



RESEARCH  
REPORT

107

# Agricultural Growth Linkages in Sub-Saharan Africa

Christopher L. Delgado

Jane Hopkins

Valerie A. Kelly

with

Peter Hazell, Anna A. McKenna, Peter Gruhn,  
Behjat Hojjati, Jayashree Sil, and Claude Courbois

## **IFPRI Board Of Trustees 1998**

Martin Piñeiro, *Chair, Argentina*

Susan Horton, *Vice Chair, Canada*

Baba Dioum, *Senegal*

Wenche Barth Eide, *Norway*

Rebeca Grynspan Mayufis, *Costa Rica*

Godfrey Gunatilleke, *Sri Lanka*

Heba Ahmad Handoussa, *Egypt*

Uwe Holtz, *Germany*

Arie Kuyvenhoven, *Netherlands*

Susumu Matsuoka, *Japan*

Geoff Miller, *Australia*

Solita Monsod, *Philippines*

Benno Ndulu, *Tanzania*

I. G. Patel, *India*

G. Edward Schuh, *U.S.A.*

Per Pinstrup-Andersen, *Director General, Ex Officio, Denmark*

The International Food Policy Research Institute is a member of the Consultative Group on International Agricultural Research and receives support from the Arab Fund for Economic and Social Development, Asian Development Bank, Australia, Belgium, Brazil, Canada, CARE, China, Colombia, Denmark, the European Commission, Food and Agriculture Organization of the United Nations, the Ford Foundation, France, the German Agency for Technical Cooperation, the German Federal Ministry for Economic Cooperation and Development, India, the Inter-American Development Bank, the International Development Research Centre (Canada), the International Fund for Agricultural Development, Ireland, Italy, Japan, the Land and Agriculture Policy Centre (South Africa), Malawi, Mozambique, the Netherlands, Norway, the Overseas Development Institute, the Philippines, the Rockefeller Foundation, South Africa, Spain, Sweden, Switzerland, the United Kingdom, the United Nations Development Programme, the United Nations Sub-Committee on Nutrition, the United States, Venezuela, the World Bank, and World Vision.

# **Agricultural Growth Linkages in Sub-Saharan Africa**

Christopher L. Delgado

Jane Hopkins

Valerie A. Kelly

with

Peter Hazell, Anna A. McKenna, Peter Gruhn,  
Behjat Hojjati, Jayashree Sil, and Claude Courbois

International Food Policy Research Institute  
Washington, D.C.

---

Copyright 1998 International Food Policy Research  
Institute

All rights reserved. Sections of this report may be  
reproduced without the express permission of but with  
acknowledgment to the International Food Policy  
Research Institute.

**Library of Congress Cataloging-in-Publication Data**

Agricultural growth linkages in sub-Saharan Africa /  
by Christopher L. Delgado . . . [et al.].

Includes bibliographic references (p. ).

ISBN 0-89629-110-3

1. Agriculture—Economic aspects—Africa, Sub-  
Saharan. 2. Agriculture and state—Africa, Sub-  
Saharan. I. Delgado, Christopher L. II. International  
Food Policy Research Institute.

HD2117.A3514 1998

338. 1'0967—dc21

98-52778

---

# Contents

Tables	iv
Foreword	vii
Acknowledgments	ix
Summary	xi
1. Introduction	1
2. Concepts, Prior Work, and Issues Pertaining to Agricultural Growth Linkages	5
3. Methodology and Overview of Case Studies	25
4. North to South in Burkina Faso	41
5. Southwestern Niger	57
6. The Senegalese Groundnut Basin	79
7. Eastern Province, Zambia and Gazaland District, Zimbabwe	99
8. Conclusions	119
Bibliography	133

