

DSGD DISCUSSION PAPER NO. 4

**PUBLIC EXPENDITURE, GROWTH, AND POVERTY
REDUCTION IN RURAL UGANDA**

Shenggen Fan, Xiaobo Zhang, and Neetha Rao

Development Strategy and Governance Division

International Food Policy Research Institute

2033 K Street, N.W.

Washington, D.C. 20006 U.S.A.

<http://www.ifpri.org>

March 2004

Copyright © 2004 International Food Policy Research Institute

DSGD Discussion Papers contain preliminary material and research results, and are circulated prior to a full peer review in order to stimulate discussion and critical comment. It is expected that most Discussion Papers will eventually be published in some other form, and that their content may also be revised.

ACKNOWLEDGEMENTS

The authors acknowledge financial support from the World Bank and USAID. They are grateful to the Uganda Bureau of Statistics, Ministry of Planning, Finance, and Economic Development (MPFED), and the staff of the IFPRI Uganda Office, particularly Dr. Ephraim Nkonya and Simon Bolwig, for their assistance in collecting most of the data used in this report. They also thank Peter Hazell, Jock Anderson, Karen Brooks, and Rob Townsend for helpful comments, and Nienke Beintema, who provided most of the data and information on agricultural research in Uganda. Any remaining errors are the responsibility of the authors.

TABLE OF CONTENTS

| | |
|---|-----|
| ACKNOWLEDGEMENTS | i |
| TABLE OF CONTENTS..... | iii |
| LIST OF TABLES..... | iv |
| ABSTRACT..... | v |
| 1. Introduction..... | 7 |
| 2. Growth and Poverty | 12 |
| Economic and Agricultural Growth..... | 12 |
| Poverty and Inequality | 14 |
| Wages and Employment | 15 |
| 3. Public Expenditures: Trends and Composition..... | 18 |
| Total Government Expenditures | 18 |
| Composition of Government Spending | 19 |
| Decentralization of Spending..... | 22 |
| 4. Agricultural R&D, and Physical and Human Capital Development | 24 |
| Agricultural R&D | 24 |
| Infrastructure..... | 26 |
| Health..... | 29 |
| Education | 30 |
| 5. Conceptual Framework and Model..... | 32 |
| Model..... | 32 |
| Marginal Impact on Growth and Poverty Reduction..... | 34 |
| 6. Data, Model Estimation, and Results..... | 38 |
| Data..... | 38 |
| Model Estimation and Results | 41 |
| Marginal Returns to Public Investment | 42 |
| 7. Conclusions..... | 47 |
| Major Findings..... | 47 |
| Priorities of Future Government Investment | 48 |
| Limitations and Future Research Directions..... | 49 |
| REFERENCES | 51 |
| Appendix: District Data | 54 |

LIST OF TABLES

| | | |
|------|--|----|
| 1. | Economic and population growth in Uganda..... | 7 |
| 2. | Incidence of poverty in Uganda..... | 8 |
| 3. | Agricultural and nonagricultural wages rates in Uganda, various years..... | 10 |
| 4. | Government expenditure of Uganda..... | 12 |
| 5. | Sector shares of government expenditure of Uganda..... | 14 |
| 6. | Social sector expenditure, per capita..... | 14 |
| 7. | Health indicators, various years..... | 23 |
| 8. | Estimates of system equations..... | 36 |
| 9. | Returns to government investment in rural Uganda..... | 37 |
| A1. | Agricultural labor productivity, 1992, 1995, and 1999..... | 50 |
| A2. | Agricultural and nonagricultural wages at the district level, 1999/2000..... | 51 |
| A3. | Percentage of nonfarm in total employment, 1992, 1995, and 1999..... | 52 |
| A4. | Distance to the closest market, 1999/2000..... | 53 |
| A5. | Travel time to the closest market, 1999/2000..... | 54 |
| A6. | Main road and railway network..... | 55 |
| A7. | Literacy rate by district, 1991..... | 56 |
| A8. | Literacy rate by district, 1999/2000..... | 57 |
| A9. | Distance from center of local community to nearest public services..... | 58 |
| A10. | Percentage of villages with access to electricity..... | 59 |
| A11. | Fertilizer use by district, 1999/2000 | 60 |
| A12. | Land area by district, 1999/2000 | 61 |
| A13. | Health status by district, 1999/2000..... | 62 |
| A14. | District development budget estimates, 2001/02..... | 63 |
| A15. | Fiscal transfers to local governments for primary education, 1993/94–1997/98..... | 64 |
| A16. | Fiscal transfers to local governments for secondary education through capitation grants, 1993/04–1997/98..... | 65 |
| A17. | Fiscal transfers to local governments for health, 1993–1997/98..... | 66 |
| A18. | Fiscal transfers to local governments for feeder road maintenance, 1993/94–1997/98..... | 67 |

ABSTRACT

Using district-level data for 1992, 1995, and 1999, the study estimated effects of different types of government expenditure on agricultural growth and rural poverty in Uganda. The results reveal that government spending on agricultural research and extension improved agricultural production substantially. This type of expenditure had the largest measured returns to growth in agricultural production. Agricultural research and extension spending also has the largest assessed impact on poverty reduction. Government spending on rural roads also had substantial marginal impact on rural poverty reduction. The impact of low-grade roads such as feeder roads is larger than that of high-grade roads such as murrum and tarmac roads. Education's effects rank after agricultural research and extension, and roads. Government spending in health did not show a large impact on growth in agricultural productivity or a reduction in rural poverty, but in part because of difficulties in measuring some of the impacts of this type of investment. Additional investments in the northern region (a poor region) contribute the most to reducing poverty. The poverty-reduction effect of spending on infrastructure and education is particularly high in this region. However, it is the western region (a relatively well-developed region) where most types of investment have highest returns in terms of increased agricultural productivity.

PUBLIC EXPENDITURE, GROWTH AND POVERTY REDUCTION IN RURAL UGANDA

Shenggen Fan, Xiaobo Zhang, and Neetha Rao*

1. INTRODUCTION

At independence in 1962, Uganda showed prospects for sustainable development with high growth and savings rates, and a well-developed education system. The country was running a trade surplus, primarily through agricultural, textile, and copper exports. It was self-sufficient in terms of food, and small-scale industry supplied the domestic market with basic inputs. Uganda suffered, however, from political turmoil and economic mismanagement from the early 1970s until the mid-1980s. Many skilled workers fled the country, leading to a rapid deterioration of human capital and managerial skills. Industry was nationalized and placed under state control. Rampant inefficiency led to a collapse of the economy, and agricultural output plummeted because of insecurity and war in rural areas.

Uganda has made great strides toward economic growth and poverty reduction since the late 1980s. In the 1990s annual GDP growth climbed steadily to 6.9 percent from only 3 percent per annum during the 1980s. As a result, the share of the population below the poverty line fell from 56 percent in 1992 to 35 percent in 1999. This rapid poverty reduction over such a short period is rare, not only in Sub-Saharan African countries but across the developing world.¹ This success, however, was not equally distributed among regions or between rural and urban areas. The incidence of poverty in rural areas was 39 percent, while it was only 10 percent in urban areas in 1999/2000. As a

*Shenggen Fan is a senior research fellow, Xiaobo Zhang is a research fellow, and Neetha Rao is a senior research assistant, in the Development Strategy and Governance Division (DSGD) of the International Food Policy Research Institute (IFPRI).

¹Another major achievement in poverty reduction took place in China from 1978 to 1984. Within six years, the rural poverty rate was reduced from 33 to 11 percent, and the number of rural poor declined from 260 to 89 million (Fan, Zhang, and Zhang 2002). Uganda's success contrasts sharply with other African nations (World Bank 2002).

result, the majority of the poor in Uganda (95 percent) are concentrated in rural areas, with agriculture as their primary source of livelihood.

Economic growth and income distribution are the fundamental forces driving poverty reduction in Uganda. Government policies play a crucial role in promoting both economic growth and better income distribution. Among these policies, government spending has been the most important instrument used by Uganda to achieve these two goals.

Economic theory provides rationales for government expenditure; correcting market failures and improving equity are the two primary ones. When a market economy fails to allocate resources efficiently, market failure occurs. One such example is the case of “externalities.” Governments can curb negative externalities (for example, pollution) and promote positive externalities (for example, R&D) by means of regulation, taxation or subsidy, and public provision. Similarly, justification for government provision of pure “public” goods is clear. The nonrival and non-excludable characteristics of these goods (and consequent inability to charge for the costs) imply that the private sector lacks any incentive to supply them.

Equity and poverty reduction considerations lead governments also to provide private goods—those that are disproportionately consumed by the poor—as a means of targeting the transfer of resources to those in need. Theoretically, a market-based economy may distribute income in socially unacceptable ways, and it is often the case that governments intervene to protect vulnerable segments of the community. Food and housing services are some of the main anti-poverty programs offered by governments; but very few countries have been successful in achieving better income distribution or poverty reduction through welfare transfers alone. Government expenditure on public investment, in addition to its growth-promoting effects, can be effectively used for this purpose, however.

Government spending is also needed to provide an enabling environment for the private sector. Much of the role of government spending and interventions can be viewed

as establishing infrastructure in its broadest sense—educational, technological, financial, physical, environmental, and social. Since markets cannot operate in a vacuum, this infrastructure is necessary for markets to play a central role in increasing wealth and living standards. Because constructing extensive infrastructure is often beyond the capacity or interest of any single firm or community-based organization, it is usually the responsibility of government.

The World Bank recently undertook a research project to analyze the impact of public spending in Uganda. The results were published in a World Bank book titled “Uganda’s Recovery: The Role of Farms, Firms, and Government” coedited by Ritva Reinikka and Paul Collier (2001). This research used data from a series of household surveys (1992–99) to investigate certain issues concerning Uganda’s social and economic development in rural areas. Some of the major findings of this report were: (1) education, access to roads, and access to extension services have a significant positive effect on agricultural production; (2) rural producers over-use nontraded inputs such as homegrown seeds and under-use purchased inputs such as fertilizers; (3) credit constraints significantly affect demand for inputs; lack of access to financial services negatively affects the start-up of nonagricultural enterprises and integration of markets for agricultural produce; and (4) knowledge about the causes and treatment of diseases, in addition to access to health services and their quality, has a significant impact on reducing individuals’ propensity to fall sick.

Based on these findings, it is clear that public investment must play an even larger role in promoting future growth and poverty reduction. However, different types of investment may have differential effects on both growth and poverty reduction, and there is need for studies of their individual impacts. Such studies were done for selected countries in Asia (China, India, Viet Nam, and Thailand) at the International Food Policy Research Institute.² These studies were primarily based on secondary-level data available at the national and local government levels. However, these types of data are either not

²Fan, Hazell, and Thorat (2000) on India; Hao and Fan (2001) on Viet Nam; Fan, Zhang, and Zhang (2002) on China; and Fan, Jitsuchon, and Methakunnavut (2003) on Thailand.

easily available or are of poor quality for most African countries. Fortunately, many African countries have begun to systematically collect household-level data for the past decade. These surveys have recorded detailed information on consumption and expenditure, making it possible to monitor changes in income and poverty. But, these surveys have limited information on production, market policies, and public investment made by various levels of government. By combining household survey data with community survey data and secondary data from local and central governments, it is possible to paint a meaningful picture of overall progress in economic growth and poverty reduction.

This paper reviews relevant literature, discusses data, develops an analytical framework, and applies it to analyze the impact of public investment on agricultural growth and poverty reduction in Uganda. Since the majority of the poor are concentrated in rural areas, this study focuses on the rural poor. Particular attention is paid to how different types of public investment may affect rural poverty through different channels, and how results differ by region. The report is organized as follows: first, we provide a brief overview of Uganda's trends and patterns of public expenditure. Second, we review Uganda's economic growth and poverty reduction, which provides a background on how different government expenditures may affect poverty reduction. Third, we describe the development of physical and human capital as a result of government spending in Uganda. We then propose an analytical framework for the analysis. Empirical estimation and results are discussed, and we then conclude with recommendations for future investment priorities. Data sources and explanations, including most of the variables used at the district level, are set out in an appendix.

Since Uganda varies sharply in its agroclimatic conditions across regions, for the purposes of this study it is useful to divide Uganda into four distinct regions:³

- *Central region.* The central region is a high rainfall area around Lake Victoria where bananas, robusta coffee, and food crops are grown. This region is the

³This regional division is used commonly in government publications. Poverty and GDP data by region are taken from the Uganda Bureau of Statistics (UBOS).

- most developed in terms of social and economic indicators, and includes the capital city, Kampala. The rural poverty incidence in the central region is the lowest among all regions (25.7 percent in 1999).
- *Eastern region.* The eastern region has two distinct rainy seasons, separated by a four-month dry period, and its main crops include millet, cassava, and cotton. This region is the second most developed region in terms of its social and economic indicators, but its rural poverty rate is still high (at 38.4 percent in 1999).
 - *North/northeastern region.* In the north, the rainfall pattern restricts cultivation to one season, with the main crops being cotton, maize, and millet. The northeastern region is included as part of the northern region, where the low average rainfall of 80 mm per year is suitable for pastoralism, sorghum, and millet. This region is the poorest of the four. More than 67 percent of the rural population and some 30 percent of the urban population is below the poverty line. In addition, this region has been struggling with a war between the government and rebels since the early 1980s.
 - *Western region.* The western region has mountainous areas where the altitude permits cultivation of temperate fruits, vegetables, and some traditional food crops. Infrastructure permitting, this region has the potential to be able to grow high-value crops. The rural poverty rate was around 29 percent in 1999.

2. GROWTH AND POVERTY

This section reviews growth and poverty in Uganda and highlights the potential role of government spending.

Economic and Agricultural Growth

From the 1970s until the mid-1980s, economic mismanagement and civil war destroyed most of the country's physical infrastructure, and manufacturing was decimated after the Asian business community was expelled en masse in the 1970s. In the 1980s and 1990s, when the National Resistance Movement (NRM) took over government, the tax base was small and inflation was high. Uganda embarked on economic reforms in 1987; challenges included increasing tax revenue and controlling public expenditure. A series of new macroeconomic policies were introduced. First, liberalization of prices and trade in the domestic market further boosted agricultural growth. Second, liberalization of foreign exchange, payments, and the trade system led to diversification of Uganda's exports and to higher competitiveness of traditional agricultural products in external markets such as those for coffee and tea. Beginning in the late 1980s, the government also encouraged diversification of commercial agriculture and export of nontraditional agricultural commodities (Byrnes 1992). Last in this list of changes, monetary restraint led to price stability, contributing to the restoration of confidence and external competitiveness (IMF 2000).

As a result of these efforts, the Ugandan economy outperformed most other countries in Sub-Saharan Africa (SSA). The long-term growth from 1982 to 1999 was 5.2 percent per annum (Table 1), and this accelerated to 6.9 percent per annum in the 1990s. As a result, GDP per capita rose from 251 dollars in 1990 (1995 constant prices) to 347 dollars in 1999.

Table 1—Economic and population growth in Uganda

| Year | GDP (million constant 1995 U.S. dollars) | GDP Per Capita (constant 1995 U.S. dollars) | Population (millions) | Ag GDP (million constant 1995 U.S. dollars) | Ag GDP per worker (constant 1995 U.S. dollars) |
|---------|--|---|-----------------------|---|--|
| 1982 | 3,146 | 236 | 13 | 1,772 | 288 |
| 1983 | 3,327 | 245 | 14 | 1,884 | 301 |
| 1984 | 3,315 | 239 | 14 | 1,827 | 287 |
| 1985 | 3,206 | 227 | 14 | 1,764 | 273 |
| 1986 | 3,218 | 223 | 14 | 1,806 | 275 |
| 1987 | 3,346 | 225 | 15 | 1,843 | 276 |
| 1988 | 3,622 | 237 | 15 | 1,944 | 286 |
| 1989 | 3,853 | 244 | 16 | 2,065 | 299 |
| 1990 | 4,102 | 251 | 16 | 2,173 | 308 |
| 1991 | 4,330 | 256 | 17 | 2,235 | 312 |
| 1992 | 4,478 | 256 | 17 | 2,213 | 303 |
| 1993 | 4,851 | 269 | 18 | 2,419 | 325 |
| 1994 | 5,161 | 277 | 19 | 2,462 | 325 |
| 1995 | 5,756 | 300 | 19 | 2,607 | 338 |
| 1996 | 6,278 | 318 | 20 | 2,718 | 346 |
| 1997 | 6,576 | 324 | 20 | 2,748 | 344 |
| 1998 | 6,944 | 332 | 21 | 2,800 | 345 |
| 1999 | 7,458 | 347 | 21 | 2,992 | 362 |
| | | <i>Annual Growth Rate</i> | | | |
| 1982–89 | 2.94 | 0.51 | 2.42 | 2.21 | 0.51 |
| 1990–99 | 6.87 | 3.66 | 3.09 | 3.62 | 1.80 |
| 1982–99 | 5.21 | 2.30 | 2.84 | 3.13 | 1.35 |

Source: World Bank 2002.

However, Uganda is facing many new challenges as it moves into the new millennium. Uganda is still predominantly an agricultural economy with most of its export earnings coming from cash crops, particularly coffee and cotton. It is also a landlocked country with high transportation costs that hinder international trade. The country undertook macroeconomic reforms in the late 1980s, which led to trade-liberalizing measures to encourage exports. Even with the lifting of certain crucial trade barriers, the rise in exports was modest because the ability to increase production was curtailed by the lack of appropriate inputs, especially for the agricultural sector. Nontrade policy barriers such as high transportation costs also featured prominently in curtailing export growth. Consequently, the recent performance of the agricultural sector has been less than hoped for. From 1982 to 1999, agriculture grew at 3.13 percent per annum, which was lower than the overall economic growth of 5.21 percent. Agricultural labor productivity grew at a

mere 1.35 percent per annum.⁴ Such modest rates of agricultural growth will definitely hinder future reductions in rural poverty.

