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Agricultural Growth Linkages and Market Opportunities in Southern Africa

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One important aspect of development strategies that support economic growth and poverty reduction in Sub-Saharan Africa is strengthening regional economic linkages that are mutually beneficial to neighboring countries. In response to fears that Africa is being marginalized in the global economy, southern Africa has taken the lead in efforts to promote regional linkages by developing several economic initiatives, including the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC), and the Southern African Customs Union (SACU).

In this brief, we present the results of a study in which a regional general equilibrium model was developed to explore prospective economic linkages in southern Africa and their implications for growth in the region's low-income countries.

AGRICULTURAL GROWTH OPPORTUNITIES IN SOUTHERN AFRICA

Results of an analysis of southern African economies and the structure and evolution of the region's agricultural production and trade indicate several means by which linkages between countries in the region could promote economic development and agricultural growth. Three such means merit particular attention: complementarities between low- and middle-income economies that support strong intraregional trade and investment linkages, unexploited agricultural growth potential, and unexploited agricultural trade opportunities.

Complementarities between Low and Middle-Income Countries

The region of southern Africa is unique to the African continent because several low- and middle-income countries exist in close proximity to each other. Already an engine of growth, South Africa accounts for 38 percent of the region's total population and more than 70 percent of its gross domestic product (GDP); its per capita income is $3,002 per year. In addition, Botswana and Mauritius are often cited as the most successful examples of economic development in Africa.

South Africa could influence intraregional growth through trade, spillovers, foreign direct investment (FDI), and other financial linkages as well as by encouraging business and consumer confidence in other African countries. The resurgence of South Africa's economy and the recent liberalization of its capital markets have spurred significant increases in foreign trade and capital inflows. South African supermarkets, for example, have created demand for high-value local products and established supply chains both inside and outside the region. South Africa also has invested in roads, ports, and other market-related infrastructure in neighboring countries, thereby enhancing the potential for regional exports.

Unexploited Agricultural Growth Potential

Economic growth in South Africa creates opportunities for agricultural growth in the region, particularly in neighboring low-income countries. In South Africa during 1994–2003, the GDP increased at 2.78 percent on average while agriculture grew at only 0.98 percent, thereby increasing

excess food demand. The recent acceleration of economic growth in South Africa (4.5–5 percent in 2005 and 2006) is expected to further increase excess food demand, in turn generating market opportunities and reducing demand constraints for low-income countries.

Poor agricultural performance—mainly a result of bad policies or politically unstable environments—has prevented low-income countries from exploiting this potential to date. For example, an urban bias in the economic development policies in Zambia has emphasized the mineral sector to the detriment of the agricultural sector, and recent political instability in Zimbabwe has caused a decline in agricultural production. Although 5-year average yields for maize production in Zambia and Zimbabwe were only 30–40 percent below those of South Africa during the early 1980s, the gap in yield widened to 50 percent in Zambia and 80 percent in Zimbabwe during 2003–05.

Because of these and other failures to exploit its agricultural potential, southern Africa has become a food-deficit region. If maize productivity could recover to its highest historical level, then the competitiveness of domestic production in low-income countries could improve significantly. Such a recovery also would enable the import substitution of maize, livestock, and other commodities, in turn creating opportunities for additional agricultural growth.

Unexploited Agricultural Trade Opportunities

Another possibility for creating regional growth opportunities is the as-yet unexploited potential in agricultural trade. One important step toward realizing this potential is to remove the tariffs and nontariff barriers that exclude low-income countries from competing. commodities that other countries in the region possibly could provide).

Nevertheless, protection is only one of the major barriers to intraregional trade. High transaction costs and underdeveloped production structures—reflected in low productivity levels and inadequate infrastructure—also are significant obstacles. Under the current circumstances (that is, without the proper structures in place), regional integration could lead to economic polarization. The successful implementation of interregional trade would require a combined strategy of trade integration, sectoral cooperation, and policy coordination to address all the trade barriers facing low-income countries in southern Africa.

The obstacles to competition that low-income countries face are reflected in their low levels of participation in the regional market. During 1990–99, intraregional exports grew by 13 percent per year; however, about 75 percent of this expansion originated in South Africa.