---

## Tables

1. Consumption parameters affecting growth linkages in Malaysia and Nigeria	12
2. Agricultural growth multipliers in Africa and Asia	14
3. Fixed-price agricultural growth multipliers in Africa and Asia adjusted for an inelastic supply of nontradables	16
4. Characteristics of samples and study zones	27
5. Characteristics of the ICRISAT/IFPRI sample households, by agro-ecological zone, Burkina Faso, 1981–85	42
6. Assumptions about tradability by reference market, Burkina Faso	44
7. Parameter assumptions for model estimation, Burkina Faso	46
8. Household consumption patterns, rural Burkina Faso, 1984/85	47
9. Marginal budget shares by sector, income, and ecological zone, Burkina Faso, 1984/85	48
10. Farm and nonfarm growth multipliers for rural Burkina Faso, 1984/85	49
11. Sensitivity analysis for parameters (percentage change in multiplier from a 10 percent change in parameter)	52
12. Sources of income growth from linkages by catchment area, income group, and ecological zone, Burkina Faso, 1984/85	53
13. Selected zone, sample, and household characteristics, Dosso, Niger, 1989/90	61
14. Share of nontradables in consumption expenditures by commodity group for alternative tradability assumptions, Dosso, Niger, 1989/90	63
15. Independent variables included in the Engel function regressions, Niger	65
16. Technical parameters used in growth multiplier calculations, Dosso, Niger, 1989/90	66
17. Expenditure patterns for Sudano-Sahelian and Sudano-Guinean zones, Dosso, Niger, 1989/90	67
18. Spending patterns for lower and upper expenditure terciles, Dosso, Niger, 1989/90	70
19. Average and marginal budget shares by sector for overall sample and sample subgroups, Dosso, Niger, 1989/90	73

20. Growth multipliers and decomposition of multipliers under alternative tradability assumptions for initial income shocks to tradable farm and nonfarm sectors, Dosso, Niger, 1989/90	74
21. Zone characteristics, southeastern and central Groundnut Basin, Senegal, 1989/90	80
22. Sample household characteristics, southeastern Groundnut Basin, Senegal, 1989/90	81
23. Sample household characteristics, central Groundnut Basin, Senegal, 1989/90	82
24. Average annual per capita expenditure by product, southeastern and central Groundnut Basin, Senegal, 1989/90	84
25. Classification of goods into farm and nonfarm and tradable (T) and nontradable (NT) categories, southeastern and central Groundnut Basin, Senegal, 1989/90	85
26. Technological coefficients and savings ratio used to calculate growth multipliers in southeastern and central Groundnut Basin, Senegal, 1989/90	87
27. Average and marginal budget shares by definition of tradability, southeastern Groundnut Basin, Senegal, 1989/90	89
28. Average and marginal budget shares, by definition of tradability, central Groundnut Basin, Senegal, 1989/90	90
29. Average and marginal budget shares by income group and presence of market, southeastern Groundnut Basin, Senegal, 1989/90	91
30. Average and marginal budget shares by income group and presence of market, central Groundnut Basin, Senegal, 1989/90	92
31. Value of the regional value-added multiplier, southeastern Groundnut Basin, Senegal, 1989/90	94
32. Value of the regional value-added multiplier, central Groundnut Basin, Senegal, 1989/90	95
33. Seasonality in wage and nonfarm business earnings of the average farm household in Eastern Province, Zambia	102
34. Mean annual farm input expenditure per hectare by farm size quartile in the plateau and valley regions, Eastern Province, Zambia, 1986	103
35. Mean annual farm investment expenditures by farm size quartile in the plateau and the valley regions of Eastern Province, Zambia, 1986	104
36. Annual consumption expenditure by the average farm household, Eastern Province, Zambia, 1986	104
37. Independent variables included in Zambia regressions	105
38. Expenditure behavior of the average farm household, Eastern Province, Zambia, 1986	106
39. Marginal budget shares by per capita expenditure decile, Eastern Province, Zambia, 1986	110

40. Marginal budget shares by farm size decile, Eastern Province, Zambia, 1986	111
41. Semi-input–output parameters for the Zambian study region	113
42. Regional income multipliers for valley and plateau agriculture	113
43. Comparison of purchasing expenditure behavior of the average household in Zambia, 1986, and Zimbabwe 1987/88	115
44. Rural household expenditure behavior in the study zones	123
45. Estimated total extra income generated by \$1.00 in extra income from production of tradables (including the initial \$1.00)	125
46. Marginal budget shares by income group, Burkina Faso, Niger, and Senegal	127
47. Source of growth linkages by sector and income group in West Africa	128