Poverty and Inequality

Table 2 shows poverty measures from five recent Ugandan household surveys by rural and urban areas, and by region. The incidence of poverty declined from 56 percent in 1992 to 36 percent in 1999, but nearly half of this reduction occurred after 1997. In five years from 1992 to 1997, Uganda reduced its poverty by 11.5 percentage points. However, it reduced poverty by more than 10 percent percentage points just in two years between 1997–99.

Table 2—Incidence of poverty in Uganda

| Region | 1992/93 | 1993/94 | 1994/95 | 1995/96 | 1997/98 | 1999/2000 |
|----------|---------|---------|---------|---------|---------|-----------|
| National | 55.5 | 52.2 | 50.1 | 48.5 | 44 | 35.2 |
| Rural | 59.4 | 56.7 | 54.0 | 53.0 | 48.2 | 39.1 |
| Urban | 28.2 | 20.6 | 22.3 | 19.5 | 16.3 | 10.3 |
| Central | 45.5 | 35.6 | 30.5 | 30.1 | 27.7 | 20.3 |
| Rural | 52.8 | 43.4 | 35.9 | 37.1 | 34.3 | 25.7 |
| Urban | 21.5 | 14.2 | 14.6 | 14.5 | 11.5 | 7.4 |
| East | 59.2 | 58.0 | 64.9 | 57.5 | 54.3 | 36.5 |
| Rural | 61.1 | 60.2 | 66.8 | 59.4 | 56.8 | 38.4 |
| Urban | 40.6 | 30.5 | 41.5 | 31.8 | 24.8 | 15.7 |
| West | 52.8 | 56.0 | 50.4 | 46.7 | 42.0 | 28.1 |
| Rural | 53.8 | 57.4 | 51.6 | 48.3 | 43.2 | 29.5 |
| Urban | 29.7 | 24.9 | 25.4 | 16.2 | 19.9 | 5.6 |
| North | 71.3 | 69.2 | 63.5 | 68.0 | 58.8 | 65.8 |
| Rural | 72.2 | 70.9 | 65.1 | 70.3 | 60.7 | 67.7 |
| Urban | 52.6 | 46.2 | 39.8 | 39.6 | 32.6 | 30.6 |

Source: UBOS, various years.

⁴FAO reported even more pessimistically on Ugandan agricultural growth. For example, FAO reported that no growth in agricultural production occurred in the 1990s, and per capita food production actually declined over time. This differs sharply from World Bank and UBOS assessments of agricultural GDP growth. As the year 2003 ended, IFPRI was engaged in a process of reconciling this difference.

Poverty reduction was uneven across different groups. There was a large spread between rural and urban areas in poverty reduction. In 1992, almost 60 percent of the rural population was under the poverty line compared with 28 percent of urban residents. In 1999, almost 40 percent of rural population was still under the poverty line, but the incidence of urban poverty had dropped to 10 percent. It is clear that urban residents benefited more from the recent economic boom than did their rural counterparts. As noted earlier, some 95 percent of Uganda's poor live in rural areas today.

Regional disaggregation shows that areas with better infrastructure have been more successful in reducing poverty. For example, the central region has the best infrastructure in the country and the lowest incidence of both rural and urban poverty. Poverty reduction here was also the largest among all regions. In the north, however, where infrastructure is poor, the incidence of poverty is almost double the national average, and poverty reduction has been the smallest among all regions.

Wages and Employment

Both agricultural and nonagricultural earnings are important sources of income for rural residents in Uganda. Data aggregated from Uganda's National Household Surveys show the following distinct features (UNHS 1995/96, 1999/2000) (Table 3). First, both agricultural and nonagricultural wages increased substantially within a relatively short time between 1992/93 and 1999/2000. Second, nonagricultural wages rose more than agricultural wages on average. Third, women were paid less than men in both sectors (irrespective of region), while men in nonagricultural sectors, on average, do better than those in engaged agriculture. In contrast, women receive better wages in agriculture than in other sectors.

There are considerable and highly visible differences across regions in terms of wages. As expected, wages in the more developed region of central Uganda increased relatively strongly between 1992/93 and 1999/2000, while in the eastern and western regions the increases were moderate. In the north increases were negligible, with the exception of an increase in nonagricultural wages for men. By 1999/2000, men and

women in agriculture in the northern region received almost 50 percent less than their counterparts in other regions.

Table 3—Agricultural and nonagricultural wages rates in Uganda, various years (shillings per day)

| Regions | Agriculture | | Nonagriculture | |
|-----------|-------------|--------|----------------|--------|
| | Male | Female | Male | Female |
| 1992/93 | | | | |
| National | 600 | 475 | 725 | 625 |
| Central | 900 | 600 | 1,000 | 800 |
| East | 500 | 400 | 600 | 600 |
| West | 500 | 400 | 500 | 500 |
| North | 500 | 500 | 800 | 600 |
| 1995/96 | | | | |
| National | 875 | 725 | 1050 | 700 |
| Central | 1,600 | 1,100 | 1,900 | 1,200 |
| East | 700 | 700 | 900 | 500 |
| West | 700 | 600 | 800 | 600 |
| North | 500 | 500 | 600 | 500 |
| 1999/2000 | | | | |
| National | 1,030 | 940 | 1,280 | 1,020 |
| Central | 1,630 | 1,420 | 1,640 | 1,230 |
| East | 920 | 860 | 1,230 | 1,130 |
| West | 1,020 | 940 | 1,200 | 1,070 |
| North | 550 | 550 | 820 | 540 |

Source: UNHS 1995/96, 1999/2000.

It is estimated that the number of new job entrants into Uganda's economy is about 306,500 people per annum (MPED 2000). The economy must be productive enough new jobs to absorb these new workers. It is evident that Uganda's agriculturally based economy is not growing fast enough to provide a lasting solution for rural under-employment and poverty. Agriculture employs the majority of people—about 85 percent in most regions. The nonfarm sector is yet to be well developed. The 1992/93 National Household Survey showed that 6.7 percent of all households in rural areas in Uganda were engaged in nonfarm activities. Many of those employed in agriculture often also work off-farm in other activities, for example, 8.2 percent in the central region and 14.7 percent in the northern region during 1992/93 (MPED 2000). As such, nonfarm employment may also become the most promising avenue for supplemental income

generation for poor people in rural Uganda, and an important pathway out of poverty. There exists regional variation in nonfarm employment⁵ patterns across the country (Appendix Tables A1 and A3). The central region showed the highest share of nonfarm employment in total employment in Uganda (30 percent), followed by the eastern and northern regions (24–25 percent). The western region lagged behind with an average of 18 percent.

⁵Defined as labor force that is not engaged in crop farming or other agricultural activities. Calculated by the authors from UNHS (various years).

3. PUBLIC EXPENDITURES: TRENDS AND COMPOSITION

Total Government Expenditures

Uganda's government expenditures in constant 1997 prices increased from 264 billion shilling sin 1982 to 1,043 billion shillings in 1999 (Table 4), a growth rate of more than 8.4 percent per annum.⁶

Table 4—Government expenditure of Uganda (billion 1997 shillings)

| Year | General Public Admin. | Defense Affairs & Services | Public Order & Safety Affairs | Educ. Affairs & Services | Health Affairs & Services | Social Affairs & Welfare | Agric., Veterinary, & Forestry | Road & other Transport Affairs | Total |
|-------|-----------------------|----------------------------|-------------------------------|--------------------------|---------------------------|--------------------------|--------------------------------|--------------------------------|---------|
| 1982 | 64.78 | 42.13 | 53.70 | 53.09 | 19.16 | 2.30 | 19.47 | 9.86 | 264.50 |
| 1983 | 58.48 | 96.44 | 23.47 | 66.40 | 14.99 | 2.41 | 15.45 | 17.25 | 294.88 |
| 1984 | 109.42 | 154.06 | 35.43 | 117.50 | 32.03 | 3.64 | 33.75 | 31.23 | 517.06 |
| 1985 | 92.21 | 192.61 | 30.31 | 102.42 | 17.10 | 2.51 | 33.38 | 39.26 | 527.96 |
| 1986 | 100.80 | 200.05 | 52.61 | 83.75 | 16.29 | 2.39 | 42.68 | 44.68 | 543.24 |
| 1987 | 88.10 | 234.68 | 47.95 | 133.85 | 17.43 | 1.28 | 32.30 | 46.22 | 601.81 |
| 1988 | 82.91 | 193.41 | 31.49 | 78.08 | 19.98 | 2.18 | 25.26 | 22.59 | 455.90 |
| 1989 | 82.63 | 169.84 | 37.87 | 56.58 | 15.74 | 0.95 | 12.34 | 32.83 | 408.78 |
| 1990 | 150.19 | 146.08 | 34.00 | 58.39 | 26.01 | 6.37 | 19.03 | 46.18 | 486.26 |
| 1991 | 343.60 | 134.60 | 47.36 | 93.63 | 29.42 | 4.83 | 19.73 | 32.68 | 705.86 |
| 1992 | 368.12 | 98.64 | 32.98 | 67.94 | 23.64 | 2.66 | 14.13 | 14.22 | 622.33 |
| 1993 | 130.63 | 101.47 | 47.92 | 54.42 | 20.78 | 5.23 | 9.57 | 22.23 | 392.25 |
| 1994 | 151.80 | 138.10 | 62.30 | 139.07 | 46.04 | 3.81 | 18.01 | 30.64 | 589.77 |
| 1995 | 176.72 | 129.15 | 66.87 | 128.89 | 44.14 | 1.89 | 10.19 | 29.86 | 587.71 |
| 1996 | 191.29 | 151.98 | 72.00 | 180.98 | 54.11 | 3.99 | 11.53 | 56.04 | 721.93 |
| 1997 | 216.60 | 146.39 | 72.14 | 204.60 | 58.42 | 1.52 | 11.36 | 48.95 | 759.98 |
| 1998* | 175.20 | 206.92 | 71.96 | 306.52 | 57.54 | 1.64 | 13.75 | 56.71 | 890.24 |
| 1999* | 238.12 | 195.18 | 82.27 | 369.88 | 70.68 | 2.04 | 11.96 | 73.15 | 1043.29 |

Source: Ministry of Finance, Planning and Economic Development (MFPED)

Note: *Extrapolated using the trend of UBOS government expenditure data for 1998 and 1999

As a percentage of GDP, Uganda consistently increased its spending during the 1980s, from 9 percent in 1980 to 16 percent in 1990 (Fan and Rao 2003). The share remained constant over the 1990s. Compared with the more-developed countries and neighboring African countries, this percentage is small. For more-developed countries,

⁶All government expenditures have been converted into 1997 constant prices using the GDP deflator.

the average is 30–40 percent for 1960–85 while the African average was 28 percent in 1998.

Uganda's total government revenue was 10–11 percent of GDP, 4–9 percentage points smaller than the expenditure share (Fan and Rao 2003). As a result, Uganda experienced a severe fiscal deficit in the past decade. This problem is attributed to a weakening tax administration, noncompliance with tax regulations, difficulties of taxing a large informal sector, granting of value-added tax (VAT) exemptions, and reduction in import duties as part of trade reform (World Bank 2002). This problem is particularly important in the short and medium terms and increases Uganda's dependence on foreign aid to fund expenditures. As such, the Ugandan government must find innovative ways to increase its tax and nontax revenues if it wants to decrease reliance on external funding of its economy and to achieve a balanced budget.

Composition of Government Spending

The composition of government expenditures reflects government priorities. The relative spending priorities in Uganda have not changed much since the late 1980s. In fact, the top three expenditures for Uganda in both the 1980s and 1990s were defense, general public administration, and education while lowest percentages of expenditures were for agriculture, roads, health and social security (Table 5).

There is a global trend to increase expenditure on education as a share of government expenditure. Uganda is no exception, spending 35.5 percent in 1999 (Table 5). Per capita education expenditure has increased four-fold since the late 1980s (Table 6). But this national aggregate masks substantial regional differences. It is in the poor regions where the government spends substantially less on education (Tables A13 and A14).

In 1999, Uganda spent 6.8 percent of government expenditure on health (Table 5), compared with an African average of 4 percent. Agriculture's share in total expenditure is also small (1.2 percent in 1999) and has declined from 7.4 percent in 1982. This is particularly worrisome considering that agriculture is the largest sector and that the

majority of the poor live in rural areas and are primarily engaged in agriculture. In addition, expenditure on agricultural research and development, one of the investments most crucial for growth in agricultural production, saw no visible growth. As a percentage of agricultural GDP, agricultural R&D remained relatively stable between 0.35–0.5 percent in Uganda in the past two decades. This is relatively low when compared to the average for other African countries, which was about 0.85 percent in the late 1990s, and extremely low when compared to most Asian and Latin American countries, which averaged about 1 percent (Pardey and Beintema 2001).

Table 5—Sector shares of government expenditure of Uganda (percent)

| Year | General Public Admin. | Defense Affairs & Services | Public Order & Safety Affairs | Educ. Affairs & Services | Health Affairs & Services | Social Affairs & Welfare | Agric., Veterinary, & Forestry | Road & other Transport Affairs |
|-------|-----------------------|----------------------------|-------------------------------|--------------------------|---------------------------|--------------------------|--------------------------------|--------------------------------|
| 1982 | 24.49 | 15.93 | 20.30 | 20.07 | 7.25 | 0.87 | 7.36 | 3.73 |
| 1983 | 19.83 | 32.70 | 7.96 | 22.52 | 5.09 | 0.82 | 5.24 | 5.85 |
| 1984 | 21.16 | 29.79 | 6.85 | 22.73 | 6.19 | 0.70 | 6.53 | 6.04 |
| 1985 | 17.47 | 36.48 | 5.74 | 19.40 | 3.24 | 0.49 | 6.32 | 7.44 |
| 1986 | 18.56 | 36.82 | 9.68 | 15.42 | 3.00 | 0.44 | 7.86 | 8.22 |
| 1987 | 14.64 | 39.00 | 7.97 | 22.24 | 2.90 | 0.21 | 5.37 | 7.68 |
| 1988 | 18.19 | 42.42 | 6.91 | 17.13 | 4.38 | 0.48 | 5.54 | 4.95 |
| 1989 | 20.21 | 41.55 | 9.26 | 13.84 | 3.85 | 0.23 | 3.02 | 8.03 |
| 1990 | 30.89 | 30.04 | 6.99 | 12.01 | 5.35 | 1.31 | 3.91 | 9.50 |
| 1991 | 48.68 | 19.07 | 6.71 | 13.26 | 4.17 | 0.68 | 2.80 | 4.63 |
| 1992 | 59.15 | 15.85 | 5.30 | 10.92 | 3.80 | 0.43 | 2.27 | 2.28 |
| 1993 | 33.30 | 25.87 | 12.22 | 13.87 | 5.30 | 1.33 | 2.44 | 5.67 |
| 1994 | 25.74 | 23.42 | 10.56 | 23.58 | 7.81 | 0.65 | 3.05 | 5.19 |
| 1995 | 30.07 | 21.98 | 11.38 | 21.93 | 7.51 | 0.32 | 1.73 | 5.08 |
| 1996 | 26.50 | 21.05 | 9.97 | 25.07 | 7.50 | 0.55 | 1.60 | 7.76 |
| 1997 | 28.50 | 19.26 | 9.49 | 26.92 | 7.69 | 0.20 | 1.49 | 6.44 |
| 1998* | 19.68 | 23.24 | 8.08 | 34.43 | 6.46 | 0.18 | 1.54 | 6.37 |
| 1999* | 22.82 | 18.71 | 7.89 | 35.45 | 6.77 | 0.20 | 1.15 | 7.01 |

Source: Ministry of Finance, Planning and Economic Development (MFPED)

Note: Expenditures include recurrent and development expenditure at the both central and local levels.

* Extrapolated using the trend of UBOS government expenditure data for 1998 and 1999

Government spending on social security and welfare expenditure has been remarkably low. In absolute terms, social security and welfare expenditure decreased from 2.30 in 1982 to 2.04 billion shillings in 1999. As a percentage of GDP, social security expenditure remained at about 0.4 percent between 1980 and 1998. Its share in

total government expenditures also declined from 0.87 percent in 1982 to 0.20 percent in 1999 (Table 5).

Uganda increased its infrastructure expenditure (road and other transport services) in absolute terms from 9.9 billion shillings in 1982 to 73.2 billion shillings in 1999. However, infrastructure expenditure as a percentage of GDP was maintained at 0.22–0.24 percent. Infrastructure spending as a share of total government expenditures increased from 3.73 percent in 1982 to 7.01 percent in 1999. This share is substantially higher than in many Asian and Latin American countries.⁷

Table 6—Social sector expenditure, per capita (1997 Shillings)

| Year | Education Affairs & Services | Health Affairs & Services | Social Affairs & Welfare |
|-------|------------------------------|---------------------------|--------------------------|
| 1982 | 3,979.96 | 1,436.57 | 172.50 |
| 1983 | 4,883.73 | 1,102.90 | 177.05 |
| 1984 | 8,479.82 | 2,311.36 | 262.92 |
| 1985 | 7,246.36 | 1,209.65 | 177.40 |
| 1986 | 5,791.65 | 1,126.35 | 165.22 |
| 1987 | 9,019.90 | 1,174.54 | 86.49 |
| 1988 | 5,111.84 | 1,308.34 | 142.74 |
| 1989 | 3,587.87 | 998.28 | 60.25 |
| 1990 | 3,575.52 | 1,593.04 | 390.35 |
| 1991 | 5,540.98 | 1,741.30 | 285.87 |
| 1992 | 3,888.78 | 1,353.17 | 152.29 |
| 1993 | 3,014.92 | 1,151.52 | 289.64 |
| 1994 | 7,463.80 | 2,470.93 | 204.74 |
| 1995 | 6,706.00 | 2,296.39 | 98.37 |
| 1996 | 9,135.99 | 2,731.67 | 201.41 |
| 1997 | 10,019.59 | 2,860.92 | 74.44 |
| 1998* | 14,568.50 | 2,734.84 | 77.91 |
| 1999* | 17,108.21 | 3,269.29 | 94.22 |

Source: Calculated by authors using Ministry of Finance, Planning and Economic Development data and World Development Indicators 2003 population data.

