classification)

Large Traders, 12 countries			Small Traders, 15 countries		
	1990-1995	1996-2000		1990-1995	1996-2000
East Africa					
Kenya	67	66	Congo, DR	14	15+
Uganda	42	50+	Rwanda	17	15
Etiopía	37	57+			
Tanzania	68	73+			
Madagascar	74	58			
West Africa					
Cote d'Ivoire	53	70+	Benin	22	31+
Cameroon	44	50+	Mali	25	32+
Nigeria	52	68+	Gambia	20	24+
Senegal	46	59+	Burkina Faso	28	36+
Ghana	26	62+	Chad	20	17
			Mauritania	15	28+
			Niger	13	21+
			Sierra Leone	15	21+
			Togo	34	41+
Southern Africa					
Zimbabwe	57	56	Malawi	38	24
South Africa	37	47+	Mozambique	44	39
			Zambia	12	32+
			Angola	17	12
Range	26-74	47-73		12-44	12-41

Source: Authors' calculation using data from COMTRADE, 2002.

Table 8—Number of comparative advantage agricultural commodities (12 large agricultural exporters in total)

5-digit SITC classification	1990-1995	1996-2000
Total number	263	300
RCA > 4 for 1 country	117	124
RCA > 4 for 2 countries	59	63
RCA > 4 for 3 countries	36	48
RCA > 4 for 4 countries	27	29
RCA > 4 for more than 4 countries	24	36

Source: Authors' calculation using data from COMTRADE, 2002.

AGRICULTURAL EXPORTS MATCH IMPORTS BETTER OVER TIME

To strengthen intra-regional trade, commodities in which exporting countries have a comparative advantage have to match with commodities demanded by other countries in the region. To explore this, we further look at whether the export commodities in which some African countries have a comparative advantage match with the import commodities in which the other African countries have a comparative disadvantage. To do this, ideally we can look at the trade flows among African countries, i.e., how much of the exports of agricultural commodities from one country has become imports of other countries in the region. However, it is known generally and from the first data section above that intra-regional trade has not yet become too important for both agricultural exporting and importing countries, given the high transaction costs persisting in Africa. The question that we would rather ask is whether there exists potential to increase trade across African countries if trading conditions are improved. For this purpose, instead of looking at intra-

regional real agricultural trade flow, which is often significantly underreported for staple commodities and may give a misleading pessimistic conclusion for Africa's future trade, we look at the correlation between the group of commodities in which the major African export countries have a strong comparative advantage and the other group of commodities in which the major African import countries have a strong comparative disadvantage. Our argument is that, although there is marginal trade across countries in the region, and notwithstanding that export markets and import sources of these commodities are mainly outside the region, if there is strong correlation between these two groups of commodities, then it is highly possible to increase trade across countries in the region by improving trading conditions.

We focus on the two commodity lists, one in which RCA values are high (and positive) for the 12 large exporters, and the other one in which RCA values are low (and negative) for the 12 large importers. Moreover, to evaluate whether the match between comparative advantage commodities and comparative disadvantage commodities changes over time, we estimate the correlation for the two periods: 1990-1995, and 1996-2000. The 5-digit SITC code is employed for this study. As for any other correlation analysis, the coefficient values lie between –1.0 and 1.0. If the list of export commodities perfectly matched the list of import commodities, i.e., the codes in the two lists were all the same, the correlation coefficient would equal one. If export commodities were different from import commodities, i.e., if there were few codes that appear in the both lists, the correlation coefficient would be less than unity, perhaps even negative, or not significant.