---

## Foreword

**T**he widespread increase in rural purchasing power under the Green Revolution in Asia during the 1970s was key to increased rural employment and industrialization. Studies suggested that an extra dollar of agricultural income was typically associated with an additional \$0.80 of nonagricultural income from local enterprises stimulated by the spending of farm households. Studies in Africa, where the Green Revolution was harder to discern, tended to be much more pessimistic.

This report revisits these issues using especially detailed panel data sets on rural consumption and incomes, collected by IFPRI and collaborating national institutions for a variety of purposes during the mid to late 1980s in Burkina Faso, Niger, Senegal, Zambia, and Zimbabwe. Results suggest that household spending of higher rural incomes from increased exports has the potential to greatly stimulate further rural income increases, on a scale that even surpasses experience in Asia. Central to this is the claim that many of the goods and services that figure heavily in rural consumption patterns in Sub-Saharan Africa are nontradables at current transport costs and prices. These include perishable fruits, vegetables, animal products, and prepared foods, services of all kinds, local handicrafts, and some bulky local starches of too low value to bear the costs of importing or exporting.

By focusing on the nontradable nature of large sectors of African rural economies, the report evokes a theme central to many of IFPRI's fieldwork-based studies: why some development strategies are more effective at achieving both growth and poverty alleviation than others. Sustained growth in rural incomes that is widely spread across households is shown to be an effective way to furnish the sustained additional local purchasing power necessary to promote aggregate production of nontradable items, while increasing the incomes of large numbers of poor people. The report does not deal with the interventions necessary to start growth in rural areas, other than to illustrate that it must involve bringing new external funds into localities on a recurring basis, such as would be the case from expansion of agricultural exports.

The report thus also raises another major theme of IFPRI's work, the complex role of agricultural and food policy in overall economic development. Jump-starting the production of agricultural tradables is shown to have much higher returns than thought previously, because of growth linkages. Conversely, rising food staple prices are

shown to have the potential to choke off growth from demand-side linkages if the conditions for a high supply response to prices are not in place. Success in raising household incomes in rural areas will rapidly lead to greatly increased demand for wage goods such as food, many of which are nontradable in rural Africa. If increased local production is not forthcoming, the relative price of these items will rise rapidly, reducing the welfare of large numbers of poor people and eventually raising production costs for the agricultural tradables that provide the engine of growth.

Per Pinstруп-Andersen  
Director General

---

## Acknowledgments

**T**he authors gratefully acknowledge financial support by the United States Agency for International Development (USAID), Africa Bureau, Office of Analysis, Research, and Technical Support, Division of Food, Agriculture, and Resources Analysis, Basic Ordering Agreement, DAN-4111-B-00-9112-00, and most particularly the enthusiastic encouragement of George Gardner, Shirley Pryor, and John van Dusen Lewis of USAID.

The project could not have been attempted without the prior existence of detailed household-level data sets collected by the International Food Policy Research Institute (IFPRI) in collaboration with various African and Consultative Group on International Agricultural Research (CGIAR) partner institutions. The close involvement in the present project of members of the original country research teams that collected the data was also essential, both to ensure that the data were interpreted correctly and to add location-specific knowledge to the analysis.

The research team also acknowledges with gratitude its debt over many years to other colleagues who were involved with the projects that originally collected the data and helped shape the views of the present authors. In particular, Thomas Reardon, currently of Michigan State University (MSU), had a key role in shaping much of IFPRI's work in the Sahel in the 1980s, most particularly on income diversification and household expenditure issues.

The Burkina Faso data set was collected in 1984/85 in collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Peter Matlon, then ICRISAT's lead economist for West Africa, and Thomas Reardon, then of IFPRI, assisted by Christopher Delgado, played lead roles in designing the survey and collecting the household expenditure data used in Chapter 4.