REGIONAL GENERAL EQUILIBRIUM MODEL FOR SOUTHERN AFRICA

Model and Data Description

A full evaluation of the role of agriculture in economic growth and food security in southern Africa requires an economy-wide view. To this end, we developed an economywide, multisectoral general equilibrium model that simultaneously and endogenously solves for both quantities and prices across the economies of the region. The model reconciles potential imbalances between demand and supply in the commodity and factor markets after the introduction of a shock (such as a reduction of tariffs or an increase in productivity). This feature makes the model a valuable tool for capturing consumption and production linkages between agriculture and the rest of the economy. The model also maintains equilibrium between the demand and supply of commodities in the world market such that bilateral trade relationships and world commodity prices can be solved simultaneously with other endogenous variables.

The model includes six southern African countries (Botswana, Malawi, Mozambique, South Africa, Zambia, and Zimbabwe), two aggregated subregions (the remaining member countries of SACU and the remaining countries in southern Africa), and various other countries and regions in Africa and elsewhere. The low-income countries of southern Africa that are the focus of the study are explicitly defined in the Global Trade Analysis Project (GTAP) database. The

model focuses on agriculture and includes 21 agricultural and related sectors and 11 nonagricultural sectors, many of which have direct links to agriculture (such as transportation and textiles).

South Africa as a Driver of Growth in Low-Income Countries

Scenario 1 models the impact of economic growth in South Africa to explore its role as a catalyst for growth in low-income countries in southern Africa. This scenario is consistent with the South African government's plans for 2004–14 and reflects the economic trend of the past 25 years. Under this scenario, South Africa's GDP is targeted to grow by 4.5 percent per year, primarily driven by exogenous growth in productivity in the nonagricultural sectors. No additional growth in productivity occurs in South Africa's agricultural sector or in any sector in the other countries inside or outside of southern Africa; therefore, the observed regional growth is induced solely by endogenous growth in South Africa's nonagricultural sector. In brief, Scenario 1 considers the opportunity for low-income countries in southern Africa to respond to the currently increasing excess demand in South Africa for agricultural and food products.

Table 1 —Aggregate effects of model simulations on southern Africa and three low-income countries in the region

Group/scenario	Additional yearly growth rate (%)					
	Real GDP	Real AgGDP	Agricultural trade		Food price index	Food consumption
			Exports	Imports		
Scenario 1						
Region	3.30	1.03	–0.02	1.11	0.45	1.88
Malawi	0.65	0.88	0.45	0.33	0.34	1.00
Mozambique	0.70	0.67	–0.48	0.70	0.41	0.87
Zambia	0.90	1.23	1.19	0.64	0.28	1.21
Scenario 2						
Region	0.02	0.29	0.00	–0.05	–0.04	0.29
Malawi	0.48	2.44	–0.19	–2.71	–1.33	2.59
Mozambique	0.34	1.80	1.09	–0.79	–0.76	1.58
Zambia	0.24	1.68	0.98	–1.90	–0.91	2.03
Scenario 3						
Region	0.01	0.09	0.05	0.01	0.00	0.04
Malawi	0.19	0.78	0.09	–0.36	–0.09	0.28
Mozambique	0.17	0.54	2.67	0.15	0.02	0.25
Zambia	0.18	0.65	2.29	–0.67	–0.07	0.28
Scenario 4						
Region	4.58	2.50	0.10	2.02	0.57	3.27
Malawi	1.16	3.42	0.21	–2.85	–0.99	3.63
Mozambique	1.06	2.51	0.51	–0.23	–0.34	2.46
Zambia	1.20	2.96	1.90	–1.43	–0.62	3.32
Scenario 5						
Region	4.57	2.30	0.14	2.07	0.60	3.02
Malawi	0.88	1.78	0.48	–0.54	0.26	1.31
Mozambique	0.89	1.26	2.10	0.70	0.45	1.12
Zambia	1.14	1.93	3.24	–0.21	0.23	1.56