In the first period (1990-1995) there are, in total, 260 export agricultural commodities in which the RCA value is greater than 4.0 for any of the 12 large export countries, and 198 import commodities in which the RCA value is less than –4.0 for any of the 11 large import countries.[12] In the second period (1996-2000) the numbers increase to 299 for exports and 212 for imports. In the first period, there are 83 commodities that appear in the both lists, i.e., in which some countries have strong comparative advantage and export them, and some countries that have strong comparative disadvantage and import. The estimated correlation coefficient between the list of agricultural export commodities (260) and the list of import commodities (198) is 0.595. In the second period, there are 97 commodities that appear in the both lists and the correlation coefficient increases to 0.624 (Table 9). Both results are statistically significant at the 0.01-level (2-tailed, run by SPSS). The results that a high correlation coefficient between commodity export and import lists, and that about one half of the commodities imported by the large importers during 1996-2000 are among the commodities the 12 large exporters have strong comparative advantages in, indicates potential to strengthen mutually beneficial agricultural trade in the region. Moreover, the apparently slightly increased value of the coefficient and increased number of commodities appearing in the both lists in the second period imply such potential may have risen over time.

While the majority of SSA farmers engage in staple food production, trade of these commodities is thin at present and the region has to depend on imports from the rest of world for wheat, maize, rice, and other food. A strategy for slashing poverty

[12] There are no separate trade data available for Botswana.

and hunger in Africa must give priority to promote growth in staple food production and trade. For this reason, we pay more attention to the potential in intra-regional trade of staple goods. In the first period, there are 58 and 63 staple goods in the export and import lists in which the RCA value is higher than 4.0 and lower than –4.0, respectively. These commodities include livestock and livestock products, fishery, cereals, roots and tubers, peas and beans. In the first period, there are 28 staple food products that appeared in both lists, accounting for 44 percent of the number of commodities imported by the large importers. A low correlation coefficient, 0.341, is obtained between staple export and import commodities in this period. In the second period, there are 61 products appeared in the export list and 69 for imports. Among them, 29 products appeared in both lists. However, the coefficient almost doubles and increases to 0.629 in the second period (Table 9). Still, both results are statistically significant at the 0.01-level. This result is quite encouraging and indicates that foodstuffs are among the most dynamic products in the region and hence that it is possible to promote intra-regional trade of these commodities. Our findings are also supported by Yeats (1998) who finds that foodstuffs dominate the fastest growing products in intra-regional trade, and suggests that a further expansion of this exchange might be able to alleviate somewhat Africa's chronic food security problems and help improve conditions for the rural poor.

We further check whether there exists correlation for trade of vegetables and fruits, since the forecast is bright in non-traditional exports, and market opportunities offer the prospect of significant growth in vegetables and fruit exports (Diao et al.,

2003). In the first period, there are, respectively, 38 and 17 vegetable and fruit commodities in the export and import lists, and among them, 7 appear in both lists. In the second period the number is 43 for exports and 20 for imports, and 9 appear in both lists. The correlation coefficient is negative (–0.14) in the first period, and becomes positive but small (0.08) in the second period (Table 9). Both results are not statistically significant (the standard errors of the correlations are larger than 0.5). This outcome shows that there is a poor match in vegetable and fruit trade between what African countries export and import. Hence, while non-traditional exports offer the most promising opportunities to realize rapid export growth, the markets are mainly outside the region. Countries within Africa are mainly competitors, and regional linkages will mainly come through technological spillovers and learning from each other, instead of commodity exchange.

SHARE OF TRADITIONAL COMMODITIES IN TOTAL EXPORTS DECLINES OVER TIME

It should be pointed out that traditional export commodities are still among those that show the strongest comparative advantages, as values of the RCA index for these commodities are high in both periods. We present the RCA indices for some selected traditional commodities for which the market is mainly outside the region.

Table 9—Correlation between exports and imports for the major trading countries in SSA

	Total Agriculture	Staples	Vegetables and Fruits
1990-1995			
Number of Commodities			
RCA > 4.0	260	58	38
RCA < -4.0	198	63	17
Number of Commodities in both	83	28	7
Correlation Coefficient	0.595**	0.341**	-0.135
1996-2000			
Number of Commodities	299	61	43
RCA > 4.0	212	69	20
RCA < -4.0			
Number of Commodities in both	97	29	9
Correlation Coefficient	0.624**	0.629**	0.078

** Correlation is significant at the 0.01 level (2-tailed) run by SPSS.
Source: Authors' calculation using data from COMTRADE, 2002.