Note: * Calculated using trend of UBOS government expenditure data.

Africa has been ravaged by war in the post-independence era, and Uganda has been no exception. Rebels have been fighting government forces in the north for more

⁷In 1998, the share of government spending on infrastructure was 3.86 percent for Africa, 4.94 percent for Asia, and 6.37 percent for Latin America (Fan and Rao 2003).

than a decade. As such, Uganda although a predominantly agricultural economy, routinely spends more on defense than on any productive or social sectors such as education, health, social security, and infrastructure. Uganda's defense spending in total government expenditures increased from 15.93 percent in 1982 to 18.71 percent in 1999, a level that is high when compared with other countries in Africa (11 percent), Asia (11 percent), or Latin America (6 percent).

Decentralization of Spending

Decentralization is expected to improve services provided to the poor by increasing transparency and accountability in the use of public funds, and the capacity of local communities to mobilize, plan, and manage their resources. Uganda has done remarkably well in this process, spending over one-third of total public expenditure through local authorities, the largest share in Africa (Foster and Mijumbi 2002). However, Uganda continues to wrestle with the problem of how to reconcile national program priorities and the need for accountability, with the objective of decentralizing resources to local government. In the face of clear evidence that district administrations were absorbing funds intended for service delivery, Uganda has limited the discretion of local government, providing 80 percent of their funding in the form of highly conditional grants. These require local governments to use the funds in ways determined at the center, and specify planning, reporting, and accounting requirements. Government has also made increasing use of transparency provisions. Public notices, FM radio stations, and newspapers are being used to publicize the resources provided to individual schools and health facilities, and what they are to be used for. The intention is to empower communities to hold civil servants and councilors to account.

However, several problems have been encountered in the process, such as inadequacy of locally generated revenues, inexperience of local officials, an underdeveloped system of public accounting, and a poorly informed citizenry. Conditional grants tend to lead to a pattern of local expenditures that has a strong focus on poverty but one that is inflexible in responding to the specific problems and

preferences of different communities. Therefore, as decentralization progresses and budgeting procedures are strengthened, conditional grants are expected to be phased out, enabling local governments to tailor anti-poverty expenditures to district priorities (IMF 2000).

4. AGRICULTURAL R&D, AND PHYSICAL AND HUMAN CAPITAL DEVELOPMENT

This section reviews the development of public technical, physical, and human capital in Uganda. Such public capital is a major source of long-term economic growth and poverty reduction. It contributes not only to growth in agricultural production, providing an adequate food supply for an increasing population, but also to development of the rural nonfarm sector, which has become increasingly important for further poverty reduction in rural areas. Given limited availability of data on irrigation, telecommunications, and electricity, our analysis focuses on agricultural R&D, roads, education, and health.

Agricultural R&D

Agricultural R&D activities in Uganda date back to the 1920s when the British colonial administration set up research stations under the Departments of Agriculture and Veterinary Services.⁸ Makerere University, initially established as a training center in the 1920s, began research activities in the 1950s. Most of the research activity prior to Uganda's independence was part of the British colonial research network in East Africa, and was aimed at improving productivity on plantations. Coffee, tea, and cotton were the priority crops for research. Needs of small-scale and traditional farmers were largely ignored.

Most of these research institutions were intact after independence until the establishment of the National Agricultural Research Organization (NARO) in 1992, although most of the other colonial research agencies were transferred to national governments of the region. Prior to 1992, most research was still very much focused on commercial export crops. Research on food crops, which are so important for the poor, received little attention. In addition, much of the research infrastructure was destroyed by war in the 1970s.

⁸For more detailed information about the agricultural research system in Uganda, refer to Beintema and Tizikara (2002).

Data on public spending for agricultural research in Uganda are available only in the 1990s. Total spending then amounted to 27 million international dollars measured in 1993 prices, and increased to 49 million international dollars in 2000 (Beintema and Tizikara 2002). As a percentage of agricultural GDP, agricultural research increased from 0.32 percent in 1995 to 0.5 percent in 2000. However, even the latter percentage is much lower than the African average of 0.85 percent in 1995 (Beintema and Tizikara 2002).

Prior to 1993, agricultural extension in Uganda was under several government agencies including the Ministry of Agriculture, the Ministry of Animal Industry and Fisheries, the Ministry of Environmental Protection, and the Ministry of Commerce, Cooperatives, and Marketing. After merging the Ministry of Agriculture and the Ministry of Animal Industry, and Fisheries, agricultural extension was reorganized under the Directorate of Extension of the Ministry of Agriculture, Animal Industry, and Fisheries. The agency is largely responsible for extension policy formulation and communication, technical and methodological guidance, coordination of different stakeholders and setting standards for monitoring and evaluation of extension services in the districts, and training at the national level of various cadres of staff for the agricultural sector. Most extension activities have been decentralized to districts.

Supported by international donors, the National Agricultural Advisory Service (NAADS) was created in 1997 as part of the Plan for Modernization of Agriculture (PMA). The NAADS was designed to redress the past shortcomings of the agricultural extension system by establishing a decentralized extension delivery system owned by farmers but serviced by the private sector. As a result, spending on extension, including both government and international donations, increased substantially over the past several years. Assessments of these new initiatives are mixed. However, it is largely accepted that a more decentralized agricultural extension system will better serve the poor.

Infrastructure

Development of rural infrastructure is key to rural social and economic life. Rural populations tend to define poverty in terms of access to infrastructure, most often roads, education, and health centers, rather than just services. Field studies of mobility among women and men in rural settlements in Africa with poor road access illustrate the frustrations and costs of living “off-road” (Porter 2002). It is particularly important to note that for women, financial, time, and—in some cases—cultural constraints on mobility are highly restrictive for commerce and trade. Uganda is no exception to this phenomenon. Four aspects of access to infrastructure have especially far-reaching implications for development in general and agricultural production in particular, namely (1) schools, (2) medical care, (3) markets, and (4) credit facilities.

The plight of the rural poor emphasizes the need for access to health care in emergencies, but health facilities are usually hard to find in remote locations. Moreover, the poor in remote areas are often the most in need of medical assistance, since water and sanitation facilities are frequently inadequate and poverty levels are above regional averages. A recent Uganda Participatory Poverty Assessment (cited by Booth, Hammer, and Lovell 2000) indicates that vaccination programs often miss remote areas, thus exposing populations to further risk. Moreover, the costs of medicine further exacerbate existing high costs of transporting the sick to a health facility.

Many farmers in remote areas prefer to send produce for sale in major markets, which are usually located on paved roads. This has important implications for women in Africa since they are the principal marketers and/or porters of agricultural produce (Porter 2002). In some parts of Uganda, such as the rural northeast, where there are severe physical and economic constraints, remote market closures following road construction have a particularly severe impact on women. By the same token, a journey to remote rural areas of Uganda needs motorized transportation, which when obliged to use poorly maintained roads has high maintenance costs.

Roads are crucial for effective rural transport systems , but the mountainous and hilly topography in many parts of Uganda hinders development of roads. The poorest communities are often the most isolated ones. The roads program, which was the earliest focus of government poverty reduction efforts, had some impact. This effort was on “classified” roads, 70 percent of which are now in fair to good condition, compared to 50 percent of feeder roads (Foster and Mijumbi 2002). The more recent 10-year Road Sector Development Program focuses on rehabilitation, maintenance, and selective upgrading of existing roads, emphasizing the main paved and gravel roads. The average distance of households to a tarred road fell from 32 km in 1997 to 22 km in 1999/2000, and 60 percent (15,000 km) of district feeder roads were rehabilitated and improved.⁹ The effects of economic growth and improved transport links were evident in improved access to *matatu* taxis, which were on average within 6 km of homes in 1999/2000 compared with 9 km in 1997. The 2000 service delivery survey found that 65 percent of communities were of the view that public transportation had improved over the previous five years, due largely to improved road maintenance.

What is also worrisome for rural Ugandans is their extremely low access to electricity. Only 12 percent of all villages and only 2.1 percent of all rural households have electricity connections in Uganda. These rates are among the lowest in the world. The Ministry of Energy and Mineral Development is planning to increase the rate of rural household electricity access to 10 percent by 2010. This rate is considerably lower than the rates achieved in India and China, for example, several decades ago. Access to electricity poses a great challenge for future development of rural areas in Uganda.

⁹ Tarmac Roads: Tarmac (or tarred) roads are generally well maintained and sealed by tar. These roads feed into cities from different border posts and towns.

Murram Roads: They are gravel roads (small stones mixed with sand) with varying degrees of maintenance dependent on seasons and traffic.

Feeder Roads: Feeder (or dirt) roads link communities to commercial and socio-economic centers or connect them to the classified road network. These roads are therefore very important for the livelihood of rural communities since they facilitate delivery of farm inputs, marketing of agricultural produce, delivery of social and administrative services. They are passable by motorized vehicles although some roads are passable only during the dry period.

Source: http://www.miniworks.go.ug/road_network.htm

Government investment in improved water infrastructure is also important for economic growth and poverty reduction. A study of micro- and small enterprises (MSEs) in Uganda showed that economic benefits to MSEs of water supply improvements might be limited (Davis et al. 2001). Enterprises in both communities where research was conducted preferred a system of public kiosks to private connections. Small retail operations that sell foodstuffs or dry goods have very little need for large quantities of water. These findings have important implications for both the design and pricing of piped water services in Uganda in that piped water services with private connections may be more appropriate for residential areas, whereas piped services to central business districts will probably require more public taps than are commonly envisioned or constructed. These findings emphasize the importance of providing a range of technological options for planning a new water supply system, and importantly, for obtaining reliable information on preferences held and demand by different groups of consumers.

Regional variation in infrastructure access is enormous. Analysis of distances to various types of infrastructure from the 1999/2000 Ugandan National Household Survey shows that urban areas of the central region fare better because people have relatively short distances to travel. For example, urban residents' travel an average of 2.4 km to a factory and 0.21 km to an all-season road. As expected, rural areas of the northern region fare the worst and people there commute 39 km on average to get to a factory and 2.4 km to reach an all-season road. The central region has the largest road network. Similarly, travel to the closest consumer market is shortest for the central region (UNHS 1999/2000). Again, the numbers for the northern region show that the poor travel longer distances to reach the nearest market.

Budget estimates for approved expenditure for feeder road maintenance from 1994/95 to 1996/97 show that expenditures were cut for most districts. However, fiscal transfers to local governments for the same years show substantial increases in the commitment to improved water supply in central, eastern, and western Uganda, the only years and regions for which these data are available.

Infrastructure for electricity, measured as the percentage of villages with such access, is the worst in the northern region with most districts in single-digit values, while most of the other regions fare slightly better. Unsurprisingly, Kampala fares best in the central region, and 73% of the city is connected to electricity.

Health

Uganda has achieved great success in containing the incidence of HIV/AIDS. The rate has declined from more than 30 percent in early 1990s to less than 6 percent today (CIA 2003). This is due to an aggressive government campaign against the disease. But Uganda has not fared well on many other fronts. Table 7 shows the changes in health indicators in Uganda during 1980–99. Although infant mortality rate has declined, all other indicators, such as death rate and life expectancy, have deteriorated over this period. Health indicators also show differences across regions. Data gathered from UNHS (1995/96, 1999/2000) show that the central region has fared best. The number of workdays “lost in the past 30 days” due to illness is lowest in this region (1.8 days). The northern, eastern, and western regions lost on this count an average of 2.3 days of work due to illness in 1999/00. What is striking for the same year is that female workers lost more time to illness than did male workers. Again, regional trends show that the central and more urban region fared best.

Table 7—Health indicators, various years

| Indicators | 1980 | 1982 | 1985 | 1987 | 1990 | 1992 | 1995 | 1997 | 1999 |
|---|--------|--------|--------|--------|--------|-------|-------|-------|-------|
| Mortality rate, infant (per 1,000 live births) | 115.50 | 115.50 | 115.50 | 115.50 | 104.40 | 97.00 | 98.20 | 99.00 | 88.33 |
| Death rate, crude (per 1,000 people) | 17.68 | 17.60 | 17.60 | 17.60 | 17.96 | 18.20 | 19.16 | 19.80 | 19.40 |
| Birth rate, crude (per 1,000 people) | 49.10 | 49.10 | 49.94 | 50.50 | 50.32 | 50.20 | 48.82 | 47.90 | 46.26 |
| Life expectancy at birth, female (years) | 49.43 | 49.10 | 49.10 | 49.10 | 47.12 | 45.80 | 43.60 | 42.14 | 42.40 |
| Life expectancy at birth, male (years) | 47.51 | 47.51 | 47.57 | 47.61 | 46.40 | 45.60 | 43.92 | 42.80 | 41.90 |
| Life expectancy at birth, total (years) | 48.45 | 48.29 | 48.32 | 48.34 | 46.75 | 45.70 | 43.77 | 42.48 | 42.14 |

Source: World Bank 2002.

Note: Data were only readily available for the years shown.

The deterioration in health indicators is a result of an inefficient health management system. In 1993, the Ministry of Health (MOH) delegated managerial responsibility to district councils for local health care, arguing that these councils were best informed about local situations. However, decentralization did little to mitigate tensions between the MOH and districts over budgetary allocations (Brown 2000). Local councils were also so overwhelmed by the huge demand for services in rural areas that they could not deliver needed services to the poor effectively. Improving the legal and regulatory framework within which a health sector can thrive is crucial. Reinikka and Ablo (2000) found that input flow into Uganda's health system suffers from serious problems, which to a large extent has to do with governance and a lack of accountability. This problem has serious implications for funding because budget allocations are wasted when institutions or their controls are weak. Because inputs did not reach the intended facilities, actual service delivery was often lacking despite nominally adequate funding.

The government has taken action on several fronts, the most important of which was a significant increase in budget allocation toward primary health care through the Poverty Action Fund, set up specifically to direct and monitor funds from debt relief and other government and donor resources earmarked for the welfare of poor people. Further annual increases for primary health care are not only protected from budget cuts but also show a projected increase of between 21 and 27 percent (Njie 2001). Another prominent feature of the health plan is to shift services from a tertiary and curative nature to a primary and preventive nature.

Education

During 1991–99, rural literacy improved across all regions in Uganda. This success resulted from a series of government policy reforms in the education sector. The Universal Primary Education (UPE) policy aims to provide free education to four children per family, emphasizing gender equity. The UPE policy led to a substantial increase in primary school enrollment, from 2.7 million pupils in 1996 to 6.6 million pupils in 1999. A striking feature of this increase was that almost one-half of the students

were female. Dropout rates, however, remained high due to lack of facilities or poor health of children. Incentives should be given to female teachers to remain in rural areas, serving as role models for girls (Tumushabe et al. 2001).

The government's policy on education in the 1990s focused on increasing access to primary education and economic opportunities for poor people. Furthermore, improving the quality of education was also considered crucial. Since 1991/92, public expenditure on education has shifted toward primary education relative to secondary or tertiary education. Measures have been taken to contain costs because of the increase in demand for education during the initial phase of macroeconomic reforms. With debt relief through the HIPC Initiative, Uganda qualified for a diversion of funds away from debt service and toward its social sectors.

5. CONCEPTUAL FRAMEWORK AND MODEL

This section reviews previous studies and develops a conceptual framework and econometric model for application to rural Uganda.

Model

Public investment affects rural poverty through many channels. It directly increases farmer incomes by increasing agricultural productivity, and increased productivity, in turn, reduces rural poverty. Increased agricultural productivity also helps to increase rural wages and employment. It creates more nonfarm employment opportunities and migration into urban or other rural regions. More agricultural output through public investment in rural areas often leads to lower food prices, helping the poor indirectly because they are often net buyers of food grains.

Previous studies on public expenditure focused on performance of budget implementation. For example, Foster and Mijumbi (2002) evaluated such performance by analyzing differences between budgets and outruns of various government expenditure items. There have also been several studies of poverty changes in Uganda by Appleton (2001a and b). These studies focused on measures of poverty in rural and urban areas and by regions, and they provide important and valuable information on the current status of and changes in Ugandan poverty.

Deininger and Okidi (2003) were the first to analyze the impact of various infrastructure, education, and health variables on farmers' income and poverty using a panel dataset created from the 1992 and 1999 Uganda National Household Surveys. The authors concluded that education, health, and infrastructure are all important. However, it proved difficult to compare relative returns to such investments, relativities that are required to make informed allocative decisions for public expenditures.

Fan, Hazell, and Thorat (2000) and Fan, Zhang, and Zhang (2002) constructed an econometric model to estimate the effects of government spending on poverty reduction through various channels, using secondary data from government statistical agencies in

India and China. These two countries have long time-series data, particularly data on disaggregated government spending, but most African countries lack this luxury. Hence, such models need to be adjusted and adapted to the African context.