Source: Authors' Computable General Equilibrium (CGE) model results, 2006.' Notes: AgGDP = agricultural GDP. Scenario 1: Total factor productivity (TFP) growth for nonagricultural sectors = 4.5% in South Africa. Scenario 2: TFP growth for cereal crops and livestock = 4.5% in Malawi, Mozambique, and Zambia. Scenario 3: TFP growth for nontraditional crops = 4.5% in Malawi, Mozambique, and Zambia. Scenario 4: TFP growth for nonagricultural sectors = 4.5% in South Africa, 7% in Botswana, 6% in rest of SACU, and 7% in rest of SADC (Angola) and TFP growth for cereal crops and livestock = 4.5% in Malawi, Mozambique, and Zambia. Scenario 5: TFP growth for nonagricultural sectors = 4.5% in South Africa, 7% in Botswana, 6% in rest of SACU, and 7% in rest of SADC (Angola) and TFP growth for nontraditional crops = 4.5% in Malawi, Mozambique, and Zambia. Results for Zimbabwe are not included because of the particular evolution of its economy and the difficulty of deriving lessons from its present situation. (Zimbabwe is experiencing its worst economic crisis since attaining independence in 1980.)

The aggregate effects on the region of Scenario 1 (as well as of the four other scenarios) are listed in Table 1. GDP growth of 4.5 percent per year in South Africa generates an annual real GDP growth of 0.7 percent in Malawi and Mozambique and almost 1 percent in Zambia. Associated increases in agricultural production and the sales prices of agricultural goods have a profound effect on real agricultural incomes, which increase by 0.67 to 1.23 percent per year in these three low-income countries. Although the higher food prices may hurt the urban poor, total food consumption in the region increases by 1.9 percent per year, and real GDP growth in these three low-income countries ranges from 0.9 percent per year in Mozambique to 1.2 percent per year in Zambia.

How is growth in South Africa spread to low-income countries? In the model simulation, economic growth in South Africa is positive and driven by productivity growth in nonagricultural sectors (which increase incomes and expenditures); agricultural growth is modest or negative because capital and labor are diverted to nonagricultural activities. Combined with nonagricultural growth (which increases incomes and expenditure), this shift away from agriculture increases agricultural imports and the prices of agricultural products in the region, mainly because South Africa is such a large market. Higher prices for agricultural goods in the region in turn induce price increases in the domestic markets of the other southern African countries giving the low-income countries an opportunity to diversify and increase their agricultural exports while decreasing their agricultural imports.

Consider some specific examples. Consumer demand for wheat and maize in South Africa increases by 2.2 and 2.1 per cent per year, respectively, while the production of these two commodities grows by only 1.6 percent per year. Because production growth is outpaced by demand growth, South Africa's net exports of maize and oilseeds decline by 3.5 and 15.9 percent per year, respectively. For high-value agricultural goods with high income elasticities

Table 2 —Effects of selected CGE model simulations on the agricultural subsectors of three low-income countries in southern Africa

Scenario/country	Cereals	Livestock	Crops for domestic market[a]	Nontraditional exports[b]	Traditional exports[c]	Total
Share in agriculture value-added (%)						
Malawi	24.3	3.7	58.9	5.0	8.1	100
Mozambique	12.6	5.3	76.0	1.9	4.3	100
Zambia	29.9	13.6	25.3	11.7	19.5	100
Additional yearly growth rate (%)						
Scenario 1						
Malawi	0.4	0.4	1.0	1.0	0.7	0.8
Mozambique	0.4	0.6	0.2	0.6	0.0	0.2
Zambia	0.8	0.8	0.7	1.3	1.0	0.9
Scenario 4						
Malawi	3.1	6.7	1.4	2.8	0.4	2.0
Mozambique	2.4	11.7	0.2	0.1	–0.4	1.0
Zambia	2.7	9.7	1.3	1.6	1.0	2.8
Scenario 5						
Malawi	0.7	0.6	1.3	10.6	0	1.5
Mozambique	0.5	0.8	0.2	11.6	–0.6	0.4
Zambia	0.9	1.0	1.3	8.5	0.3	1.8

Source: Authors' CGE model results, 2006.
Notes: [a]Roots, tubers, fruits, and vegetables.
[b]Fruits, vegetables, oilseeds, and cotton.
[c]Tobacco, tea, coffee, and cocoa.