Three commodities, coffee, cocoa, and tobacco, are selected (Table 10), lower part); the RCA index value is high and also increases in the second period for most countries. This implies that African countries will continue to have their comparative advantage in some traditional commodities in the future. While in general, the traditional commodities account for a large share of African countries' agricultural exports, their share in total exports of the commodities selected by the RCA index has declined over time for most countries. In the upper part of Table 10, we present the aggregate export share of the commodities selected according to the RCA index in each country's total agricultural exports (columns one and three for the two

periods), and the same shares computed minus traditional commodities (column two and four). Comparing column four to column two, there are nine countries for which the share increases in the second period, indicating declining share for traditional commodities and that countries are becoming more diversified in their comparative advantage. In the lower part of the Table 10, we also present some selected non-traditional commodities that are expected to have promising export opportunities. To simplify the Table, we select only one commodity for each country, according to the value and change in the RCA index. With a few exceptions, most these non-traditional commodities still account for a small share of a country's agricultural exports. However, an increase in the value of RCA indicates something of their export potential in the future.

In sum, the revealed comparative advantage analysis displays potential for growth in intra-regional agricultural trade. The most dynamic products in intra-regional trade are foodstuffs and the possibility of expanding exchange of staple food goods is good. While strengthening intra-regional linkages to promote agriculture-led growth is a feasible strategy, significant increase in foodstuff trade depends on improvement of trading conditions in Africa.

Table 10—Export shares of agricultural commodities with comparative advantage

	1990-1995		1996-2000	
Total Share	**With traditional**	**Without traditional**	**With traditional**	**Without traditional**
Kenya	92.0	70.7	91.0	73.4
Uganda	98.1	19.9	95.3	34.4
Ethiopia	98.9	35.6	98.0	38.3
Tanzania	96.7	69.5	96.0	75.1
Madagascar	94.0	75.7	93.0	79.1
Cote d'Ivoire	96.7	51.5	96.3	46.9
Cameroon	97.4	70.0	97.4	76.2
Nigeria	97.9	69.5	96.8	69.7
Senegal	98.6	98.6	97.1	97.1
Ghana	96.6	46.0	95.8	49.7
Zimbabwe	84.4	35.9	88.5	40.8
South Africa	58.9	58.9	54.6	54.6

	Selected Traditional Commodity	**RCA**		**Selected non-traditional Commodity**	**RCA**	
		1990-1995	**1996-2000**		**1990-1995**	**1996-2000**
Kenya	Coffee beans	61	67	Vegetable	261	452
Uganda	Coffee beans	302	255	Fish	60	143
Ethiopia	Coffee beans	253	336	Vegetable products	369	801
Tanzania	Coffee beans	95	81	Fish	745	2418
Madagascar	Coffee beans	59	38	Fruits	171	226
Cote d'Ivoire	Cocoa beans	534	757	Cocoa base	190	348
Cameroon	Cocoa beans	172	262	Food preparation	>4	69
Nigeria	Coffee beans	366	292	Sesame	34	167
Senegal				Fish	52	100
Ghana	Cocoa beans	422	536	Fish	19	119
Zimbabwe	Tobacco leaf	157	231	Vegetable	50	93
South Africa				Fruits	10	17

Source: Authors' calculation using data from COMTRADE, 2002.

4. BARRIERS TO GROWTH IN AGRICULTURAL TRADE

The evidence from historic trends is clear. If Africa is to break away from the vicious cycle of hunger and poverty through agriculture-led growth, it will also need to expand market opportunities both inside and outside the region. To do so, it must build infrastructure and reform institutions to reduce transaction costs, increase competitiveness, and improve quality, as well as reform policies to encourage agricultural trade among the African nation themselves. In this section, three important barriers and their effects on promoting African countries' agricultural trade are analyzed. We first analyze how much African countries can gain from removal of subsidies among the more-developed countries. We then assess the possible gains from African countries' own trade liberalization. Finally, we evaluate the benefits from reducing transportation costs. A global CGE model is employed for the analysis and the possible gains from different policy reforms and investment choices are measured and compared quantitatively.