The Niger data set was collected in 1989/90 in collaboration with the Institut National de la Recherche Agronomique du Niger (INRAN) and the ICRISAT Sahelian Center. Samba Ly of INRAN, Thomas Reardon, and Jojo Baidu-Forson of ICRISAT collaborated with Jane Hopkins on the collection of the Niger data used in Chapter 5.

The Senegal data set was collected in 1989/90 in collaboration with the Institut Sénégalais de Recherches Agricoles (ISRA). Thomas Reardon, and Bocar Diagana and Abdoulaye Fall of ISRA collaborated with Valerie Kelly in the collection of the

Senegal data used in Chapter 6. Special acknowledgment is also made of the assistance of Aliou Diagne, then of MSU and now of IFPRI, in improving the analysis of the Senegal expenditure data.

The Zambia data set was collected in 1985/86 in collaboration with the Rural Development Studies Bureau of the University of Zambia. John Milimo, then of the Rural Development Studies Bureau, Raphael Celis, then of IFPRI, and Sudhir Wanmali and Neal Bliven of IFPRI collected the Zambian data used in Chapter 7, with survey design input from Peter Hazell.

The Zimbabwe data were collected in 1987/88 in collaboration with the Department of Physical Planning, Ministry of Local Government, Rural and Urban Development, Government of Zimbabwe. Sudhir Wanmali of IFPRI and Jonathan Zamchiya of the Department of Physical Planning, Zimbabwe, collected the Zimbabwe data used in Chapter 7.

The authors would also like to acknowledge the helpful written comments received on previous drafts from Keijiro Otsuka and Dean DeRosa. They are also very grateful for the copious, detailed, and insightful comments received from Alain de Janvry. Remaining deficiencies of the report are the responsibility of the authors.

Within this team-authored document, primary responsibility was taken as follows: Christopher Delgado drafted the summary; Delgado, Jane Hopkins, Valerie Kelly, and Claude Courbois drafted the introduction; Delgado and Anna McKenna drafted the survey of the literature; Delgado and Jayashree Sil drafted the conceptual framework, the model (based on previous work by Peter Hazell), and the Burkina Faso chapters; Hopkins, Delgado, and Peter Gruhn drafted the Niger chapter; Kelly, Delgado, and McKenna drafted the Senegal chapter; Hazell and Behjat Hojjati drafted the Zambia and Zimbabwe chapter; and Delgado, Hopkins, and Kelly drafted the conclusion. Overall editing and revision in response to reviewers' comments were carried out by Delgado and Courbois.

---

## Summary

**R**ural income growth from increased crop production can have multiplicative effects on a region when that income is spent on local goods and services that would not otherwise have had a market outlet. These spin-off effects on local activities from the spending of increased farm incomes are called “agricultural growth linkages,” and they were shown to be an important element in the creation of rural industry in Asia following the Green Revolution in cereals production. Yet it has been hard to demonstrate the existence of such spin-offs from crop growth in Africa, since additions to farm income have typically been spent on goods that are considered to be either imports to rural localities or displacements of potential exports from them. Thus, until now, the extra effects on production of rural income growth in Africa were thought to be lost (from the standpoint of local employment) to imports, or thought to displace production that would otherwise have been exported from the local region.

After reviewing the literature on agricultural growth linkages in Africa, this report examines the mix of farm and nonfarm goods and services that rural Africans purchase, and the implications of these expenditures for rural economic growth in five African countries: Burkina Faso, Niger, Senegal, Zambia, and Zimbabwe. In the West African countries, in addition to farm and nonfarm sectors, individual commodities are sorted into tradable and nontradable categories, and by geographic zones of interest: local, national, and multicountry regional. The same process is followed in Southern Africa for Zambia, but no assumptions are made on regional tradability because of lack of data. Fully comparable data were not available for Zimbabwe, but some similarities in rural consumption patterns could be detected.