Building on previous IFPRI studies in Asia and Ugandan data availability, this study develops and adapts a simultaneous equations model to estimate the effects of government expenditure on agricultural production and on rural poverty through different channels. Equations (1) to (4) give the formal structure of the system.

Equation (1) models the hypothesized major determinants of rural poverty (P). These include agricultural output per agricultural laborer ($AOUTPC$), rural daily wage ($RWAGES$), and the nonagricultural employment share (NFE).

$$P = f(AOUTPC, RWAGES, NFE) \quad (1)$$

$$AOUTPC = f(LANDP, FERTP, AGEXT, RLITER, DROADS, PSICK) \quad (2)$$

$$RWAGES = f(AOUTPC, RLITER, DROADS, PSICK) \quad (3)$$

$$NFE = f(AOUTPC, RLITER, DROADS, PSICK) \quad (4)$$

The agricultural labor productivity variable captures how improved agricultural productivity contributes to poverty reduction directly through increased income. Nonfarm employment income is the second most important source of income after agricultural production for rural residents in Uganda. The wage and share of nonfarm laborers in total laborers are reasonable proxies for nonfarm income. Moreover, in this manner, it is possible to distinguish between the differential impacts of changes in wages and shares of workers in the nonfarm sector on rural poverty reduction.

Equation (2) is an agricultural labor productivity function, in which gross crop production value per unit of agricultural labor is the dependent variable, while independent variables include the conventional inputs land ($LANDP$) and fertilizer ($FERTP$) expressed on a per unit labor basis. The following public investment variables capture the direct impact of technology, infrastructure, and education on agricultural growth: an agricultural research and extension variable measured in stock terms ($AGEXT$) which in turn is a function (described below) of lagged government spending on

agricultural research and extension; rural literacy rate (*RLITER*); average distance of households to different types of roads (*DROADS*), that is, tarred, murrum, and feeder roads, and a health indicator measured by the share of people who have been sick in the past 30 days. Complications arose in calculating combined government expenditure on agricultural research and extension since only the latter is available at the district level. Since most agricultural research is conducted at the national level in a small country such as Uganda, this may not be an important limitation. In our empirical analysis, we allocated national agricultural research expenditures to each district in proportion to the district extension expenditures, and then added them to extension spending, thus making this variable agricultural research and extension.

Equations (3) and (4) are wages and employment determination functions in the rural nonfarm sector. The independent variables include a set of public investment variables such as rural infrastructure and education. Agricultural productivity is also included in both equations to capture effects of improved labor productivity on rural wages and rural nonfarm employment.

Ideally, we should also include a set of equations to model the relationship between government expenditures and improved public capital such as roads, education, and health, as Fan et al. (2000 and 2002) have done in their studies in Asia, but historical data on government spending by region in Uganda are available only after 1993. For this reason, we used an alternative approach. We first estimated growth and poverty impacts of physical infrastructure, health, and education. We then used estimates of the unit cost of public capital to obtain benefit-cost ratios of various types of government spending.

Marginal Impact on Growth and Poverty Reduction

By totally differentiating equations (1) to (4), we can derive marginal impacts and elasticities for different types of public capital on growth in agricultural production and rural poverty. The growth effect is straightforward—that is, we take the derivative of the equation with respect to each variable of agricultural services, education, infrastructure,

and health. For poverty effects, public capital not only affects poverty through agricultural productivity but also through wages and employment.

The impact of government investment in agricultural research and extension on poverty can be derived as:

$$\begin{aligned}
 dP/dAGEXT &= (\partial P/\partial AOUTPC) (\partial AOUTPC/\partial AGEXT) \\
 &+ (\partial P/\partial RWAGES) (\partial RWAGES/\partial AOUTPC) (\partial AOUTPC/\partial AGEXT) \\
 &+ (\partial P/\partial NFE) (\partial NFE/\partial AOUTPC) (\partial AOUTPC/\partial AGEXT) \quad (5)
 \end{aligned}$$

The first term on the right hand side of Equation (5) captures the impact on poverty of government investments in agricultural research and extension through yield-enhancing technologies such as improved varieties, and therefore also increased agricultural labor productivity. Such labor productivity also affects poverty through changes in rural nonfarm wages and employment, which are captured in the remaining two terms.

The impact of government investments in rural roads through shortened distance to different types of roads is derived as:

$$\begin{aligned}
 dP/dDROADS &= (\partial P/\partial AOUTPC) (\partial AOUTPC/\partial DROADS) \\
 &+ (\partial P/\partial RWAGE) (\partial RWAGE/\partial AOUTPC) (\partial AOUTPC/\partial DROADS) \\
 &+ (\partial P/\partial NFE) (\partial NFE/\partial AOUTPC) (\partial AOUTPC/\partial DROADS) \\
 &+ (\partial P/\partial RWAGE) (\partial RWAGE/\partial DROADS) \\
 &+ (\partial P/\partial NFE) (\partial NFE/\partial DROADS) \quad (6)
 \end{aligned}$$

The first term on the right side of Equation (6) measures direct effects on poverty of improved productivity attributable to shorter distance to rural roads. Terms 2 and 3 are indirect effects of improved productivity through changes in rural wages, and employment. Terms 4 and 5 capture direct effects on poverty of higher rural wages and greater nonagricultural employment opportunities arising from government investment in roads. We can similarly derive the impact on rural poverty of increased investment in health and education.

To calculate returns in growth and poverty reduction per unit of monetary spending, we also need information on the unit cost of public capital. For example, how much it would cost to build one additional kilometer of rural roads, or how much it would cost to educate a rural laborer to become literate. There are several ways to estimate such unit costs. One way is to use the actual cost of building one additional unit of public capital under present conditions. However, this type of information is not readily available. A second approach is to estimate the average unit cost from past investments. For the unit cost of rural roads, total length of rural roads divided by total investment in rural roads during the past 30 years can be used. Another approach would be to regress the length of roads against the investment in roads using time-series data. A difficult problem with this second approach is the time lag between spending and creation of public capital. Once again, estimating the time lag empirically would require long time-series data, seldom available for Africa.

Considering the data availability and situation in Uganda, the second approach is preferable—that is, calculating the average unit cost of spending of each type of public capital. For agricultural research and extension, we first constructed a stock variable using an arbitrary but plausible set of weights of lagged expenditures:

$$AGEXT_t = 0.05*rd_{t-1} + 0.1*rd_{t-2} + 0.2*rd_{t-3} + 0.3*rd_{t-4} + 0.2*rd_{t-5} + 0.1*rd_{t-6} + 0.05*rd_{t-7},$$

where $AGEXT_t$ is research stock at year t , rd_{t-i} is government spending in agricultural research and extension at year $t-i$, $i = 1..7$. As noted above, agricultural research spending was distributed among districts in proportion to extension expenditures.

Roads were disaggregated into feeder, murram, and tarmac roads. Since we do not have unit cost data for these three categories, we arbitrarily assumed that the unit cost of feeder roads is one-quarter of the cost of murram roads, and one-eighth of the cost of

tarmac roads.¹⁰ We then allocate total government expenditures on roads across these three categories based using these assumptions and the respective road lengths. For education, we first calculated unit spending per unit of rural population, and then divided per capita spending by reduction in rural illiteracy rate to achieve a unit cost of reduction in rural illiteracy rate. Similarly, we calculated the unit cost of health in terms of reduction in the percentage of rural residents who were sick in the previous 30 days.

¹⁰This differential cost of different types of roads can be found and supported by the World Bank Road Information System, which provides unit cost of the World Bank-funded road projects across different countries.

6. DATA, MODEL ESTIMATION, AND RESULTS

Data

The unit of analysis in this study is a combination of national, regional, and district levels. Most of the data are collected from various agencies of the Ugandan government and/or aggregated from the UNHS, crop surveys, and community surveys conducted by the Uganda Bureau of Statistics (UBOS). Crop-production and land-use variables were generated from crop surveys, while most of infrastructure variables such as access to market, roads, school, health service, and post office were from community surveys. Poverty, income, employment, and wages by districts were aggregated from different national household surveys. Most of the government spending variables at the national level were obtained from the Ministry of Planning and Finance, while spending data at the district level were from the Ministry of Local Governments and the Ministry of Planning and Finance. More detailed data sources and descriptions are included in the appendix.

We collected data for various indicators and years for 45 districts in Uganda, with some indicators going as far back as 1980. For the purpose of comparison, we converted all government expenditures into 1997 Ugandan Shillings. A 10% discount rate is also used to inflate or deflate expenditures or output into a common base year. Total expenditure is broken down into various sectors following the *Statistics Abstract* (UBOS various years). They includes both recurrent and development expenditure. Other sources include the FAOStat Database (June 2000) and the World Bank's *2002 World Development Indicators*. Total GDP, agricultural GDP, total population, agricultural population, employment by sector, road density, and literacy rate are taken from various agencies of the Republic of Uganda. Due to lack of systematic secondary data at the district level, we generated a panel dataset at the district level for 1992, 1995, and 1999 by directly aggregating survey data at household and community levels in these years. Numerous studies, notably a set of studies collected in the book edited by Reinikka and Collier (2001), have used these surveys. Data on agricultural output and inputs are

generated from crop surveys. Employment, education level, health status, and poverty incidence are from household surveys. Information on markets, wages, prices, and infrastructure are derived from community surveys. Appendices in Reinikka and Collier (2001) provide a detailed discussion of these surveys.

The crop and household surveys cover the same households. The surveys in 1992 and 1999 are large and comprehensive in that they cover about 10,000 households and address a wide range of topics. Between 1992 and 1999, there were four monitoring surveys with shorter questionnaires and a smaller sample size of 5,000 households. The surveys in 1995 used in the analysis contain 5,435 usable observations. The community surveys involve about 1,000 communities across the country. These surveys cover all districts except several in the northern region. As each household or community in the surveys corresponds to a particular sample multiplier, we can use the multiplier as a weight for data aggregation.

Poverty. With respect to poverty estimation, we closely followed Appleton's method (2001a) to estimate values of consumption per adult equivalent. Based on regionally specific poverty lines described in Appleton (2001a), we then calculated poverty rates at the district level.¹¹ The traditional approach uses a single national poverty line derived from a common "food basket". Uganda has large regional variation in diets with six major staple foods being eastern. For example, matooke is mainly consumed in the central and western regions, and not in the northern region. Therefore, a single national "food basket" approach may not be appropriate. Based on this concern, Appleton calculates regional-specific poverty lines following the standard approach of Ravallion and Bidani (1994). By comparing the poverty incidence based on national and regional poverty lines, he shows that region-specific poverty line is more appropriate for estimating regional patterns of poverty in Uganda.

Output values. Because the questionnaire in the crop survey provides more than 30 units for each crop, and many crops are only for self-consumption, it is difficult to

¹¹Appleton (2001a) has reported poverty rates at the regional level only.

aggregate output values across households and crops. For those crops with reported market sales in a household, we used the market price to derive total output value. In cases where price information was not available for a particular crop, we used the median price measured by the same quantity among all the households within a district to derive the output value for this particular output. If for the same quantity there was no available price at the district level, we used the national median price as a proxy to calculate the output value of the crop produced by the household. The questionnaire includes the following crops: matooke, maize, finger millet, sorghum, rice, beans, field peas, cowpeas, pigeon peas, groundnuts, sim-sim, cotton, Irish potatoes, sweet potatoes, cassava, coffee, tea, tobacco, trees, flowers, oranges, passionfruit, pineapples, mangoes, papaw, onions, cabbages, dodo, tomatoes, carrots, other vegetables, other fruits, and other crops. Unfortunately, estimates of production of livestock and fishery are not included in the crop survey. Considering that most poor rely primarily on cropping for a living, the impact of exclusion of livestock and fishery on poverty measures is minimal.

Land. Land variable is agricultural land, which is taken from the Crop Survey by UBOS.

Fertilizer. Fertilizer is aggregate value of fertilizer used by farmers for crop production. The data are from the Crop Survey of UBOS.

Employment. The household socioeconomic survey reports the activity status as well as the codes for industry and occupation. Based on this information, we estimated total labor force, employment rate, and share of farming and nonfarm employment in total employment.

Wages. Farming and nonfarm wage rates for men and women at the district level are aggregated from the community survey, expressed as shillings per month.

Health outcome. The household socioeconomic survey reports data on household members who had fallen sick due to illness in the previous 30 days and on how many days were lost. Based on this information, we created two indicators at the district level:

percentage of residents who had fallen sick and average days of work lost due to illness over the past 30 days.

Education level. The literacy rate is from the household socioeconomic survey, and is defined as the share of population over the age of 15 who can read and write.

Roads. Average distances in kilometers to the nearest feeder road and all-season murram and tarred (or tarmac) roads are generated from the community survey.

Agricultural research and extension. Agricultural research expenditures are available only at the national level. After mid-1990s, agricultural extension expenditures were available for most of the districts. The expenditures were available for selected districts in the early 1990s. For earlier years, we aggregated the district level expenditures into regions, and used regional aggregate expenditures for all districts within a region, assuming extension services spill into each district equally. Finally we allocated national agricultural research expenditures by district in proportion to their extension expenditures.

Model Estimation and Results

We used double-log functional forms for all equations in the system. The observations with missing or zero (for example in the case of fertilizer) values are deleted from our sample during the estimation. As a result, we have 90 observations (3 years and 30 districts). More flexible functional forms (such as translog or quadratic equations) impose fewer restrictions on estimated parameters, but many coefficients are not statistically significant because of multicollinearity problems. The system is estimated using the full information maximum likelihood technique.

The results of the estimated system are presented in Table 8. The estimated poverty equation (Equation 1) show that growth in agricultural labor productivity and nonfarm employment are both significant factors in determining rural poverty in Uganda. For every 1 percent of growth in agricultural production, 0.27 percent of rural poor people would escape poverty. Rural nonfarm employment had about the same

influence on the incidence of poverty. In contrast, rural wages did not significantly reduce rural poverty. This may be because there is surplus rural labor, consistent with the so-called efficient wage theory.

The estimated agricultural labor productivity function (Equation 2) shows that the coefficients of land input and fertilizer are statistically significant with elasticities of 0.126 and 0.161, respectively.¹² The strong and significant coefficient of the fertilizer variable indicates that increased fertilizer use has great potential for promoting future agricultural production. The results also show that investment in agricultural research and extension, improvements in rural literacy rate, shortened distances to feeder roads, and reduced days of sickness of labor have all contributed significantly to growth in agriculture. However, shortened distances to murram roads and tarmac roads do not appear to have statistically significant impacts on improvement in agricultural labor productivity.

The estimates for Equation (3) show that improved health has contributed to increases in rural wages; but all the other variables included have an insignificant impact on wages.

The estimates for Equation (4) suggest that nonfarm employment is highly correlated with proximity to murram roads and tarmac roads, but not to feeder roads. The rural literacy variable and days of sickness are not significant at the 10 percent level.

Marginal Returns to Public Investment

Using the estimated equations (1) to (4) in Table 8 and the estimated relationship between government average investment for the past four years and physical public capital stocks, we derived marginal returns to different types of government expenditures in growth and reduction of rural poverty, as shown in Equations (5) and (6). This is done in two steps. First, we calculate the marginal returns in agricultural output and poverty

¹² The land variable is measured as agricultural land per agricultural worker while the fertilizer variable is measured as fertilizer purchased value per agricultural worker. Since both variables are only available for 1999, we use the same values for these two variables for 1992 and 1995.

reduction per unit of physical unit, for example increased agricultural output or number of poor reduced per kilometer of feeder roads.¹³ Then we use the unit cost of these physical units, for example shillings per kilometer, to convert the effects to a per unit of investment (or cost) basis.¹⁴

We calculated marginal returns by different types of investments in four regions and for Uganda as whole. Results are presented in Table 9. Only statistically significant coefficients are used in this calculation.

Effects are measured as a ratio of shillings or the number of poor people brought out of poverty per unit of spending in 1999.¹⁵ For example, returns to investments in agricultural research and extension are measured as shillings of additional production or number of persons brought out of poverty per one additional shilling spent on agricultural research and extension. These measures provide information for comparing relative benefits of additional units of expenditure on different items in different regions, which can contribute usefully to setting future priorities for government expenditure to further increase agricultural productivity and reduce rural poverty.

¹³ We use feeder roads to illustrate our calculation of the benefit-cost ratios. Table 8 shows that the elasticity of labor productivity with respect to feeder roads is 0.139. We assume heroically that a one percent increase in feeder roads will translate to a one percent reduction in the average distance of a household to the nearest feeder road. Using the expression for marginal product of a Cobb-Douglas or log-linear production function as elasticity*output/input, the output benefit of one additional km of feeder roads is then calculated as $0.139 * AOUT / LFEEDER$, where *AOUT* is the total agricultural output value (given unchanged labor quantity) and *LFEEDER* is the length of feeder roads. At the national level *AOUT* in 1999 is 380 billion shillings while length of feeder roads is 12,721 km. Therefore, for the marginal km of feeder roads, 4.1 million shillings of agricultural production value would be produced. For the cost side, we first allocate the national road expenditures to the district level proportional to the district spending on roads. The average costs including both recurrent and investment is 597 thousand (0.597 million) shillings per km. The benefit-cost ratio for the feeder roads is therefore 7. For poverty reduction impact, equations 1 and 2 imply that the poverty reduction elasticity of the feeder roads variable is $0.266 * 0.139 = 0.037$. Total number of poor in Uganda in 1999 is 6.7 million. This implies that, for one additional km of feeder roads, $0.037 * 6.7 * 10^6 / 12,721 = 19.5$, almost 20 poor would be lifted above the poverty line. This thus translates to a poverty reduction effect of about 33 poor lifted above the poverty line ($19.5 / 0.597$) per million shillings of spending.