OPENING EUROPEAN AND AMERICAN MARKETS IS IN THE COMMON INTEREST OF AFRICAN COUNTRIES

Many studies show that policies pursued by a small number of countries in the North cause most of the distortions in world agricultural markets (e.g., ERS/USDA, 2001; Burfisher et al., 2002). By decomposing the possible increase in world prices due to worldwide agricultural trade liberalization, Diao et al. (2002) find that removing domestic and export subsidies in more-developed countries' agriculture, especially in the EU and U.S., accounts for about 80 percent of the possible increase

in world agricultural prices after world-wide agricultural liberalization. Thus, it is obvious that agricultural liberalization among the more-developed countries will create export opportunities for Africa countries. Moreover, since the EU is the largest market for African countries, benefits of an open EU agricultural market are especially important to Africa.

We use the global CGE model to evaluate the extent of gains to African countries if the EU and U.S. remove their subsidies to agriculture and fully open their market to developing countries. The simulation results show significant effects for African farmers as a whole. Measured by real agricultural GDP, the region's total agricultural income would increase by 5.7 percent if the EU and U.S. fully open the markets and remove agricultural subsidies. Total agricultural production would increase by 7 percent in the region, total agricultural exports would increase by 20 percent, and agricultural exports to the EU and U.S. increase by 33 percent. Intra-regional agricultural trade will be stimulated (increases by 3.8 percent) and partially replaces the imports from outside the region (as total agricultural imports fall by 8.6 percent). An open EU agricultural market is especially important to Africa according to these simulations. The removal of EU agricultural subsidies and elimination of import tariffs allow African countries as a group to increase real agricultural GDP by 4.5 percent, while the gain from opening the U.S. agricultural market is only about one percent (Table 11).

REMOVING AFRICAN TRADE BARRIERS IN BOTH AGRICULTURE AND NON-AGRICULTURE BENEFITS AGRICULTURE

Many African countries have undertaken market reforms in recent years. These reforms are a solid beginning but are not yet sufficient to generate greater supply response and competitiveness in export markets. One important reason is that distortions in non-agriculture can negatively affect agriculture. While many African countries have long been emphasizing the importance of agriculture, it is evident that their policies are often biased against the sector. Sources of bias in the past were sector policies such as export duties, subsidies, and parastatal margins that kept farm prices below world prices. To stimulate agricultural growth, it is required to reduce or to eliminate distortions in the economy more than just in agriculture. To evaluate how much the agricultural sector can benefit from removal of economy-wide distortions, we use the model to simulate a scenario in which all African countries eliminate their trade barriers in all sectors.[13] The simulation results show that total GDP and agricultural real income would increase by 2.8 and 1.5 percent, respectively, for African countries as whole. While agricultural production rises slightly (0.2 percent), agricultural exports would increase by 19 percent (Table 11). More importantly, intra-regional agricultural trade can increase by more than 50 percent, indicating high barriers to commodity exchange across African countries at present, and hence, a strong potential for future growth in such exchange.

[13] Due to the data limitations, we have to use only tariff data to represent such distortions.

Table 11—Reducing transaction costs scenarios: Sub-Saharan Africa macro results

	Real GDP	Real Agr GDP	Total agr Production	Food consumption	Total agr Exports	Exports to EU&US	Total agr Imports	Intra-SSA imports	Food Prices
Scenarios:				Percent change over the base					
1. Agricultural liberalization in EU and U.S.	0.65	5.67	7.02	0.10	20.2	32.8	-8.6	3.8	1.79
2.Agricultural liberalization in EU	0.65	4.53	5.91	0.08	17.9	30.0	-5.0	2.6	1.26
3. Agricultural liberalization in U.S.	-0.01	1.03	1.02	0.00	2.3	2.8	-3.3	1.1	0.50
4. Full trade liberalization in SSA	2.82	1.52	0.16	-0.37	18.8	18.0	24.3	53.2	-0.71
5. 50% increase in Mozambique transport TFP	0.09	0.22	0.12	0.12	0.4	0.4	0.2	0.8	0.06
6. 50% increase in SSA transport TFP	5.26	9.63	7.63	5.14	27.7	27.9	11.7	22.4	0.34

Source: IFPRI CGE model results.