The classification of goods as tradable or nontradable is based on the judgment of those who collected the data, extensive field inquiry into what was actually consumed, judgment as to where products consumed typically originated, and whether tradable substitutes (in the sense that their price movements were in tandem) were available locally. Food was a big item in household expenditures, and, as it turned out, many foods consumed were nontradables. Earlier studies also noted the high propensity to spend increments to income on food in Africa, but mistakenly classified virtually all important foods as tradables, following the assumptions made in Asia. Thus demand for additional food in the earlier studies was considered a “leakage”: spending increments to

income on tradable goods (including food) was thought to either decrease the quantity of goods available for local export or increase the amount the region spent on imports. It is not surprising that previous estimates of rural growth multipliers in Africa have generally been very low.

The results of this report are much more optimistic, largely because the underlying assumptions about tradability follow African conditions more closely, but also because of the unusually detailed data used on the flows of consumption expenditure over the year. These were from weekly or biweekly repeated interviews, which captured both food consumption patterns and total expenditures (a proxy for household income) especially well.

The way rural people spend increments to income is measured in the report as average budget shares—the percentage of total household expenditures going to a given group of goods and services—and marginal budget shares (MBS)—the percentage of the last unit of income earned that is allocated to the goods or services in question. MBSs are estimated econometrically and show the direct impact of unit income changes on consumption. The MBS for nontradables was 47 percent in Niger and about 33 percent in Senegal, suggesting that an ample share of rising incomes will be spent on items that would not otherwise have a market outlet and conversely no alternative source of supply. Examples are processed and unprocessed foods, inputs to agriculture, and services. If the new demand for these goods cannot be met because of supply rigidities, hefty price increases could result.

The MBS for nontradables as a group is the single most important determinant of the magnitude of estimated growth multipliers. In the four-sector, modified, semi-input–output model used, this was decomposed into farm and nonfarm items. Other determinants were technical coefficients of input use, value-added shares by sector, and the savings ratio. Multipliers were calculated by solving the set of regional equations that balanced consumption and availability of goods and services.

The report finds that the farm sector in Africa is better able to propagate income growth than previously thought. Growth in household income that comes from increases in agricultural production, perhaps spurred by new technology or changes in export prices, is largely spent on farm and nonfarm items that are nontradable, such as perishable foods, services, and locally produced nonfarm goods. Overall the report finds that adding US\$1.00 of new farm income potentially increases total income in the local economy—beyond the initial \$1.00—by an additional \$1.88 in Burkina Faso, by \$1.48 in Zambia, by \$1.24 to \$1.48 in two locations in Senegal, and \$0.96 in Niger.

Given the methodology used, these are upper bounds of the potential gains. Actual gains may be as much as 30 percent less, due to possible rigidities in the supply responsiveness of nontradables to price rises under African conditions. Even so, the results are substantial, suggesting that \$1.00 of initial growth in rural agricultural incomes leads to an additional \$1.00 on average of income from production of rural nontradables. This implies that the overall benefit of finding a way to boost rural incomes (from additional exports, say) on the supply side is probably twice as high as the immediate return from the activity that was promoted in the first place.

## CHAPTER 1

---

# Introduction

**T**he objective of this report is to demonstrate the extent of linkages between farm and nonfarm sectors and between nontradable and tradable goods sectors in Sub-Saharan Africa and to illustrate how these linkages can shape and accelerate rural economic growth. The farm sector is defined here to include all unprocessed agricultural goods, such as raw crops and livestock. Everything else, including processed farm items, is counted in the nonfarm sector. The term “nontradable” is used for goods that at prevailing relative prices are rarely, if ever, traded across the borders of the chosen zone of analysis. Nontradables also must not have close tradable substitutes that are available locally. This implies that the domestic price of the nontraded good is not likely to be well correlated with the domestic price of any tradable good that could play the same role in the consumption basket. By convention, services are always nontradables, since the service is completely performed locally, and it can neither be imported nor exported. Perishable foods are often nontradable because of the risk of loss in transit. Tradables, on the other hand, can in theory always be imported or exported at a constant price determined by a reference market outside the region in question.