(such as fruits and vegetables), the growth of demand is much higher than that of production. The cotton imports of South Africa (already a net importer of cotton) increase by 16 percent as a result of increased demand spurred by growth in the country's textile industry.

The key effects of growth in Malawi, Mozambique, and Zambia are summarized in Table 2 for the five model scenarios. The major contributor to overall economic growth is the increased production of staple crops because the sector is large and growth rates are high. In Malawi, Mozambique, and Zambia, the production of grains and other staple crops accounts for more than 10 percent of GDP, and growth in these same subsectors accounts for 23 to 31 percent of overall GDP growth.

Agriculture as a Driver of Non-Agricultural Growth

Scenarios 2 and 3 consider the potential of the agricultural sectors of southern Africa's low-income countries (again excluding Zimbabwe) as growth engines. Scenario 2 focuses on the role of domestic and regional food markets—specifically, the maize and livestock sectors—and Scenario 3 analyzes the impact of growth in the nontraditional export sector.

As in Scenario 1, productivity is exogenously shocked to grow by 4.5 percent in the sectors and countries in question. The cumulative effect is equivalent to doubling the 2001 yields for maize and livestock by 2015. Application of the same productivity growth rate to each sector in Malawi, Mozambique, and Zambia allows for the evaluation of different responses in each country, which reflect differences in how the regional economic linkages affect each sector in each country's economy. Note that in Scenarios 2 and 3, only the low-income countries experience additional growth, and it is assumed that South Africa experiences no additional productivity growth.

The aggregate effects of subsector growth on total GDP, agricultural GDP (AgGDP), agricultural exports and imports, and other macroeconomic indicators were examined. As expected given the larger share of AgGDP in the three countries, combined growth in maize and livestock production results in an annual growth of 0.24–0.48 percent in total GDP and 1.68–2.44 percent in AgGDP. These effects are much larger than those that result from a productivity shock of the same magnitude applied to nontraditional export crops (Table 1, Scenarios 2 and 3). Growth in maize and livestock outputs has a larger effect on domestic production and import substitution in the three countries; maize imports fall by 12.2–38.7 percent and livestock imports by 8.6–10.8 percent, resulting in a decline in total agricultural imports of 0.8–2.7 percent. However, the major impact of increased productivity in nontraditional export crops is on exports, which increase by 2.3–2.7 percent per year in Mozambique and Zambia.

The expansion of grain and livestock output reduces domestic food prices at a rate of −0.76 percent per year in Mozambique and −1.33 and −0.91 percent per year in Malawi and Zambia, respectively. This reduction in domestic food prices not only explains the significant increases in food consumption but also reflects the existence of demand constraints to the expansion of grain production. Hence, productivity growth in the grain sector can cause a shift in domestic terms of trade against agriculture, negating the income benefit of productivity improvement. In contrast, simultaneous growth in maize and livestock output in all three countries can help improve the terms of trade in the grain sector such that when grain production increases, domestic prices fall while agricultural income increases.

Overcoming Constraints to Domestic Demand for Grains in Low-Income Countries

The last group of scenarios combines nonagricultural productivity growth in middle-income countries with agricultural productivity growth in the three low-income countries, again focusing on staple foods (Scenario 4) and nontraditional exports (Scenario 5). Under both scenarios, South Africa's GDP is again targeted to grow at 4.5 percent per year, whereas growth in Botswana and the rest of the SACU is forecast at 7 and 6 percent, respectively, according to average historical growth rates. The rest of the region (that is, Angola) is targeted to grow at 7 percent as a result of Angola's current economic recovery process. In addition to

Table 3 —Growth in nontraditional exports (%) for three low-income countries in southern Africa

Country	Fruits and Vegetables	Oilseeds	Cotton
Malawi			
Share in total exports	1.9	0.4	1.2
Additional yearly growth in exports	22.3	35.1	24.5
Contribution to growth in agricultural exports	89.1	29.6	57.9
Mozambique			
Share in total exports	10.2	5.7	22.2
Additional yearly growth in exports	20.7	12.7	14.9
Contribution to growth in agricultural exports	39.5	13.7	62.2
Zambia			
Share in total exports	9.3	0.7	10.6
Additional yearly growth in exports	16.8	38.0	21.6
Contribution to growth in agricultural exports	43.6	7.7	63.7

Source: Authors' CGE model results, 2006.
Note: Sums of contributions are greater than 100 because of declines in the exports from other sectors.

nonagricultural growth in middle-income countries, Scenario 4 simulates a 4.5 percent increase in productivity of cereals and livestock in the three low-income countries and Scenario 5 simulates a 4.5 percent growth in nontraditional crops in low-income countries.