REDUCING MARKETING COSTS IS CRITICAL

Growth in African agriculture and increased intra-regional and international agricultural trade are critically constrained by high marketing costs in the region. What is needed now is increased attention to market development. Two scenarios are designed to evaluate the importance of reducing marketing costs on African agricultural trade and farm income. We first focus on the inter-linkage/spillover effect of reducing marketing costs. We choose Malawi and Mozambique as examples

for this analysis and evaluate the effect of improving Mozambique's transportation sector on Malawian agriculture. We then assess the total gains if the transportation costs can be reduced in the whole region.

As a land-locked country, all Malawian exports and imports have to transit through neighboring countries, mainly South Africa and Mozambique. Improving the efficiency of the Mozambique transportation sector not only reduces Mozambique marketing costs, but also benefits Malawi. We simulate such effect by increased total factor productivity (TFP) in the Mozambique transportation sector, which will cause per unit of transportation service cost to fall. This will reduce Mozambique's own transportation costs, benefits other sectors in Mozambique for which transportation services are an intermediate input, and also reduces the margins on Mozambique international trade (by reducing the gap between cif and fob prices). Simultaneously, reducing Mozambique transportation service costs benefit Malawian international trade, since import prices faced by Malawi importers will fall and export prices will rise.

By increasing TFP in the Mozambique transportation sector by 50 percent, the simulation indicates significant gains for both Mozambique and Malawi. In this scenario, Mozambique real GDP increases by 6.6 percent (Table 12), and Malawi real GDP increases by 1.8 percent (Table 13). Farm incomes and agricultural output also rise in both countries. Measured by agricultural real GDP, agricultural income increases by 6.9 percent in Mozambique and 3.0 percent in Malawi. Total agricultural output increases by 5.9 percent in Mozambique and 2.6 percent in Malawi. Consumers in both countries also benefit from reduced marketing costs;

total food consumption increases by 5.9 percent in Mozambique, and 1.4 percent in Malawi.

For Mozambique, both GDP and agricultural real income increase due to both reduced international transportation margins and reduced domestic transportation costs. Total agricultural exports and imports in Mozambique rise together, 15.7 and 15.4 percent, respectively. For Malawi, increased GDP and agricultural real income are only due to the reduced international transportation costs. Reduced trade margins cause Malawi total agricultural exports to increase by 7.1 percent, and total agricultural imports increase by 17.7 percent.

In the last scenario, we increase TFP in the transportation sector for all African countries. Specifically, given its relatively more advanced technological status, we assume that the transportation sector in South Africa is initially more efficient than in the other countries. Thus, we assume that TFP of the transportation sector in South Africa increases by 30 percent and TFP of the transportation sectors in the other African countries increases by 50 percent.

The results of this simulation are encouraging. Reducing marketing costs significantly and positively affects African countries: real GDP increases by 5.3 percent, and agricultural real GDP increases by 9.6 percent for the region as a whole (Table 11, scenario 6). Moreover, most countries enjoy a significant increase in both aggregate real GDP and agricultural real GDP, and the benefits are more equally distributed among the countries in the region than in the case of liberalizing the EU market, where some small countries stand to gain little. For example, in the first scenario in which EU and U.S. fully liberalize their agriculture, real GDP and

agricultural income in Malawi increase by only 0.6 and 1.2 percent, respectively. In this scenario, by increasing TFP in all the transportation sectors, real GDP and agricultural income increase by 5.2 and 7.8 percent in Malawi (Table 13).

Reducing marketing costs also benefits consumers. For the region as a whole, total food consumption increases by 5.1 percent, the highest increase among all the scenarios examined. Moreover, relative food price levels are quite constant, with only a slightly increase of 0.34 percent, which implies that low-income households can also get benefits. For most countries, agricultural exports increase more than the increase in agricultural imports, and for the region as whole, total agricultural exports increase by 27.7 percent and agricultural imports increase by 11.7 percent.