This report contends that output growth in farm tradables that results from the alleviation of supply constraints—from technological progress or better infrastructure, for example—can potentially have major secondary growth effects via the demand created in rural areas for nontradables. Many items consumed in rural areas are in fact nontradables, and many of these nontradables are staple foods. Therefore, policies to improve the production response of producers of nontradables are important for two main reasons. First, an increase in the supply of nontradables would help capture the opportunity for additional income growth from these demand effects. Second, as incomes rise, an increased supply of nontradables that people wish to spend additional income on would help prevent price increases that would put pressure on nominal wages. Such price pressures could lead to higher production costs and reduce output growth in that sector.

This report presents five case studies of demand linkages in a variety of country situations in Sub-Saharan Africa. In each case, researchers examine the mix of farm and nonfarm goods and services that rural Africans purchase, the potential of these expenditure patterns for encouraging growth in rural areas by stimulating demand, and

the interventions necessary to sustain overall rural economic growth arising from initial growth in farm tradables stimulated by economic reforms such as structural adjustment programs. From these studies, it appears that the farm sector is potentially better able to propagate income growth than previously thought. Increased household incomes from exports are spent on farm and nonfarm items whose production was constrained by inadequate local demand; this spending in turn has spin-off effects that generate even more new income. The analysis in this report is based on empirical estimation of demand patterns coupled with assessment of the implications of demand parameters with respect to income, using the methodology of fixed-income agricultural growth multipliers.

Growth multipliers indicate the upper limits of the extra net income that could be had in rural areas from new production of nontradable goods and services stimulated by consumer and intermediate spending of new household income originating from the tradable sectors. These increments to income could come from technological progress in the production of tradable items, improvement in export prices, and so forth.

The actual multiplier is a numerical solution to a regional-level model of supply and demand that incorporates household demands and intermediate demands between sectors, and it explicitly models these interrelationships. Like all regional models, in computing costs and benefits, the results depend largely on what is included in the geographical area of interest and what is outside. The study takes the region of interest as “national,” but occasionally also cites the results of using multipliers calculated with a more restrictive definition of the region of interest (“local”) and a less restrictive one (“regional multicountry”).

The choice of the region of interest defines the amount of trade “leakage,” so that a larger catchment area, which implies a higher share of nontradables in consumer and intermediate demands, is associated with a higher multiplier. Therefore, there is little analytical interest in directly comparing the result of a change of assumptions. On the other hand, such a comparison is useful for illustrating the sensitivity of results to changes in assumptions about tradability. The national definition of tradability is the most useful definition for the classification procedure used in making assumptions about tradability.

Growth linkages of the type dealt with here occur only if underemployed resources are drawn into production by new local demand. This can only occur if there are underemployed resources and if those resources can be drawn into production to meet additional demand without major price increases. Resources are assumed to be underemployed if there is insufficient demand to purchase what the resources produce, typically because of remoteness and poverty. Local prices for these demand-constrained items exceed what they can be sold for locally for export but are less than would be required to make them a profitable import. Because new effective demand for these nontradable items cannot be met by imports (by definition), they have to be met by increased local production. The additional income created by respending of the initial income on nontradable goods produced by previously underemployed local resources creates a multiplier effect.

Numerical results from fixed-income multiplier models are best thought of as upper limits rather than firm predictions of how much additional growth in nontradables

will occur from the initial shock to the tradables sector. This is because they are based on an assumed infinite supply elasticity for nontradable goods: extra demand is met by increased production at a “fixed price” (hence the name for this class of model). In other words, rapid growth in demand for nontradable foods because of an export boom is assumed to result in increased production of nontradable foods, not higher prices for these items. It seems likely that in Africa, rapidly increasing demand for nontradables will be met with less than perfectly elastic supply; part of the increased local spending on nontradables will be accounted for by higher prices rather than increased output. The more local production is constrained by demand, as would be the case where underemployed labor and land are available, the closer the true multiplier effects are likely to be to estimated multipliers.