Increased economic growth in middle-income countries enhances the effect of productivity growth on farm income. Real AgGDP per capita grows at 2.5, 3.0, and 3.4 percent in Mozambique, Zambia, and Malawi, respectively. These rates are much higher than the corresponding rates obtained under Scenario 2. Economic growth in the middle-income countries also boosts the impact of productivity growth on nontraditional exports in the low-income countries modeled under Scenario 5. GDP growth in Malawi, Mozambique, and Zambia is 7–10 times larger under Scenario 5 than under Scenario 3, in which agricultural export growth is stimulated by improving productivity in these countries alone (Table 1).

Productivity shocks similar to those used in Scenario 2 result in much higher growth rates in the cereal and livestock sectors of the low-income countries when they are stimulated by nonagricultural growth in the middle-income countries. This results in much higher growth in per capita GDP per year under Scenario 4 (1.1–1.2 percent compared with less than 0.5 percent under Scenario 2).The results for growth in the agricultural subsectors under Scenarios 4 and 5 are listed in Table 2.

Unsurprisingly, growth in nontraditional export sectors has a larger impact on agricultural exports than growth in staple crops does (Table 3). In Mozambique, for example, total agricultural exports grow at a rate of 2 percent per year in Scenario 5, compared with only 0.5 percent in Scenario 4. The highest growth rate for agricultural exports is for fruits and vegetables in Mozambique, whereas oilseed exports increase more rapidly in Zambia. However, the major contributor to growth in agricultural exports in both countries is not fruits and vegetables or oilseeds (which both have a small share of total exports) but cotton. This crop has export opportunities for Zambia, where it is still considered a nontraditional export crop. Cotton's share of agricultural exports is 11 percent in Zambia and more than 22 percent in Mozambique.

The model results confirm that agricultural expansion into nontraditional crops offers strong potential for these low-income countries in southern Africa. However, they also highlight the limitations of these crops as engines of agricultural growth because of their small share of agricultural production.

CONCLUSION AND POLICY IMPLICATIONS

Results of our analysis indicate that economic linkages exist between countries in southern Africa that could be exploited to benefit the region's low-income countries. Southern Africa is the only African region where low- and middle-income countries are located within close proximity of each other. This situation provides great potential for growth linkages favoring economic growth through regional production and trade, particularly for agricultural growth in low-income countries. Historically stagnant and even declining levels of productivity and generally favorable conditions also point to significant unexploited potential in agriculture, which—with strong regional trade and investment linkages—also could generate opportunities for agricultural growth in southern Africa's low-income countries.

Analysis of regional characteristics indicates that the excess food demand that results from the growth pattern of the middle-income countries in southern Africa—especially South Africa—offers significant opportunities for agricultural growth in low-income economies. In this unique region growth in middle-income economies provides the additional demand for grain and livestock that low-income countries have the potential to provide. This relationship slows the decline of grain prices that could result from increased production. Also, given the existing gap in maize and livestock production between the region's low- and middle-income countries, low-income countries could potentially accelerate growth in agricultural production by increasing productivity in their maize and livestock sectors.

The analysis results also indicate strong potential for countries to diversify their exports by increasing the production of nontraditional crops. The expansion of nontraditional agricultural exports would require investing in sanitary measures and harmonizing quality standards across the region Although the impact of private investment on regional trade was not studied, it is important to mention that new FDI flows and technology spillovers from South Africa—especially in research and development (R&D) and food retailing and processing—could boost regional exports by creating direct linkages between demand in South Africa and production in the low-income countries (although retailing could possibly threaten domestic linkages within low-income countries).