Results of the last two scenarios suggest strong cross-sectoral linkages between African agriculture and non-agriculture, especially transportation and marketing services. With poor market and transport conditions and high transaction costs, many African agricultural commodities cannot reach either domestic and regional markets, or world markets. Without improving the efficiency of these non-agricultural sectors that provide critical inputs or services to agricultural production and trade, it is virtually impossible for the countries to increase their competitiveness in international markets, and the region would gain little from trade liberalization.

Table 12—Reducing transaction costs scenarios: Mozambique macro results

	GDP	Real Agr GDP	Total agr Production	Food Consumption	Total agr Exports	Total agr Imports	Food Prices
Scenarios:			Percent change over the base				
1. Full U.S.&EU agricultural liberalization	1.1	3.0	5.4	1.1	22.6	1.3	8.0
2. Full EU agricultural liberalization	1.0	1.8	1.4	0.8	11.7	1.8	4.1
3. Full U.S. agricultural liberalization	0.2	1.4	4.1	0.4	12.0	0.3	3.8
4. Full trade liberalization in SSA	2.6	0.7	-0.4	-1.7	18.9	12.2	-4.0
5. 50% increase in Mozambique transport TFP	6.6	6.9	5.9	5.9	15.7	15.4	2.5
6. 50% increase in SSA transport TFP	6.8	7.9	7.2	5.6	31.5	17.0	-0.3

Source: IFPRI CGE model results.

Table 13—Reducing transaction costs scenarios: Malawi macro results

	GDP	Real Agr GDP	Total agr Production	Food Consumption	Total agr Exports	Total agr Imports	Food Prices
Scenarios:			Percent change over the base				
1. Full U.S.&EU agricultural liberalization	0.6	1.6	2.2	0.7	3.0	-8.9	4.6
2. Full EU agricultural liberalization	0.5	1.1	1.5	0.5	1.4	-7.5	2.5
3. Full U.S. agricultural liberalization	0.1	0.4	0.6	0.2	1.2	-2.1	1.8
4. Full trade liberalization in SSA	3.9	6.0	6.2	-0.7	22.0	36.4	-3.9
5. 50% increase in Mozambique transport TFP	1.8	3.0	2.6	1.4	7.1	17.7	2.5
6. 50% increase in SSA transport TFP	5.2	7.8	6.8	4.1	16.5	52.1	4.2

Source: IFPRI CGE model results.

5. CONCLUSIONS

Given the predominant role of agriculture in livelihoods of most Africans, any strategy for slashing poverty and hunger in Africa must center on rapid growth in the agricultural sector. Strengthening linkages and generating mutual benefits across African countries is an important part of the strategy to promote agriculture-led growth at the Africa-wide scale. Identifying growth poles in the regions is a necessary step for such a strategy. Using agricultural trade data, this study focused on identifying major countries that play important roles in regional agricultural trade and commodities in which African countries have a comparative advantage and where there is potential for more trade within the region.

There are 12 large traders that together export 80 percent of African agricultural exports. There are 12 large importers (eight of them are also large exporters), which account for 70 percent of that total imports. Among these combined 16 large traders, 70 percent of agricultural products traded within SSA are exported by the six largest exporters, and 50 percent are imported by the seven largest importers (three of them are also the largest exporters). These 10 largest traders seemingly have ready potential to become growth poles in Africa-wide growth led by promoting agricultural trade.

Revealed comparative advantage, a statistical indicator derived from real-world post-trade observation, was used to identify in which agricultural products African countries have a comparative advantage, and whether different countries have a comparative advantage in different commodities and hence have more mutually beneficial trade opportunities. It is known that at the present, intra-SSA

trade only plays a marginal role and that official trade data often significantly underestimate the actual trade flows, especially foodstuff trade, between countries. Using such data, it is easy to derive too pessimistic a conclusion about Africa's future trade.