¹⁴ Ideally, this relationship should be estimated econometrically based on historical data such as by Fan et al (1998 and 2002) in China and India. But lack of long-term time series data on these physical capital items and investment at the regional level does not allow us to do so in Africa.

¹⁵ When the constant return to scale is assumed, the effects on production of various inputs and public investment variables are equivalent to those on productivity.

Table 8—Estimates of system equations

| | | | | | | | | | | |
|------------------|---|---|---------------------------------|---|--------------------------------|---|--------------------------------|-----------------------------------|-----------------------------------|---------------|
| (1) <i>P</i> | = | - | 0.2664 <i>OUTPC</i> (-4.04)* | - | 0.183 <i>RWAGE</i> (-0.98) | - | 0.270 <i>NFE</i> (-2.75)* | | $R^2 = 0.407$ | |
| (2) <i>OUTPC</i> | = | | 0.126 <i>LANDP</i> (3.65)* | + | 0.161 <i>FERTP</i> (2.99)* | + | 0.189 <i>AGEXT</i> (1.75)* | + 0.332 <i>RLITER</i> (1.80)* | - 0.139 <i>DFROAD</i> (-1.94)* | $R^2 = 0.675$ |
| | | + | 0.245 <i>DMROAD</i> (1.39) | - | 0.09 <i>DTROAD</i> (-1.04) | - | 0.465 <i>PSICK</i> (-2.04) | | | |
| (3) <i>RWAGE</i> | = | - | 0.088 <i>Y</i> (-1.52) | + | 0.133 <i>RLITER</i> (1.00) | + | 0.023 <i>DFROAD</i> (0.63) | - 0.068 <i>DMROAD</i> (-0.63) | - 0.048 <i>DTROAD</i> (-1.12) | $R^2 = 0.418$ |
| | | - | 0.216 <i>PSICK</i> (-2.32)* | | | | | | | |
| (4) <i>NFE</i> | = | - | 0.172 <i>Y</i> (-0.78) | - | 0.152 <i>RLITER</i> (-0.81) | - | 0.053 <i>DFROAD</i> (-0.78) | - 0.216 <i>DMROAD</i> (-2.25)* | - 0.234 <i>DTROAD</i> (-3.05)* | $R^2 = 0.315$ |
| | | - | 0.104 <i>PSICK</i> (-0.62) | | | | | | | |

Note: Asterisk indicates that coefficients are statistically significant at the 10 percent level, based on the statistics reported in respective parentheses. The coefficients of regional dummies are not reported.

Table 9—Marginal returns to government investment in rural Uganda

| Investment | Central | East | North | West | Uganda |
|---|----------------|-------------|--------------|-------------|---------------|
| Benefit–cost ratio | | | | | |
| Agricultural R&D | 12.49 | 10.77 | 11.77 | 14.74 | 12.38 |
| Education | 2.05 | 3.51 | 2.10 | 3.80 | 2.72 |
| Feeder Roads | 6.03 | 8.74 | 4.88 | 9.19 | 7.16 |
| Murram Roads | n.s. | n.s. | n.s. | n.s. | n.s. |
| Tarmac Roads | n.s. | n.s. | n.s. | n.s. | n.s. |
| Health | 1.37 | 0.92 | 0.37 | 0.96 | 0.90 |
| Number of poor people reduced per million shillings | | | | | |
| Agricultural R&D | 21.75 | 66.31 | 175.52 | 48.91 | 58.39 |
| Education | 3.57 | 21.60 | 31.38 | 12.62 | 12.81 |
| Feeder Roads | 10.51 | 53.85 | 72.82 | 30.49 | 33.77 |
| Murram Roads | 4.08 | 11.88 | 14.80 | 9.77 | 9.70 |
| Tarmac Roads | 2.59 | 13.12 | 62.92 | 9.39 | 9.73 |
| Health | 2.60 | 6.15 | 5.95 | 3.46 | 4.60 |

Source: Calculated by authors as exposted in Footnote 13.

Note: n.s. indicates that the respective coefficients are not statistically significant.

An important feature of the results in Table 9 is that most of these investments reduce poverty while increasing agricultural productivity. However, there are sizable differences in production and poverty reduction gains among expenditure items and across regions. In terms of productivity effects, for the country as a whole, government expenditure on agricultural extension and research has the highest returns in labor productivity. For the marginal shilling invested, 12 shillings would be returned. The feeder roads investment ranks second, with a benefit-cost ratio about 7. Education also has positive returns, with a benefit–cost ratio of about 3. Health is the only government investment that has a return lower than its cost, of only 0.9 shilling per shilling spent.

Regional disaggregation reveals that, for all types of investments except health, the return is highest in the western region. For agricultural research and extension the eastern region has the lowest return, while central and northern regions fall in between. For education and roads, the central and northern regions have the lowest returns while the eastern region ranks in the middle.

In terms of poverty reduction, agricultural research and extension again ranks first, followed by feeder roads. Among different types of roads, feeder roads have the largest impact, murrum roads the second-largest impact, and tarmac roads the least impact. Education's effects on poverty are smaller than those of agricultural services and feeder roads, but higher than for murrum and tarmac roads and for health. Government investment in health has the smallest impact on poverty reduction.

For all types of investment, the northern region has the highest returns except for health. The north and east have similar impacts of health expenditures on poverty. On the other hand, in the central region all types of investment have impacts on poverty reduction that are the smallest among all regions.

It appears that there might be a tradeoff between growth in agricultural productivity and reduction in rural poverty when the government allocates investment across regions. If the government attempts to maximize poverty-reduction by investing more in the northern region, productivity may have to be sacrificed in other regions because this region has lower marginal returns in agricultural productivity. But the trade-off is small.

7. CONCLUSIONS

This section concludes our study by reporting the major findings. It then highlights implications for future government investment priorities, and points out limitations and future research directions.

Major Findings

Using largely district-level data for 1992, 1995 and 1999, this study developed a simultaneous equations model to estimate the effects of different types of government expenditure on agricultural growth and rural poverty in Uganda. Results show that most government investments, such as agricultural services, rural infrastructure, rural education, and health, have contributed to agricultural productivity growth and reduced rural poverty. However, variations in their marginal effects on production and poverty reduction were large, among different types of spending and across regions.

Government spending on agricultural research and extension improved agricultural productivity substantially. This type of expenditure had the largest measured returns to growth in agricultural production. Growth in agriculture is still much needed to meet the food needs of an increasingly larger population. Agricultural research and extension spending also has the largest assessed impact on poverty reduction. Government spending on rural roads also had substantial marginal impact on rural poverty reduction. The impact of low-grade roads such as feeder roads is larger than the impact of high-grade roads such as murram and tarmac roads. The large impact of feeder roads on poverty reduction is mainly through improved agricultural productivity, while murram and tarmac roads had no significant impact on agricultural productivity. The impact of these better roads on poverty reduction is mainly through improved nonfarm employment opportunities. Education's effects rank after agricultural research and extension, and feeder roads. These poverty-reduction effects appeared to come from growth in agricultural productivity, improved nonfarm employment, and increased rural wages.

Government spending on health did not show a large impact on agricultural productivity growth or rural poverty reduction. Four reasons are likely to account for this. First, health investment tends to affect growth and poverty reduction in the long run. Due to the nature of our data set, this aspect could not be captured. Second, a large share of health expenditures is spent on prevention and treatment of HIV/AIDS-related diseases, which has obvious significant impacts on long-term growth and poverty reduction and directly affects the well being of poor people. Without these efforts, Uganda would have had a much higher incidence of poverty; however, our model is unable to demonstrate these effects. Third, Uganda achieved great success in containing HIV/AIDS through a very aggressive public campaign whereby the prevalence of HIV/AIDS fell from 30 percent in 1998 to 6 percent today. While Uganda should continue to address HIV/AIDS, future government spending on this problem will likely yield lower returns in productivity and poverty reduction than in the past. Finally, there may be significant inefficiencies in the Ugandan health system, as briefly discussed earlier. Uganda ranks 149 among 191 countries in overall health system performance (Tandon et al. 2002).

Additional investments in the northern region contribute most to reducing poverty because this is where most of Uganda's poor people are now concentrated, and the government has relatively neglected this region in the past. The poverty-reduction effect of investing in infrastructure and education is particularly high in this region. Nonetheless, in terms of increased agricultural productivity, most types of investment have the highest returns in the western region.

Priorities of Future Government Investment

The results of this study have potentially important policy implications for future government investment priorities in Uganda. As Table 5 showed, education is the largest spending category among all public investments considered in the study, accounting for 35 percent of total expenditure in 1999. At the other extreme, agriculture accounts for only 1.2 percent of total government expenditure. All types of infrastructure (roads, electricity, and telecommunications) together accounted for only 7 percent of total

government spending. Health spending accounted for about 7 percent of the total. Are these allocations optimal for maximizing growth and poverty reduction? This study reveals large differentials in the effect of various types of government spending on growth and poverty reduction. The potential gains from reallocating government resources are enormous. The following policy suggestions are offered based on the results of this study:

1. With 86 percent of the population living in rural areas, and about half of rural income coming directly from agriculture, increased investment in agricultural research and extension is urgently needed. Agricultural R&D spending was less than 0.50 percent of agricultural GDP in 1998. This is extremely low compared with many more-developed countries, but it is also low compared with most developing countries. The highest returns in both agricultural growth and poverty reduction shown in this study suggest that increased investment in agricultural research and extension is a “win-win” (growth and poverty) strategy for national development.
2. Rural infrastructure and education should receive higher priority in the public investment portfolio. Investments in infrastructure and education reduce rural poverty mainly by spurring nonfarm employment and growth in agricultural productivity. Roads should receive particular attention among all types of infrastructure, and among all types of roads, low-grade roads such as feeder roads should have higher priority than tarmac or murrum roads.
3. In the past, Uganda invested heavily in the health sector and made significant strides in confronting HIV/AIDS through an aggressive public campaign. As a result, the prevalence of HIV/AIDS has fallen from 30 percent of the population five years ago to 6 percent today. Uganda should continue its investments in health care, but future investments should be geared to improving the efficiency of existing public health-care systems.
4. Infrastructure and education investment in the northern region yields the highest returns in terms of reducing rural poverty and promoting agricultural growth. This suggests that the government should drastically increase its investment in this region, governance and security concerns permitting.

Limitations and Future Research Directions

This study has several limitations. Among the most critical are some data constraints. While we will continue to improve our data collection, the government should put serious effort into organized, coordinated, and systematic data collection for

the long run. Without such data, it is difficult for the government to monitor and evaluate the impacts of various investments and to set future investment priorities to achieve stated objectives.

A general-equilibrium analysis is needed to analyze how government investment in rural areas affects not only the agricultural sector and rural areas, but also other sectors and cities. Ignoring these impacts severely underestimates the overall impact of public investment on poverty. An effort similar to that described in this paper is also needed to analyze the impact of urban investment on poverty reduction. Without such information documenting what we anticipate will be lower relative returns to public investment, it will be impossible to convince national policymakers to change the prevailing investment policy that is so biased to urban development.

Further, centralization versus decentralization of public spending is still an understudied subject. Uganda was one of the first African countries to have followed a more radical process of decentralization of public provision to local government. The performance of this process has been mixed. It is important to analyze how a more decentralized spending pattern may be more pro-poor than a centralized one.

Finally, an analysis of the political and institutional context of public investments, and conditions for efficient provision of public goods and services is also much needed to improve the efficiency of public investments. In particular, how can the government design a mechanism (via policies, regulations and fiscal systems) to mobilize public resources to invest in rural areas? How can public institutions be reformed to improve incentive systems, accountability, human capital, and management? These are important research issues requiring further investigation.

REFERENCES

- Ablo, E., and R. Reinikka. 2000. *Do Budgets Really Matter? Evidence from Public Spending on Education and Health in Uganda*. Washington, D.C.: World Bank.
- Appleton, S. 2001a. "Poverty in Uganda, 1999/2000: Preliminary Estimates from the UNHS." Nottingham, U.K.: University of Nottingham.
- _____. 2001b. Changes in poverty in Uganda, 1992–1997." Chapter in *Uganda's Recovery: The Role of Farms, Firms, and Government*, P. Collier and R. Reinikka, eds. Washington, D.C.: World Bank.
- Beintema, N. M., and C. Tizikara. 2002. *Uganda. Agricultural Science and Technology Indicators Country Brief No. 1*. Washington, D.C. and The Hague: IFPRI, ISNAR, and NARO.
- Booth, D., L. Hammer, and E. Lovell. 2000. Poverty and Transport. A report prepared for the World Bank and DFID. London: Overseas Development Institute.
- Brown, A. 2000. "Current Issues in Sector-Wide Approaches for Health Development: Uganda Case Study." Geneva: World Health Organization.
- Byrnes, Rita M. (ed.). 1992. *Uganda: A Country Study*. Federal Research Division. Washington D.C.: Library of Congress. 108–111.
- CIA (Central Intelligence Agency). 2003. Fact book. <<http://www.cia.gov/cia/publications/factbook/geos/ug.html#Intro>> (Accessed April 2003).
- Davis, J., A. Kang, J. Vincent, and D. Whittington. 2001 "How Important is Improved Water Infrastructure to Microenterprises? Evidence from Uganda." *World Development* 29 (1): 1753–1767.
- Decentralization Secretariat. Various years. *Fiscal Transfers to Local Governments, 1993/94–1999/2000*. Entebbe: Government of Uganda.
- Deininger, K., and J. Okidi. 2003. "Growth and Poverty Reduction in Uganda, 1992–2000: Panel Data Evidence." *Development Policy Review* 22 (4): 481–509.
- Fan, S., and N. Rao. 2003. "Public Spending in Developing Countries: Trend, Determination and Impact." EPTD Discussion Paper No. 99, Washington, D.C.: International Food Policy Research Institute.
- Fan, S., S. Jitsuchon, and N. Methakunnavut. 2003. "Rural Infrastructure Development and Poverty Reduction in Rural Thailand." Project Report submitted to the Asian Development Bank by IFPRI and Thailand Development Research Institute.
- Fan, S., L. Zhang, and X. Zhang, 2002. *Growth, Inequality, and Poverty in Rural China: The Role of Public Investment*. IFPRI Research Report No. 125. Washington, D.C.: International Food Policy Research Institute.

- Fan, S., P. Hazell, and S. Thorat. 2000. Government spending, agricultural growth, and poverty in rural India. *American Journal of Agricultural Economics* 82 (4): 1038-1051.
- FAO (Food and Agriculture Organization of the United Nations). n.d. FAOStat Database. <http://www.fao.org/waicent/portal/statistics_en.asp> (accessed June 2003).
- Foster, M., and P. Mijumbi. 2002. "How, When and Why does Poverty get Budget Priority? Poverty Reduction Strategy and Public Expenditure in Uganda." ODI Working Paper 163. London: Overseas Development Institute. April.
- Hao, C. T., and S. Fan. 2001. "How Can Vietnam Better Target Its Public Spending for Poverty Reduction." Paper presented at the International Conference on Rural Investment, Growth, and Poverty Reduction, held in Beijing, November 5–6.
- IMF (International Monetary Fund). 2000. "IMF and World Bank Support Debt Relief for Uganda." Press Release No. 00/34, May 2.
- MPED (Uganda, Ministry of Finance, Planning, and Economic Development.) 2000. "Poverty Reduction Strategy Paper: Uganda's Poverty Eradication Action Plan, Summary and Main objectives." <[Http://www.imf.org](http://www.imf.org)> (accessed April 2003).
- Njie, H. 2001. "Poverty and Ill Health: The Ugandan National Response." *Development* 44 (1): 93–98.
- Pardey, P. G., and N. M. Beintema. 2001. *Slow Magic: Agricultural R&D a Century after Mendel*. Washington, D.C.: IFPRI Food Policy Report.
- Porter, G. 2002. "Living in a Walking World: Rural Mobility and Social Equity Issues in Sub-Saharan Africa." *World Development* 30 (2): 285–300.
- Ravallion, Martin and Benu Bidani (1994), "How robust is a poverty line?" *World Bank Economic Review*, 8 (1): 75-102.
- Reinikka, R. and P. Collier (eds.). 2001. *Uganda's Recovery: The Role of Farms, Firms, and Government*. Washington, D.C.: World Bank.
- Tandon, A., C. Murray, J. Lauer, and D. Evans, 2000. "Measuring Overall Health System Performance for 191 Countries." Global Program on Evidence for Health Policy Discussion Paper Series No. 30. Geneva: World Health Organization.
- Tumushabe, J., C A. Barasa, F. K. Muhanguzi, and J. F. Otim-Nape. 2001. Gender and Primary Schooling in Uganda. IDS Research Report No. 42. Brighton, U.K.: Institute of Development Studies.
- UBOS (Uganda, Bureau of Statistics). Various years. Statistics Abstract. Entebbe: Government of Uganda.
- _____. 1991. The 1991 Population and Housing Census. Entebbe: Government of Uganda.

UMOF (Uganda, Ministry of Finance). 2001/02. District Development Budget Estimates.
Entebbe: Government of Uganda.

UNHS (Ugandan National Household Surveys). 1992/93, 1995/96, and 1999/2000.
Entebbe: Government of Uganda.

World Bank. 2002. World Development Indicators, 2002. Washington, D.C. CD-ROM.