Multiplier analysis in general and this report in particular build on the tradition, established in the study of Asian development, of exploring the role of agricultural growth in promoting overall rural employment through spin-off effects (Johnston and Mellor 1961; Mellor 1966, 1976, 1986). These effects, or “growth linkages,” are created by the addition of substantial new local household purchasing power in periods of rapid agricultural development. This new purchasing power under some conditions stimulates additional production and employment.

Using case studies from Burkina Faso, Niger, Senegal, Zambia, and Zimbabwe, the report demonstrates empirically the importance of rural growth linkages in stimulating rural African economies. In each case study, the research examines the mix of agricultural and nonagricultural goods and services that rural Africans purchase, the implications of these expenditure patterns for the potential to stimulate growth in rural areas, and the conditions necessary to deal with expected surges in demand from growth in tradable agriculture stimulated by economic reforms such as structural adjustment programs.<sup>1</sup> The investigation reveals an agricultural sector that is better able to propagate income growth than previously thought (Hirschman 1958; Hazell and Röell 1983—the latter for West Africa), including growth in nonagricultural incomes.

Unlike planners in Asia and Latin America in an earlier era, decisionmakers on development strategy in Sub-Saharan Africa are still debating priorities for achieving rapid growth and specifically the role of agriculture (Delgado 1991). In Asia prior to the 1970s, it was clear that agriculture was a lead sector and that foodgrain production by smallholder farmers was the central priority for agricultural development (Mellor 1966). In much of Latin America, less emphasis was placed on agriculture historically than on import-substituting industrialization (Hirschman 1958). In Africa, debate continues over the role of agriculture in economic development generally, but also about priorities for export versus food crops, large versus small farms, mechanical versus biological technology, and so forth (Delgado, Mellor, and Blackie 1987; Delgado 1996).

Yet the agricultural sector accounted for 40 percent or more of GDP in a third of all Sub-Saharan African countries in 1994 (World Bank 1996). Agriculture accounted

---

<sup>1</sup> The present study is not focused on structural adjustment and therefore uses the term solely as shorthand to connote those economic reforms, recently carried out in many African countries, that are designed to improve the competitiveness of domestic production of tradable goods.

for an average of 34 percent of GDP in low-income and 8 percent of GDP in middle-income Sub-Saharan African countries in 1996 (World Bank 1998). In 1993 agricultural products made up 33 percent of the value of exports from low-income, nonoil-exporting, Sub-Saharan African countries (World Bank 1996). Of the 20 countries for which data were available for 1980–92, 13 had at least 50 percent of their economically active male population working in agriculture. Four of those countries had over 75 percent of their male population working in agriculture. For the female population, 14 out of 20 countries reported more than 50 percent working in agriculture (World Bank 1996). Agriculture remains a vital element in the structure of these economies; misconstruing its proper place in the growth process could lead to significantly lower national income levels.

This report argues that the prime entry point for investigating the true importance of agriculture to overall economic development lies in establishing empirically the nature of the linkages between agricultural growth and growth in other sectors of the economy. It also addresses how the importance of these linkages is likely to differ between open and closed economies, given the relative importance of agriculture to overall employment; reviews the growth linkages literature from Asia and Africa; examines in detail the factors that affect the magnitude of growth linkages in Africa; and draws conclusions about the key issues to consider in examining these growth linkages.

Chapter 2 outlines prior work on agricultural growth linkages. Chapter 3 presents an overview of the case study data, the formal model, assumptions, and research methods used in the country studies. Chapters 4, 5, and 6 are devoted to the Burkina Faso, Niger, and Senegal case studies, respectively. Chapter 7 discusses the Zambia case study, with sections to identify similar elements in Zimbabwe, although analysis of Zimbabwe is limited by the lack of fully comparable data. Chapter 8 presents the overall conclusions of the case studies as a group. It should be borne in mind throughout that the empirical analysis is drawn from price effects—income and other nonprice variables are the postulated determinants of demand. Furthermore, agricultural growth multipliers are a normative technique—they show what both possible and desirable, given underlying assumptions, but they do not measure the possibilities.