Such a strategy is unlikely to affect overall growth in the agricultural sector or make a serious dent in rural poverty because nontraditional exports represent a relatively small share of AgGDP and employment. Instead, improvements in the staples and livestock subsectors stand to bring about larger gains in terms of accelerating agricultural growth, ensuring food security, and reducing poverty rates.

The productivity of the staples and livestock subsectors will improve only if fundamental barriers to increased agricultural productivity and competitiveness can be removed, especially in the poorer countries. Such barriers include restrictive domestic policies that prevent the movement of grain between surplus and deficit areas, inefficient input delivery and procurement systems, poor road infrastructure (especially rural feeder roads), and weak or nonexistent rural support services and institutions (for example, credit lenders), all of which lead to excessively high transportation and transaction costs. Even if some of these barriers can be removed, whether low-income countries will be able to take advantage of the economic growth of their richer neighbors also will depend on how well public investments, institutions, and policies can be harmonized across countries. Without such changes, the tendency toward economic polarization will only be exacerbated.

Strengthening initiatives designed to promote greater regional cooperation is an important first step. However, the existing overlap of regional economic communities in southern Africa poses an additional challenge. For example, countries that belong to both COMESA and SADC—such as Malawi and Zambia—often must balance conflicting interests in both communities. In contrast, South Africa does not belong to COMESA but does belong to SACU, the long-established customs union. Different and overlapping obligations like these can potentially restrict effective negotiations on trade and labor migration between member countries. For example, a Malawian or Zambian who wishes to travel to South Africa still must obtain a visa

(which can take more than 10 days). This requirement inevitably introduces high transaction costs among private traders who wish to transport goods and services between countries. Results of the computable general equilibrium (CGE) model presented here indicate a potential for huge gains from regional integration. However, if such gains are to be captured, many institutional and policy barriers must be relaxed or removed. SADC and COMESA can play this important role. Within each body, some evidence already exists of greater cooperation among member countries to commit more resources to agricultural development and to harmonize policies and development strategies. This concept is exemplified in the goals of the Comprehensive Africa Agriculture Development Programme (CAADP) and the Regional Indicative Strategic Development Plan (RISDP) initiatives. Finally, as part of their negotiations under these initiatives, low-income countries must insist on developing stronger and more efficient regional markets for cereals, livestock products, and agricultural inputs.

The research results presented here are based on Nin Pratt and Diao, "Exploring Growth Linkages and Market Opportunities for Agriculture in Southern Africa," DSGD Discussion Paper 42 (Washington, D.C.: IFPRI, 2006). Alejandro Nin Pratt, Xinshen Diao, and Michael Johnson are research fellow, senior research fellow, and research fellow, respectively, in IFPRI's Development Strategy and Governance Division. Isaac Minde is senior scientist at the International Crops Research Institute for the Semi-Arid Tropics in Zimbabwe. Pius Chilonda is ReSAKSS-SA Coordinator and Femi Olubode-Awosola is postdoctoral fellow, both at the International Water Management Institute in South Africa.

The Regional Strategic Analysis and Knowledge Support System (ReSAKSS) is an Africa-wide network involving three regional nodes. Each node has been established by three of the leading regional economic communities (RECs) in sub-Saharan Africa—the Common Market of Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC)—in collaboration with the International Food Policy Research Institute (IFPRI) and Africa-based centers of the Consultative Group on International Agricultural Research (CGIAR) as part of the AU/NEPAD's Comprehensive Africa Agriculture Development Programme (CAADP) implementation process.

The ReSAKSS nodes facilitate access by the RECs and their member states to policy-relevant analyses of the highest quality in order to improve policymaking, track progress, document success, and derive lessons that can feed into the review and learning processes associated with the implementation of the CAADP agenda. ReSAKSS is jointly funded by the United States Agency for International Development (USAID), UK Department for International Development (DFID), and the Swedish International Development Cooperation Agency (SIDA). The Southern Africa ReSAKSS node (ReSAKSS-SA) is jointly implemented by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the International Water Management Institute (IWMI), in collaboration with regional and national partners. This brief has undergone a standard peer-review process involving one reviewer from within the ReSAKSS network of technical partners.

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