APPENDIX: DISTRICT DATA

Subnational-level data on growth, poverty, and public spending by various investment items are not easily available for most developing countries. Uganda is no exception, although these data have become more accessible. Most such data are compiled from different sources. Moreover, the definitions, scope, and coverage of the variables may vary over time and across regions. For these reasons, this appendix includes some of the recently released district-level data used in our analysis, which might be of more general interest.

Appendix Table A1—Agricultural labor productivity, 1992, 1995, and 1999 (current Ugandan shillings)

| Region | District | 1992 | 1995 | 1999 |
|-----------|-------------|------------|--------|---------|
| Central | Kalangala | 24,940 | 29,092 | 105,444 |
| | Kampala | 16,044 | 1,101 | 53,520 |
| | Kiboga | 17,022 | 18,375 | 159,809 |
| | Luwero | 13,592 | 42,821 | 162,417 |
| | Masaka | 13,376 | 27,604 | 115,658 |
| | Mpigi | 11,467 | 12,438 | 139,516 |
| | Mubende | 9,797 | 31,408 | 128,451 |
| | Mukono | n.a. | 27,355 | 109,654 |
| | Nakasongola | 13,145 | n.a. | 78,270 |
| | Rakai | n.a. | 40,745 | 96,324 |
| Eastern | Sembabule | n.a. | n.a. | 97,483 |
| | Bugiri | n.a. | n.a. | 94,308 |
| | Busia | 14,826 | n.a. | 71,183 |
| | Iganga | 11,081 | 60,118 | 105,381 |
| | Jinja | 10,178 | 34,556 | 200,976 |
| | Kamuli | 9,129 | 32,319 | 79,882 |
| | Kapchorwa | n.a. | 56,487 | 133,011 |
| | Katakwi | 16,349 | n.a. | 63,268 |
| | Kumi | 12,086 | 19,630 | 60,283 |
| | Mbale | 9,898 | 33,888 | 90,546 |
| | Pallisa | 9,672 | 19,885 | 69,865 |
| | Soroti | 5,054 | 18,130 | 38,062 |
| | Tororo | n.a. | 15,351 | 93,926 |
| | Northern | Adjumani | 14,241 | n.a. |
| Apac | | 10,597 | 16,581 | 40,815 |
| Arua | | 8,421 | 18,665 | 60,184 |
| Gulu | | 8,726 | 27,196 | n.a. |
| Kitgum | | 6,707 | n.a. | n.a. |
| Kotido | | 5,665 | 12,377 | 7,708 |
| Lira | | 9,395 | 12,785 | 47,787 |
| Moroto | | 6,886 | 10,656 | 4,509 |
| Moyo | | 6,715 | 13,382 | 40,720 |
| Nebbi | | 8,969 | 21,095 | 36,137 |
| Western | | Bundibugyo | 14,762 | 34,707 |
| | Bushenyi | 15,493 | 45,841 | 108,109 |
| | Hoima | 9,615 | 22,607 | 94,863 |
| | Kabale | 15,292 | 33,802 | 79,465 |
| | Kabarole | 11,314 | 36,858 | 92,449 |
| | Kasese | 12,961 | 22,896 | n.a. |
| | Kibale | 9,885 | 50,694 | 89,902 |
| | Kisoro | 10,225 | 36,530 | 63,498 |
| | Masindi | 14,511 | 35,233 | 93,637 |
| | Mbarara | n.a. | 41,813 | 88,320 |
| | Ntungamo | 18,012 | n.a. | 126,282 |
| Rukungiri | 14,241 | 49,143 | 94,962 | |

Source: Calculated by the authors from UNHS various years.

Note: Per capita output is measured as total crop production value divided by total agricultural employment; n.a. indicates data were not available.

**Appendix Table A2—Agricultural and nonagricultural wage at the district level, 1999/2000
(shillings per day)**

| Region | District | Men's agricultural wages | Women's agricultural wages | Men's nonagricultural wages | Women's nonagricultural wages |
|---------------|-----------------|---|---|--|--|
| Central | Kalangala | 1,357 | 1,143 | 1,625 | 1,100 |
| | Kampala | n.a | n.a | 2,177 | 1,613 |
| | Kiboga | 1,438 | 1,357 | 1,725 | 1,571 |
| | Luwero | 2,063 | 1,466 | 1,889 | 1,279 |
| | Masaka | 1,403 | 1,152 | 1,455 | 1,233 |
| | Mpigi | 2,756 | 2,517 | 1,690 | 1,450 |
| | Mubende | 1,299 | 1,155 | 1,653 | 852 |
| | Mukono | 1,303 | 1,105 | 1,534 | 1,274 |
| | Nakasongola | 2,300 | 1,922 | 1,833 | 1,056 |
| | Rakai | 1,000 | 958 | 1,460 | 1,000 |
| Eastern | Sembabule | 1,333 | 1,500 | 1,350 | 1,250 |
| | Bugiri | 1,022 | 1,022 | 1,778 | 1,333 |
| | Busia | 1,083 | 1,083 | 1,500 | 1,438 |
| | Iganga | 909 | 714 | 1,379 | 941 |
| | Jinja | 1,018 | 977 | 1,643 | 1,567 |
| | Kamuli | 937 | 701 | 1,416 | 1,712 |
| | Kapchorwa | 1,417 | 1,417 | 1,563 | 1,563 |
| | Katakwi | 600 | 600 | 750 | 750 |
| | Kumi | 985 | 946 | 1,625 | 1,625 |
| | Mbale | 993 | 993 | 1,541 | 1,542 |
| | Pallisa | 856 | 856 | 1,450 | 1,450 |
| | Soroti | 850 | 850 | 1,000 | 1,000 |
| | Tororo | 1,114 | 1,114 | 1,306 | 1,276 |
| | Northern | Adjumani | 617 | 617 | 1,438 |
| Apac | | 539 | 539 | 1,857 | 688 |
| Arua | | 635 | 650 | 1,169 | 974 |
| Kotido | | 500 | 500 | 500 | 500 |
| Lira | | 525 | 525 | 2,417 | 1,750 |
| Moroto | | 554 | 586 | 1,000 | 1,000 |
| Moyo | | 1,017 | 733 | 1,313 | 1,125 |
| Bebbi | | 627 | 618 | 1,071 | 1,036 |
| Western | Bushenyi | 940 | 828 | 1,270 | 1,111 |
| | Hoima | 1,531 | 1,150 | 1,458 | 1,000 |
| | Kabale | 973 | 967 | 1,088 | 1,019 |
| | Kabarole | 1,130 | 1,091 | 1,398 | 1,083 |
| | Kibaale | 853 | 853 | 1,144 | 1,144 |
| | Kisoro | 1,129 | 886 | 1,253 | 947 |
| | Masindi | 2,371 | 2,064 | 2,265 | 1,518 |
| | Mbarara | 954 | 924 | 1,270 | 1,223 |
| | Btungamo | 823 | 823 | 993 | 993 |
| | Rukungiri | 1,000 | 980 | 1,304 | 1,269 |

Sources: Calculated by the authors from UNHS various years.

Note: n.a. indicates data were not available.

Appendix Table A3—Percentage of nonfarm in total employment, 1992, 1995, and 1999

| Region | District | 1992 | 1995 | 1999 |
|-----------|-------------|------|------|------|
| Central | Kalangala | 27 | 17 | 37 |
| | Kampala | 57 | 93 | 96 |
| | Kiboga | 7 | 6 | 15 |
| | Luwero | 12 | 18 | 21 |
| | Masaka | 13 | 22 | 20 |
| | Mpigi | 31 | 35 | 40 |
| | Mubende | 16 | 16 | 19 |
| | Mukono | n.a. | 25 | 34 |
| | Nakasongola | 22 | n.a. | 12 |
| | Rakai | n.a. | 12 | 15 |
| Eastern | Sembabule | n.a. | n.a. | 23 |
| | Bugiri | n.a. | n.a. | 20 |
| | Busia | 14 | n.a. | 37 |
| | Iganga | 12 | 25 | 22 |
| | Jinja | 35 | 44 | 54 |
| | Kamuli | 9 | 22 | 22 |
| | Kapchorwa | n.a. | 15 | 10 |
| | Katakwi | 20 | n.a. | 19 |
| | Kumi | 17 | 56 | 19 |
| | Mbale | 16 | 27 | 20 |
| | Pallisa | 6 | 56 | 18 |
| | Soroti | 13 | 46 | 23 |
| | Tororo | n.a. | 21 | 23 |
| Northern | Adjumani | 14 | n.a. | 34 |
| | Apac | 6 | 26 | 13 |
| | Arua | 8 | 29 | 20 |
| | Gulu | 7 | 31 | n.a. |
| | Kitgum | 4 | n.a. | n.a. |
| | Kotido | 6 | 70 | 49 |
| | Lira | 18 | 32 | 20 |
| | Moroto | 4 | 67 | 22 |
| | Moyo | 12 | 33 | 24 |
| | Nebbi | 23 | 29 | 16 |
| Western | Bundibugyo | 12 | 15 | n.a. |
| | Bushenyi | 12 | 24 | 16 |
| | Hoima | 16 | 21 | 20 |
| | Kabale | 24 | 24 | 20 |
| | Kabarole | 14 | 21 | 18 |
| | Kasese | 25 | 16 | n.a. |
| | Kibale | 12 | 13 | 9 |
| | Kisoro | 11 | 15 | 14 |
| | Masindi | 16 | 14 | 28 |
| | Mbarara | n.a. | 13 | 21 |
| | Ntungamo | 19 | n.a. | 21 |
| Rukungiri | 14 | 14 | 19 | |

Sources: Calculated by the authors from UNHS various years.

Note: n.a. indicates data were not available.

Appendix Table A4—Distance to the closest market, 1999/2000 (kilometers)

| Region | District | Consumer Market | | Input Market | | Output market | |
|---------|-------------|-----------------|-------------|--------------|-------------|---------------|-------------|
| | | Periodic | Most common | Periodic | Most common | Periodic | Most common |
| Central | Kalangala | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 |
| | Kampala | 1.67 | 1.76 | n.a. | n.a. | n.a. | n.a. |
| | Kiboga | 6.57 | 9.40 | 7.65 | 10.55 | 7.65 | 10.55 |
| | Luwero | 7.23 | 16.80 | 8.15 | 18.83 | 7.30 | 15.50 |
| | Masaka | 5.52 | 9.39 | 6.16 | 9.97 | 6.35 | 9.42 |
| | Mpigi | 4.48 | 7.41 | 4.18 | 8.90 | 4.39 | 10.25 |
| | Mubende | 8.30 | 12.60 | 9.41 | 12.37 | 8.26 | 13.40 |
| | Mukono | 3.74 | 6.99 | 4.26 | 7.66 | 4.88 | 7.35 |
| | Nakasongola | 13.42 | 7.47 | 11.40 | 12.27 | 13.42 | 12.44 |
| | Rakai | 6.76 | 9.09 | 6.98 | 10.40 | 6.98 | 10.39 |
| Eastern | Sembabule | 4.34 | 59.20 | 3.99 | 58.89 | 3.99 | 58.89 |
| | Bugiri | 4.12 | 4.08 | 3.20 | 6.89 | 3.60 | 6.25 |
| | Busia | 4.62 | 17.68 | 4.62 | 17.68 | 4.35 | 19.60 |
| | Iganga | 3.41 | 9.17 | 5.14 | 11.25 | 3.95 | 9.93 |
| | Jinja | 5.62 | 8.92 | 3.25 | 13.38 | 3.03 | 11.78 |
| | Kamuli | 5.73 | 7.02 | 13.15 | 13.15 | 8.11 | 7.37 |
| | Kapchorwa | 3.92 | 25.61 | 4.40 | 29.83 | 4.40 | 29.83 |
| | Katakwi | 7.54 | 7.23 | 9.18 | 13.55 | 7.65 | 8.95 |
| | Kumi | 5.25 | 5.58 | 6.50 | 6.64 | 6.50 | 6.45 |
| | Mbale | 3.77 | 19.79 | 4.71 | 23.51 | 4.79 | 23.53 |
| | Pallisa | 4.76 | 3.72 | 5.22 | 4.31 | 4.70 | 4.67 |
| | Soroti | 3.80 | 3.31 | 5.75 | 7.73 | 5.41 | 5.71 |
| | Tororo | 3.40 | 17.46 | 4.07 | 21.48 | 3.16 | 20.42 |
| | Northern | Adjumani | 9.20 | 10.79 | 10.17 | 10.79 | 9.20 |
| Apac | | 5.42 | 14.92 | 5.92 | 14.76 | 5.92 | 13.18 |
| Arua | | 4.36 | 9.39 | 6.24 | 9.39 | 4.41 | 10.09 |
| Kotido | | 0.50 | 6.92 | 0.50 | 16.59 | 0.50 | 0.50 |
| Lira | | 6.75 | 8.98 | 6.72 | 9.61 | 8.47 | 9.81 |
| Moroto | | 17.50 | 18.40 | 18.92 | 20.36 | 21.50 | 3.00 |
| Moyo | | 15.64 | 5.35 | 15.64 | 5.35 | 15.64 | 5.35 |
| Bebbi | | 6.67 | 8.11 | 7.33 | 8.11 | 7.18 | 8.11 |
| Western | Bushenyi | 3.65 | 3.71 | 3.70 | 3.82 | 3.70 | 3.76 |
| | Hoima | 7.32 | 7.04 | 8.53 | 9.24 | 7.06 | 9.24 |
| | Kabale | 6.66 | 6.29 | 6.93 | 6.87 | 6.95 | 6.87 |
| | Kabarole | 5.07 | 4.88 | 5.07 | 4.74 | 5.14 | 4.95 |
| | Kibaale | 4.58 | 4.58 | 4.63 | 4.63 | 4.82 | 4.63 |
| | Kisoro | 4.67 | 2.75 | 7.54 | 5.67 | 5.75 | 5.75 |
| | Masindi | 7.63 | 15.85 | 10.18 | 18.85 | 7.87 | 18.48 |
| | Mbarara | 5.47 | 4.78 | 6.54 | 6.34 | 6.38 | 6.74 |
| | Btungamo | 4.66 | 3.43 | 5.96 | 3.45 | 5.96 | 3.45 |
| | Rukungiri | 4.43 | 5.59 | 7.33 | 5.59 | 3.9 | 5.71 |

Sources: Calculated by the authors from UNHS 1999/2000.

Note: n.a. indicates data were not available.

Appendix Table A5—Travel time to the closest market, 1999/2000 (minutes)

| Region | District | Consumer Market | | Input Market | | Output market | |
|---------|-------------|-----------------|-------------|--------------|-------------|---------------|-------------|
| | | Periodic | Most common | Periodic | Most common | Periodic | Most common |
| Central | Kalangala | 141.67 | 139 | 141.67 | 175.83 | 50.00 | 170.00 |
| | Kampala | 15.00 | 15.22 | n.a. | n.a. | n.a. | n.a. |
| | Kiboga | 69.50 | 78.89 | 81.88 | 86.25 | 81.88 | 98.75 |
| | Luwero | 48.64 | 57.50 | 55.00 | 62.07 | 52.32 | 61.61 |
| | Masaka | 75.71 | 62.90 | 69.79 | 67.36 | 69.53 | 72.20 |
| | Mpigi | 43.31 | 43.98 | 51.00 | 51.91 | 46.95 | 56.03 |
| | Mubende | 70.68 | 75.71 | 77.58 | 79.85 | 68.75 | 79.85 |
| | Mukono | 48.33 | 56.89 | 52.33 | 53.45 | 55.54 | 60.52 |
| | Nakasongola | 65.00 | 75.00 | 61.88 | 75.00 | 65.00 | 76.88 |
| | Rakai | 66.25 | 53.75 | 78.08 | 62.69 | 103.46 | 62.69 |
| Eastern | Sembabule | 56.43 | 135.00 | 56.43 | 130.00 | 56.43 | 130.00 |
| | Bugiri | 56.00 | 51.67 | 38.33 | 62.86 | 36.67 | 75.00 |
| | Busia | 60.83 | 75.83 | 60.83 | 75.83 | 57.50 | 93.75 |
| | Iganga | 43.55 | 57.07 | 50.34 | 61.76 | 44.61 | 57.70 |
| | Jinja | 42.31 | 36.82 | 51.25 | 57.73 | 45.71 | 48.33 |
| | Kamuli | 58.97 | 59.69 | 76.73 | 70.89 | 66.96 | 56.55 |
| | Kapchorwa | 86.67 | 92.86 | 95.00 | 105.00 | 95.00 | 105.00 |
| | Katakwi | 59.17 | 50.83 | 64.09 | 79.09 | 62.00 | 67.27 |
| | Kumi | 45.42 | 47.08 | 56.50 | 57.27 | 56.50 | 55.46 |
| | Mbale | 46.36 | 72.25 | 51.51 | 73.90 | 52.64 | 74.36 |
| | Pallisa | 37.34 | 28.08 | 40.73 | 36.55 | 40.40 | 39.58 |
| | Soroti | 35.50 | 31.21 | 46.50 | 49.62 | 46.50 | 36.25 |
| | Tororo | 40.20 | 43.88 | 44.38 | 52.79 | 42.69 | 50.15 |
| | Northern | Adjumani | 94.00 | 140.00 | 108.33 | 140.00 | 94.00 |
| Apac | | 82.66 | 119.23 | 92.50 | 127.90 | 83.13 | 116.94 |
| Arua | | 49.76 | 88.19 | 61.67 | 88.19 | 51.52 | 88.19 |
| Kotido | | 5.00 | 38.33 | 5.00 | 90.46 | 5.00 | 5.00 |
| Lira | | 62.11 | 97.56 | 65.88 | 103.78 | 67.88 | 103.33 |
| Moroto | | 122.69 | 124.09 | 132.50 | 135.00 | 135.00 | 15.00 |
| Moyo | | 76.88 | 57.50 | 76.88 | 57.50 | 76.88 | 57.50 |
| Bebbi | | 68.33 | 87.14 | 82.08 | 87.14 | 73.18 | 87.14 |
| Western | Bushenyi | 37.51 | 36.57 | 38.04 | 38.55 | 38.04 | 37.09 |
| | Hoima | 61.67 | 62.53 | 80.33 | 80.00 | 81.00 | 79.29 |
| | Kabale | 76.17 | 63.20 | 82.59 | 80.56 | 81.83 | 75.37 |
| | Kabarole | 60.72 | 59.94 | 62.03 | 60.87 | 62.01 | 57.81 |
| | Kibaale | 45.78 | 45.78 | 46.27 | 46.27 | 43.69 | 43.69 |
| | Kisoro | 58.46 | 31.60 | 85.00 | 70.83 | 70.83 | 70.83 |
| | Masindi | 61.67 | 61.33 | 68.46 | 68.21 | 80.00 | 68.57 |
| | Mbarara | 57.12 | 52.40 | 68.33 | 63.53 | 69.46 | 68.49 |
| | Btungamo | 30.00 | 14.29 | 36.92 | 21.36 | 36.92 | 21.36 |
| | Rukungiri | 50.95 | 56.36 | 49.52 | 56.36 | 49.05 | 58.33 |

Sources: Calculated by the authors form UNHS 1999/2000.