In order not to miss potential opportunities and to avoid historical bias, we investigated whether a group of commodities in which some countries have a comparative advantage matched with the group of commodities imported by other African countries. If these two groups of products should match each other, even where there is only marginal cross-country trade currently, there is potential to promote intra-trade through reducing market transaction costs in the future. Almost one-half of commodities imported matched the exports in the most recent period. The correlation between exports and imports is as high as 0.63 in that period (1996-2000), and seems to be improving over time. The correlation for the staple good trade doubles over the two observation periods, up from 0.34 in the first period (1990-1995). This finding is encouraging and indicates that foodstuffs are among the most dynamic products in the region. On the other hand, the low and insignificant correlation coefficients for the vegetable and fruit trade indicate that the market for these commodities is mainly outside the region, and African countries may eventually become competitors in such trade. However, as the forecast is relatively bright for non-traditional exports, and as market opportunities seemingly offer the prospect of significant growth in vegetable and fruit exports, the regional linkages can perhaps best be strengthened through technological spillovers and mutual country learning rather than through exchanging commodities.

Poor infrastructure and institutional barriers have constrained African countries to further exploit their comparative advantage and strengthen their economic linkages. In the last part of the paper, we evaluated quantitatively how many African countries can gain from the removal of subsidies among major more-developed countries, from reducing their own trade barriers, and from improving transportation conditions. The simulations, using a global CGE model, show that opening the EU market is strongly in the common interest of African countries, and by increasing those export opportunities, the region's total agricultural income increases by 4.5 percent. Reducing African countries own trade barriers, both in agriculture and non-agriculture, can significantly increase intra-regional agricultural trade (by more than 50 percent), but increased agricultural income is quite small (1.5 percent). Improving the transportation sector's TFP generates the most encouraging results, increasing agricultural income by 9.6 percent, and total food consumption by 5.1 percent.

While this study could not allow us to estimate how much the investment costs needed in order to significantly improve the transportation sector's productivity in the region, the simulation results seem suggest that the benefit of the globalization and agricultural trade liberalization to the African countries would be limited by their poor market access conditions such as poor transportation conditions and other infrastructure. As has now been shown in many other studies, with poor market and transport conditions and high transaction costs, many African agricultural commodities can hardly reach domestic and regional markets, or be exported to the world. Without improving the efficiency of these non-agricultural sectors that

provide critical inputs or services to agricultural production and trade, it is virtually impossible for the countries of SSA to increase their competitiveness in international markets.

REFERENCES

Balassa, Bela, 1965. "Trade liberalization and 'revealed' comparative advantage," *The Manchester School of Economic and Social Studies* 33: 99-123.

Burfisher, Mary E., Sherman Robinson, and Karen Thierfelder,. 2002. "The Global Impacts of Farm Policy Reforms in Organization for Economic Cooperation and Development Countries," *American Journal of Agricultural Economics* 84(3): 234-241.

Diao, Xinshen, Paul Dorosh, and Shaikh Mahfuzur Rahman, 2003. "Market opportunities for African agricultural products: an examination of demand-side constraints on agricultural growth," DSGD Discussion Paper No. 1, IFPRI.

Diao, Xinshen, Terry Roe, and Agapi Somwaru. 2002. "Developing Country Interests in Agricultural Reforms under the World Trade Organization," *American Journal of Agricultural Economics* 84(3): 782-790.

Economic Research Services. 2001. *Agricultural Policy Reform in the WTO, the Road Ahead*. Agricultural Economic Report No. 802, ERS/USDA, Washington, DC.

Foroutan, Faezeh, and Lant Pritchett, 1993. "Intra-Sub-Saharan African trade: is it too little?" *Journal of African Economies* 2(1): 74-105.

Lafay G., 1990."La mesure des avantages comparatifs reveles," *Economie prospective internationale* 41.

Vollrath, Thomas L., 1991. "A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage," *Weltwirtschaftliches Archiv* 130: 265-279.

Yeats, Alexander J., 1998. What can be expected from African regional trade arrangements? Some empirical evidence. unpublished memorandum, World Bank, Washington DC.

DSGD DISCUSSION PAPER

1. *Market Opportunities for African Agriculture: An Examination of Demand-side Constraints on Agricultural Growth,* September 2003 by . Xinshen Diao, Paul Dorosh, Shaikh Rahman with Siet Meijer, Mark Rosegrant, Yukitsugu Yanoma, and Weibo Li.