## CHAPTER 2

---

# Concepts, Prior Work, and Issues Pertaining to Agricultural Growth Linkages

**A**s a concept, agricultural growth linkages has a long tradition in the literature seeking to assess the role of agriculture in economic development. It grew out of the search for ways to promote the industrialization of poor, agrarian societies. Over time, the concept has become more formalized. Debates have also increasingly tended to focus on the likely magnitudes of a few key parameters that tend to drive numerical solutions in simplified quantitative models. This chapter will review the concept and its formalization, but only briefly look at ways that it can be made much more complicated. Instead, the emphasis will be on the underlying issues and simple insights that can be gleaned from pursuing this kind of research and their significance for development strategy.

### **Agricultural Linkages to Overall Growth in Closed and Open Economies**

In the tradition of Hirschman's (1958) work in Latin America, early studies on economic linkages between industries or sectors, focused only on production linkages. These were classified as "backward" and "forward" linkages arising from any new production activity. The demand for inputs derived from the new activity are the backward linkages; for example, new net demand for logs arising from establishment of a sawmill. New productive activities that arise as a result of having a new intermediate product on the market are the forward linkages. For example, the increased output of boards from the sawmill (or decreases in the price of boards) would stimulate the construction industry.

Agricultural growth was thought not to have strong backward and forward production linkages. It stimulated little new demand for intermediate inputs or new investment in downstream activities. This led to the conclusion that encouraging agriculture was not a high priority for fostering growth in developing countries. Hirschman

(1958) argued that public investment should be directed toward nonagricultural sectors, which typically have greater production linkages to the overall economy, resulting in higher multiplier effects (Hazell and Röell 1983). An “anti-agriculture” mindset was undoubtedly also encouraged by the elasticity pessimism debate of the time concerning agricultural exports (Prebisch 1959). This held that the demand of the developing countries for the manufactured exports of the developed countries would grow much faster than the demand of the developed countries for the agricultural commodity exports of the developing countries, leading to declining terms of trade for agricultural exporters. Perhaps a general Malthusian concern with diminishing marginal productivity in agriculture also was a factor.

Furthermore, Hirschman espoused the “unbalanced growth” hypothesis, whereby the essence of development strategy was to stimulate production in those areas, typically industrial, thought to exhibit high backward and forward linkages (that is, “growth poles”). In relatively open, small economies, pressure on the prices of food and other wage goods from growth of employment in tradable sectors can be met through increased imports of the things workers wish to consume. Thus, no particular importance was attached to having domestic agricultural output grow at the same rate as nonagricultural output.

The case for agriculture as a motor for overall growth is enhanced by focusing on the impact that growth in the agricultural sector has on incomes and hence on rural demand for consumer goods and services from outside the agricultural sector, particularly when the economy in question is largely closed to trade. Inspired by the experience of India during the Green Revolution, with a large, relatively closed economy, Mellor (1966) and Adelman and Morris (1973) point out that although production linkages from the agricultural sector (especially subsistence agriculture) may in fact be weak, having little direct effect on growth outside of agriculture, consumption linkages from the agricultural sector clearly do have major indirect effects on the rest of the economy.

The argument hinges on the view that economic development in a closed economy is a process of balanced growth between agriculture and nonagriculture (see also Nurkse 1953). Growth in one sector is quickly choked off if consumption and production of intermediate goods are inelastic. For example, industrial growth from the transfer of capital and labor out of agriculture is choked off if demand for extra food arising from extra wage income is not met with increased food production. Resulting food price increases are quickly translated into demand for higher wages, which shrink industrial profit ratios. Conversely, food production growth will quickly lead to declining producer incomes if employment, and thus food demand, is not rising fast enough to absorb the additional food produced without a drastic reduction in prices.

In Mellor’s view, in addition to the marginal propensity of landlords to invest agricultural profits in nonagricultural ventures, the overall intersectoral impact of growth in food production depends on how much of the extra wage income is spent on labor-intensive, nonagricultural goods and services, and how much is spent on the increased food production itself or leaks out into savings or imports. Responding on food is in