Note: n.a. indicates data were not available.

Appendix Table A6—Main road and railway network (kilometers)

| Region | All weather tarmac | All weather murram, gravel | Dry weather feeder (dirt) road | Total roads | Railway Lines |
|---------------------|---------------------------|-----------------------------------|---------------------------------------|--------------------|----------------------|
| CENTRAL | 1,009 | 2,404 | 4,136 | 7,549 | 293 |
| Kampala | 126 | 81 | 5 | 212 | 23 |
| Kiboga | 0 | 104 | 182 | 286 | 0 |
| Luwero | 169 | 534 | 1,298 | 2,001 | 0 |
| Masaka | 149 | 151 | 526 | 826 | 19 |
| Mpigi | 275 | 746 | 575 | 1,596 | 76 |
| Mubende | 110 | 267 | 474 | 851 | 107 |
| Mukono | 147 | 441 | 773 | 1,361 | 68 |
| Rakai | 33 | 80 | 303 | 416 | 0 |
| EASTERN | 565 | 2,337 | 2,288 | 5,190 | 535 |
| Iganga | 103 | 371 | 570 | 1,044 | 111 |
| Jinja | 149 | 97 | 118 | 364 | 61 |
| Kamuli | 33 | 367 | 352 | 752 | 74 |
| Kapchorwa | 0 | 41 | 99 | 140 | 0 |
| Kumi | 75 | 231 | 167 | 473 | 72 |
| Mbale | 84 | 236 | 180 | 500 | 40 |
| Pallisa | 0 | 175 | 183 | 358 | 4 |
| Soroti | 36 | 674 | 373 | 1,083 | 72 |
| Tororo | 85 | 145 | 246 | 476 | 101 |
| NOTHERN | 93 | 3,700 | 3,201 | 6,994 | 258 |
| Apac | 35 | 519 | 308 | 862 | 51 |
| Arua | 1 | 503 | 680 | 1,184 | 0 |
| Gulu | 11 | 477 | 379 | 867 | 137 |
| Kitgum | 0 | 640 | 313 | 953 | 0 |
| Kotido | 0 | 362 | 372 | 734 | 0 |
| Lira | 46 | 365 | 404 | 815 | 70 |
| Moroto | 0 | 584 | 243 | 827 | 0 |
| Moyo | 0 | 172 | 156 | 328 | 0 |
| Nebbi | 0 | 78 | 346 | 424 | 0 |
| WESTERN | 609 | 2,194 | 3,096 | 5,899 | 142 |
| Bundibugyo | 0 | 106 | 19 | 125 | 0 |
| Bushenyi | 97 | 113 | 275 | 485 | 0 |
| Hoima | 10 | 135 | 250 | 395 | 0 |
| Kabale | 41 | 247 | 127 | 415 | 0 |
| Kabarole | 77 | 262 | 599 | 938 | 61 |
| Kasese | 93 | 107 | 127 | 327 | 38 |
| Kibaale | 0 | 47 | 375 | 422 | 0 |
| Kisoro | 0 | 46 | 105 | 151 | 0 |
| Masindi | 90 | 401 | 159 | 650 | 0 |
| Mbarara | 140 | 213 | 844 | 1,197 | 43 |
| Ntungamo | 61 | 86 | 133 | 280 | 0 |
| Rukungiri | 0 | 431 | 83 | 514 | 0 |
| UGANDA TOTAL | 2,276 | 10,635 | 12,721 | 25,632 | 1,228 |

Source: National Biomass Study, Forest Department, Uganda Railways, and Ministry of Works, Transport and Communication as cited in *Statistical Abstract 2001*, UBOS.

Appendix Table A7—Literacy rate by district, 1991 (percent)

| Region/district | Rural | Urban | Average |
|-----------------|-------|-------|---------|
| Central | | | |
| Kalangala | 71 | 82 | 72 |
| Kampala | n.a. | 88 | 88 |
| Kiboga | 54 | 79 | 55 |
| Luwero | 58 | 76 | 59 |
| Masaka | 60 | 82 | 62 |
| Mpigi | 71 | 87 | 73 |
| Mubende | 56 | 83 | 58 |
| Mukono | 59 | 78 | 61 |
| Rakai | 53 | 81 | 54 |
| East | | | |
| Iganga | 46 | 71 | 47 |
| Jinja | 61 | 83 | 67 |
| Kamuli | 40 | 69 | 41 |
| Kapchorwa | 54 | 68 | 54 |
| Kumi | 41 | 64 | 42 |
| Mbale | 54 | 72 | 56 |
| Pallisa | 47 | 62 | 47 |
| Soroti | 45 | 67 | 47 |
| Tororo | 50 | 70 | 53 |
| West | | | |
| Bundibugyo | 39 | 53 | 40 |
| Bushenyi | 54 | 77 | 55 |
| Hoima | 56 | 79 | 56 |
| Kabale | 50 | 71 | 51 |
| Kabarole | 48 | 75 | 49 |
| Kasese | 47 | 70 | 50 |
| Kibaale | 50 | 73 | 51 |
| Kisoro | 32 | 48 | 33 |
| Masindi | 50 | 83 | 52 |
| Mbarara | 51 | 82 | 53 |
| Ntungamo | 47 | 80 | 47 |
| Rukungiri | 56 | 76 | 57 |
| North | | | |
| Apac | 53 | 72 | 53 |
| Arua | 45 | 64 | 46 |
| Gulu | 46 | 71 | 49 |
| Kitgum | 38 | 67 | 39 |
| Kotido | 10 | 47 | 12 |
| Lira | 49 | 70 | 50 |
| Moroto | 8 | 54 | 11 |
| Moyo | 44 | 69 | 45 |
| Nebbi | 46 | 61 | 47 |

Source: UBOS 1991.

Note: n.a. indicates data were not available.

Appendix Table A8—Literacy rate by district, 1999/2000 (percent)

| Region | District | Average | Female | Male |
|-----------|-------------|---------|--------|-------|
| Central | Kalangala | 81.72 | 81.29 | 82.21 |
| | Kampala | 93.50 | 90.13 | 97.28 |
| | Kiboga | 66.51 | 51.41 | 78.86 |
| | Luwero | 78.11 | 72.86 | 84.22 |
| | Masaka | 78.07 | 72.73 | 84.19 |
| | Mpigi | 83.01 | 79.07 | 87.12 |
| | Mubende | 65.64 | 58.30 | 73.64 |
| | Mukono | 73.78 | 64.56 | 84.16 |
| | Nakasongola | 70.03 | 63.88 | 77.01 |
| | Rakai | 69.98 | 61.13 | 79.02 |
| Sembabule | 67.27 | 57.73 | 77.02 | |
| Eastern | Bugiri | 65.30 | 52.13 | 81.02 |
| | Busia | 60.65 | 45.53 | 78.24 |
| | Iganga | 63.50 | 51.23 | 78.05 |
| | Jinja | 74.08 | 67.75 | 80.70 |
| | Kamuli | 60.12 | 47.79 | 74.30 |
| | Kapchorwa | 62.37 | 48.26 | 76.82 |
| | Katakwi | 48.03 | 31.52 | 69.93 |
| | Kumi | 58.65 | 45.52 | 75.97 |
| | Mbale | 65.47 | 53.56 | 77.90 |
| | Pallisa | 59.14 | 43.22 | 76.44 |
| | Soroti | 54.28 | 37.85 | 73.01 |
| Tororo | 61.60 | 46.64 | 75.68 | |
| Northern | Adjumani | 59.68 | 38.09 | 83.26 |
| | Apac | 69.16 | 49.41 | 90.29 |
| | Arua | 58.87 | 38.28 | 82.25 |
| | Kotido | 13.53 | 7.05 | 29.82 |
| | Lira | 61.13 | 36.26 | 87.86 |
| | Moroto | 12.59 | 7.070 | 22.16 |
| | Moyo | 57.04 | 36.79 | 80.65 |
| | Bebbi | 54.28 | 34.59 | 79.08 |
| Western | Bushenyi | 68.69 | 59.78 | 78.22 |
| | Hoima | 70.20 | 63.01 | 77.56 |
| | Kabale | 66.31 | 56.08 | 77.81 |
| | Kabarole | 67.29 | 56.42 | 79.59 |
| | Kibaale | 70.99 | 63.91 | 77.91 |
| | Kisoro | 56.49 | 38.97 | 74.85 |
| | Masindi | 61.45 | 49.10 | 74.05 |
| | Mbarara | 69.39 | 59.74 | 79.25 |
| | Btungamo | 69.70 | 62.52 | 77.94 |
| | Rukungiri | 76.33 | 66.08 | 86.74 |

Sources: Calculated by the authors from UNHS 1999/2000.

Appendix Table A9—Distance from center of local community to nearest public services (kilometers)

| Region | District | School | Clinic | Post office |
|----------|-------------|--------|--------|-------------|
| Central | Kalangala | 2.17 | 2.00 | 7.90 |
| | Kampala | 0.69 | 2.94 | 2.61 |
| | Kiboga | 1.23 | 12.25 | 27.39 |
| | Luwero | 0.88 | 5.41 | 7.86 |
| | Masaka | 1.30 | 3.74 | 8.75 |
| | Mpigi | 1.19 | 2.93 | 7.57 |
| | Mubende | 1.93 | 5.40 | 14.21 |
| | Mukono | 1.35 | 3.43 | 9.43 |
| | Nakasongola | n.a. | 6.00 | 24.69 |
| | Rakai | 1.58 | 5.88 | 7.15 |
| | Sembabule | 1.31 | 5.75 | 28.16 |
| Eastern | Bugiri | n.a. | 2.50 | 13.29 |
| | Busia | n.a. | 5.88 | 9.08 |
| | Iganga | 1.75 | 3.24 | 9.37 |
| | Jinja | 1.47 | 1.55 | 5.72 |
| | Kamuli | 1.65 | 3.83 | 12.53 |
| | Kapchorwa | 0.75 | 1.63 | 22.38 |
| | Katakwi | 1.73 | 2.80 | 20.27 |
| | Kumi | 0.35 | 4.00 | 9.71 |
| | Mbale | 1.40 | 2.47 | 9.73 |
| | Pallisa | 1.08 | 4.12 | 12.69 |
| | Soroti | 1.56 | 4.95 | 9.87 |
| | Tororo | 0.79 | 2.00 | 11.30 |
| Northern | Adjumani | 1.00 | 7.40 | 11.65 |
| | Apac | 2.37 | 6.83 | 25.17 |
| | Arua | 1.33 | 7.16 | 14.79 |
| | Kotido | 1.28 | 2.21 | 46.92 |
| | Lira | 1.54 | 3.29 | 38.79 |
| | Moroto | 1.60 | 5.71 | 38.71 |
| | Moyo | 0.56 | 2.90 | 21.20 |
| | Bebbi | 1.57 | 5.25 | 8.44 |
| Western | Bushenyi | 0.99 | 4.13 | 11.12 |
| | Hoima | 0.83 | 2.53 | 9.78 |
| | Kabale | 1.64 | 4.79 | 21.73 |
| | Kabarole | 2.45 | 5.58 | 15.15 |
| | Kibaale | 1.50 | 8.53 | 10.97 |
| | Kisoro | 2.14 | 4.20 | 10.05 |
| | Masindi | 1.81 | 4.34 | 10.91 |
| | Mbarara | 1.45 | 6.81 | 20.50 |
| | Btungamo | 1.33 | 4.61 | 12.71 |
| | Rukungiri | 1.04 | 3.93 | 10.15 |

Sources: Calculated by the authors from UNHS 1999/2000.

Appendix Table A10—Percentage of villages with access to electricity

| Region | District | Percentage | Region | District | Percentage |
|---------------|-----------------|-------------------|---------------|-----------------|-------------------|
| Central | Kalangala | n.a. | Northern | Adjumani | 13 |
| | Kampala | 73 | | Apac | 3 |
| | Kiboga | 8 | | Arua | 7 |
| | Luwero | 9 | | Kotido | n.a. |
| | Masaka | 15 | | Lira | 9 |
| | Mpigi | 35 | | Moroto | 7 |
| | Mubende | 8 | | Moyo | 9 |
| | Mukono | 27 | | Bebbi | 4 |
| | Nakasongola | 3 | | | |
| | Rakai | 14 | | Western | Bushenyi |
| Sembabule | 0 | Hoima | 13 | | |
| | | Kabale | 9 | | |
| Eastern | Bugiri | 10 | Kabarole | | 10 |
| | Busia | 6 | Kibaale | | n.a. |
| | Iganga | 14 | Kisoro | | 9 |
| | Jinja | 45 | Masindi | | 20 |
| | Kamuli | 9 | Mbarara | | 15 |
| | Kapchorwa | 19 | Btungamo | | 14 |
| | Katakwi | n.a. | Rukungiri | | 1 |
| | Kumi | 10 | | | |
| | Mbale | 26 | | | |
| | Pallisa | 4 | | | |
| Soroti | 17 | | | | |
| Tororo | 10 | | | | |

Sources: Calculated by authors from UMHS 1999/2000.

Note: n.a. indicates data were not available.

Appendix Table A11: Fertilizer use by district, 1999/2000 (shillings/acre)

| Region | District | Average Manure | Average Fertilizer | % of household using manure | % of household using fertilizer | |
|-----------|-------------|----------------|--------------------|-----------------------------|---------------------------------|-----|
| Central | Kalangala | 412.4 | n.a. | 2.1 | n.a. | |
| | Kampala | n.a. | n.a. | n.a. | n.a. | |
| | Kiboga | 32.1 | n.a. | 1.6 | n.a. | |
| | Luwero | 567.2 | 55.4 | 8.6 | 1.2 | |
| | Masaka | 2,748.5 | 270.6 | 14.0 | 2.8 | |
| | Mpigi | 3,181.3 | 509.0 | 16.0 | 4.6 | |
| | Mubende | 1,619.4 | 219.4 | 7.5 | 1.0 | |
| | Mukono | 1,941.4 | 576.3 | 11.0 | 4.2 | |
| | Nakasongola | n.a. | n.a. | n.a. | n.a. | |
| | Rakai | 1,522.1 | 12.5 | 9.3 | 1.3 | |
| | Sembabule | 2,809.8 | 84.5 | 10.9 | 1.6 | |
| Eastern | Bugiri | n.a. | 771.1 | n.a. | 2.3 | |
| | Busia | n.a. | n.a. | n.a. | n.a. | |
| | Iganga | 53.5 | 64.9 | 2.4 | 1.0 | |
| | Jinja | 45.5 | 35.0 | 2.3 | 1.8 | |
| | Kamuli | 18.4 | 32.5 | 1.1 | 0.9 | |
| | Kapchorwa | 341.5 | 1,898.2 | 4.4 | 7.4 | |
| | Katakwi | n.a. | n.a. | n.a. | n.a. | |
| | Kumi | 182.3 | n.a. | 1.4 | 0.0 | |
| | Mbale | 72.4 | 730.7 | 2.9 | 7.6 | |
| | Pallisa | n.a. | n.a. | n.a. | n.a. | |
| | Soroti | 26.7 | n.a. | 0.6 | n.a. | |
| Northern | Tororo | 25.2 | 77.7 | 1.3 | 2.1 | |
| | Adjumani | 25.0 | n.a. | 1.8 | n.a. | |
| | Apac | 22.5 | 19.8 | 0.5 | 0.7 | |
| | Arua | 40.2 | 3,142.3 | 0.9 | 21.6 | |
| | Kotido | n.a. | n.a. | n.a. | n.a. | |
| | Lira | n.a. | 7.5 | n.a. | 0.3 | |
| | Moroto | n.a. | n.a. | n.a. | n.a. | |
| | Moyo | n.a. | n.a. | n.a. | n.a. | |
| | Bebbi | n.a. | 2.0 | n.a. | 0.1 | |
| | Western | Bushenyi | 1,198.1 | 88.1 | 4.5 | 0.8 |
| | | Hoima | 166.7 | 242.1 | 4.2 | 2.6 |
| Kabale | | 346.8 | 126.9 | 6.1 | 2.8 | |
| Kabarole | | 100.9 | 45.3 | 3.7 | 2.1 | |
| Kibaale | | 59.8 | n.a. | 0.6 | n.a. | |
| Kisoro | | 9.3 | n.a. | 1.4 | n.a. | |
| Masindi | | 213.1 | 108.7 | 1.1 | 0.8 | |
| Mbarara | | 340.8 | 149.5 | 6.0 | 1.0 | |
| Btungamo | | 1,145.9 | n.a. | 14.9 | n.a. | |
| Rukungiri | 401.3 | 632.7 | 8.9 | 1.1 | | |

Source: Ugandan National Household Survey 1999/2000: Crop Survey. UBOS.

n.a.: data missing.

Appendix Table A12: Land area by district, 1999/2000 (acres)

| Region | District | 1 st season | 2 nd season | Total | |
|---------|-------------|------------------------|------------------------|---------|---------|
| Central | Kalangala | 2,285 | 2,210 | 4,494 | |
| | Kampala | 2,818 | 2,790 | 5,609 | |
| | Kiboga | 101,355 | 97,805 | 199,160 | |
| | Luwero | 190,990 | 175,834 | 366,824 | |
| | Masaka | 244,672 | 246,499 | 491,171 | |
| | Mpigi | 344,222 | 343,058 | 687,280 | |
| | Mubende | 227,299 | 227,519 | 454,818 | |
| | Mukono | 262,363 | 268,693 | 531,056 | |
| | Nakasongola | 44,830 | 43,791 | 88,621 | |
| | Rakai | 149,010 | 154,475 | 303,485 | |
| Eastern | Sembabule | 51,811 | 52,368 | 104,179 | |
| | Bugiri | 103,196 | 86,452 | 189,648 | |
| | Busia | 72,959 | 57,910 | 130,869 | |
| | Iganga | 264,441 | 223,475 | 487,916 | |
| | Jinja | 62,948 | 51,092 | 114,040 | |
| | Kamuli | 167,934 | 137,419 | 305,353 | |
| | Kapchorwa | 40,737 | 33,114 | 73,851 | |
| | Katakwi | n.a. | n.a. | n.a. | |
| | Kumi | 199,314 | 128,209 | 327,523 | |
| | Mbale | 251,934 | 221,869 | 473,803 | |
| | Pallisa | 221,303 | 40,158 | 261,461 | |
| | Soroti | 181,365 | 17,305 | 198,669 | |
| | Tororo | 181,685 | 140,450 | 322,135 | |
| | Northern | Adjumani | 19,117 | 22,122 | 41,240 |
| Apac | | 232,705 | 232,024 | 464,729 | |
| Arua | | 186,794 | 187,183 | 373,978 | |
| Kotido | | 35,593 | 0 | 35,593 | |
| Lira | | 301,982 | 189,304 | 491,286 | |
| Moroto | | n.a. | n.a. | n.a. | |
| Moyo | | 25,364 | 33,344 | 58,708 | |
| Bebbi | | 183,357 | 183,977 | 367,333 | |
| Western | | Bushenyi | 227,888 | 55,134 | 283,022 |
| | | Hoima | 108,410 | 23,696 | 132,107 |
| | Kabale | 140,655 | 682 | 141,337 | |
| | Kabarole | 491,713 | 261,009 | 752,723 | |
| | Kibaale | 129,720 | 7,756 | 137,476 | |
| | Kisoro | n.a. | n.a. | n.a. | |
| | Masindi | 99,860 | 26,145 | 126,005 | |
| | Mbarara | 290,176 | 106,679 | 396,855 | |
| | Btungamo | 112,180 | 15,002 | 127,182 | |
| | Rukungiri | 135,759 | 132,533 | 268,292 | |

Source: Ugandan National Household Survey 1999/2000: Crop Survey. UBOS.
n.a.: not available.

Appendix Table A13—Health status by district, 1999/2000

| Region | District | Percentage of falling sick during the past 30 days | | | Days lost due to illness | | |
|-----------|-------------|--|--------|-------|--------------------------|--------|------|
| | | Total | Female | Male | Total | Female | Male |
| Central | Kalangala | 28.53 | 35.15 | 20.75 | 2.41 | 3.02 | 1.68 |
| | Kampala | 26.76 | 28.20 | 25.28 | 1.79 | 2.12 | 1.46 |
| | Kiboga | 26.49 | 23.87 | 28.36 | 2.34 | 1.91 | 2.65 |
| | Luwero | 21.47 | 22.85 | 20.18 | 1.85 | 2.20 | 1.52 |
| | Masaka | 17.21 | 18.64 | 15.69 | 1.48 | 1.57 | 1.40 |
| | Mpigi | 22.01 | 22.5 | 21.53 | 1.84 | 1.82 | 1.87 |
| | Mubende | 24.73 | 25.97 | 23.43 | 2.39 | 2.43 | 2.35 |
| | Mukono | 25.19 | 26.80 | 23.58 | 2.21 | 2.43 | 1.99 |
| | Nakasongola | 21.41 | 19.85 | 22.89 | 1.62 | 1.47 | 1.77 |
| | Rakai | 16.76 | 18.47 | 15.12 | 1.72 | 1.81 | 1.63 |
| Eastern | Sembabule | 15.87 | 20.01 | 12.45 | 1.42 | 1.82 | 1.08 |
| | Bugiri | 37.19 | 38.29 | 36.10 | 2.54 | 2.91 | 2.17 |
| | Busia | 40.52 | 45.76 | 34.72 | 2.44 | 2.72 | 2.13 |
| | Iganga | 42.43 | 44.82 | 39.78 | 2.76 | 2.97 | 2.53 |
| | Jinja | 31.80 | 32.84 | 30.73 | 1.76 | 1.84 | 1.67 |
| | Kamuli | 45.58 | 48.87 | 42.07 | 3.16 | 3.32 | 3.00 |
| | Kapchorwa | 20.76 | 25.35 | 16.14 | 1.51 | 1.69 | 1.32 |
| | Katakwi | 31.52 | 35.19 | 27.87 | 2.56 | 2.90 | 2.22 |
| | Kumi | 32.35 | 33.38 | 31.26 | 2.56 | 2.77 | 2.34 |
| | Mbale | 36.59 | 38.84 | 34.36 | 2.87 | 3.10 | 2.64 |
| Northern | Pallisa | 30.57 | 32.65 | 28.48 | 2.25 | 2.53 | 1.96 |
| | Soroti | 33.26 | 39.19 | 26.90 | 2.74 | 3.63 | 1.79 |
| | Tororo | 34.30 | 37.86 | 30.82 | 2.87 | 3.18 | 2.56 |
| | Adjumani | 21.73 | 26.17 | 16.43 | 1.71 | 2.11 | 1.23 |
| | Apac | 32.35 | 31.73 | 32.99 | 2.95 | 3.09 | 2.82 |
| | Arua | 25.53 | 26.64 | 24.36 | 2.22 | 2.28 | 2.16 |
| | Kotido | 19.34 | 19.48 | 19.15 | 1.44 | 1.62 | 1.20 |
| | Lira | 30.90 | 33.46 | 28.49 | 2.97 | 3.29 | 2.67 |
| | Moroto | 17.19 | 21.19 | 12.63 | 1.10 | 1.36 | 0.79 |
| | Moyo | 31.01 | 34.78 | 26.59 | 2.66 | 2.87 | 2.42 |
| Western | Bebbi | 29.68 | 34.93 | 23.86 | 2.48 | 3.04 | 1.86 |
| | Bushenyi | 26.22 | 27.98 | 24.43 | 2.82 | 3.02 | 2.61 |
| | Hoima | 27.02 | 29.36 | 24.90 | 2.13 | 2.22 | 2.04 |
| | Kabale | 15.04 | 16.34 | 13.66 | 1.61 | 1.69 | 1.54 |
| | Kabarole | 30.81 | 33.78 | 27.71 | 2.84 | 3.08 | 2.59 |
| | Kibaale | 30.48 | 32.07 | 28.98 | 2.93 | 3.08 | 2.80 |
| | Kisoro | 13.52 | 14.58 | 12.44 | 1.63 | 1.63 | 1.63 |
| | Masindi | 23.59 | 23.68 | 23.51 | 1.97 | 2.08 | 1.87 |
| | Mbarara | 18.55 | 20.45 | 16.60 | 1.80 | 2.00 | 1.61 |
| | Btungamo | 26.72 | 29.75 | 23.60 | 2.77 | 3.14 | 2.39 |
| Rukungiri | 24.63 | 26.41 | 22.77 | 2.52 | 2.82 | 2.21 | |

Sources: Calculated by the authors from UNHS 1999/2000.

Appendix Table A14—District development budget estimates, 2001/02 (thousand Ugandan Shillings)

| Region | District | Rural water | LGDP | PHC dev't. | Dutch grant | SFG | Total |
|------------|---------------|-------------|-----------|------------|-------------|-----------|-----------|
| Central | Kalangala | 163,700 | 230,673 | 234,000 | 0 | 428,535 | 1,056,908 |
| | Kampala | 0 | 2,854,868 | 182,335 | 0 | 857,071 | 3,894,274 |
| | Kayunka | 358,000 | 0 | 100,363 | 0 | 1,028,485 | 1,486,848 |
| | Kiboga | 262,000 | 371,353 | 311,387 | 0 | 1,542,727 | 2,507,467 |
| | Luwero | 555,200 | 811,712 | 403,832 | 0 | 857,071 | 2,627,815 |
| | Masaka | 745,500 | 1,274,577 | 270,504 | 0 | 685,565 | 2,976,236 |
| | Mpigi | 440,300 | 751,862 | 220,142 | 0 | 1,028,485 | 2,440,789 |
| | Mubende | 592,100 | 1,169,912 | 174,505 | 0 | 599,950 | 2,536,467 |
| | Mukono | 578,600 | 0 | 185,726 | 0 | 1,028,485 | 1,792,811 |
| | Nakasongola | 433,500 | 315,515 | 166,652 | 0 | 857,071 | 1,772,739 |
| | Rakai | 638,200 | 0 | 170,142 | 0 | 857,071 | 1,665,413 |
| | Sembabule | 410,400 | 334,235 | 164,000 | 0 | 1,028,485 | 1,937,119 |
| | Wakiso | 598,100 | 1,020,641 | 296,647 | 0 | 857,071 | 2,772,458 |
| | Eastern | Bugiri | 342,700 | 595,197 | 242,298 | 0 | 1,371,314 |
| Busia | | 258,000 | 427,267 | 224,069 | 0 | 857,071 | 1,766,407 |
| Iganga | | 300,000 | 495,614 | 209,772 | 0 | 1,542,727 | 2,548,114 |
| Jinja | | 289,000 | 0 | 180,368 | 0 | 857,071 | 1,326,439 |
| Kagermaido | | 310,300 | 0 | 47,999 | 0 | 857,071 | 1,215,370 |
| Kamuli | | 583,300 | 1,052,454 | 559,899 | 0 | 857,071 | 3,052,724 |
| Kapchorwa | | 270,400 | 275,160 | 193,495 | 0 | 599,950 | 1,339,005 |
| Katakwi | | 549,300 | 513,730 | 64,000 | 1,156,793 | 685,656 | 2,969,480 |
| Kumi | | 542,800 | 0 | 112,529 | 0 | 857,071 | 1,512,400 |
| Mayuge | | 235,000 | 414,182 | 132,193 | 0 | 1,371,314 | 2,152,689 |
| Mbale | | 240,000 | 907,131 | 206,915 | 0 | 1,714,142 | 3,068,188 |
| Pallisa | | 303,200 | 734,476 | 274,404 | 0 | 857,071 | 2,169,150 |
| Sironko | | 235,000 | 418,135 | 208,101 | 0 | 1,371,314 | 2,232,550 |
| Soroti | | 494,000 | 0 | 135,570 | 2,318,967 | 1,028,485 | 3,977,022 |
| Tororo | 250,000 | 768,967 | 209,376 | 0 | 1,028,485 | 2,256,827 | |
| Northern | Adjumani | 324,400 | 225,117 | 91,998 | 478,859 | 599,950 | 1,720,324 |
| | Apac | 766,100 | 976,648 | 209,225 | 0 | 1,028,485 | 2,980,457 |
| | Arua | 739,000 | 0 | 284,347 | 2,318,967 | 760,782 | 4,103,096 |
| | Gulu | 489,600 | 875,441 | 287,634 | 2,636,414 | 685,656 | 2,338,331 |
| | Kitgum | 351,200 | 345,206 | 67,286 | 0 | 857,071 | 1,620,763 |
| | Kotido | 317,200 | 0 | 203,473 | 0 | 771,363 | 1,292,037 |
| | Lira | 702,300 | 0 | 308,253 | 0 | 857,071 | 4,504,037 |
| | Moroto | 284,300 | 701,988 | 133,956 | 0 | 780,690 | 1,900,934 |
| | Moyo | 357,700 | 224,857 | 192,975 | 425,053 | 599,950 | 1,800,535 |
| | Nakapiripirit | 310,800 | 0 | 101,956 | 0 | 247,777 | 660,533 |
| | Nebbi | 489,600 | 798,523 | 173,937 | 1,554,946 | 771,363 | 3,788,369 |
| | Pader | 405,400 | 283,355 | 109,725 | 0 | 857,071 | 1,655,551 |
| | Yumbe | 287,100 | 0 | 82,733 | 0 | 267,684 | 637,518 |
| | Western | Bundibugyo | 428,900 | 327,718 | 486,444 | 0 | 1,028,485 |
| Bushenyi | | 817,900 | 1,312,719 | 268,909 | 0 | 857,071 | 3,256,599 |
| Hoima | | 444,400 | 0 | 154,000 | 0 | 857,071 | 1,455,471 |
| Kabale | | 501,500 | 0 | 169,970 | 0 | 1,285,604 | 1,957,074 |
| Kabarole | | 425,900 | 561,419 | 234,000 | 0 | 1,028,485 | 2,249,804 |
| Kamwenge | | 335,200 | 413,677 | 82,000 | 0 | 1,199,899 | 2,030,776 |
| Kanungu | | 323,700 | 0 | 96,344 | 0 | 325,223 | 745,267 |
| Kasese | | 304,400 | 0 | 190,236 | 0 | 857,071 | 1,351,707 |
| Kibaale | | 301,800 | 0 | 167,711 | 0 | 857,071 | 1,326,582 |
| Kisoro | | 491,400 | 0 | 144,798 | 0 | 857,071 | 1,493,269 |
| Kyenjojo | | 392,800 | 502,322 | 82,000 | 0 | 1,714,142 | 2,691,264 |
| Masindi | | 499,200 | 720,857 | 206,930 | 0 | 857,071 | 2,284,058 |
| Mbarara | | 1,073,900 | 1,642,003 | 178,770 | 0 | 599,950 | 3,494,623 |
| Ntungamo | | 535,100 | 567,123 | 223,157 | 0 | 857,071 | 2,182,452 |
| Rukungiri | 370,600 | 889,616 | 146,000 | 0 | 531,832 | 1,938,049 | |

Source: UMOF 2001/02.

Note: LGDP=Local Government Development Program; PHC=Primary Health Care; SFG=School Facilities Grant

Appendix Table A15—Fiscal transfers to local governments for primary education, 1993/94–1997/98 (thousand Ugandan shillings)

| Region | District | 1993/94 | 1994/95 | 1995/96 | 1996/97 ^a | 1997/98 ^a | |
|-----------|-------------|------------|---------|---------|----------------------|----------------------|---------|
| Central | Kalangala | 0 | 0 | 8,283 | 13,751 | 9,453 | |
| | Kampala | 0 | 243,168 | 0 | 650,282 | 446,435 | |
| | Kiboga | 0 | 0 | 56,644 | 118,935 | 107,513 | |
| | Luwero | 0 | 245,875 | 0 | 377,694 | 326,198 | |
| | Masaka | 266,895 | 0 | 0 | 704,452 | 560,084 | |
| | Mpigi | 419,882 | 0 | 0 | 767,554 | 654,776 | |
| | Mubende | 0 | 240,500 | 0 | 420,768 | 323,731 | |
| | Mukono | 312,839 | 0 | 0 | 692,583 | 660,061 | |
| | Nakasongola | 0 | 0 | 0 | 0 | 90,649 | |
| | Rakai | 212,304 | 0 | 0 | 322,101 | 347,710 | |
| | Sembabule | 0 | 0 | 0 | 0 | 105,156 | |
| | Eastern | Bugiri | 0 | 0 | 0 | 0 | 140,138 |
| | | Busia | 0 | 0 | 0 | 0 | 129,679 |
| | | Iganga | 0 | 350,938 | 0 | 794,361 | 600,590 |
| Jinja | | 164,835 | 0 | 0 | 243,130 | 208,181 | |
| Kamuli | | 0 | 0 | 263,658 | 407,530 | 374,284 | |
| Kapchorwa | | 0 | 0 | 101,531 | 98,018 | 93,078 | |
| Katawi | | 0 | 0 | 0 | 0 | 208,932 | |
| Kumi | | 0 | 0 | 183,321 | 198,799 | 231,192 | |
| Mbale | | 425,389 | 0 | 0 | 597,150 | 657,766 | |
| Pallisa | | 0 | 0 | 186,426 | 300,394 | 294,200 | |
| Soroti | | 0 | 421,980 | 0 | 361,483 | 370,380 | |
| Tororo | | 259,902 | 0 | 0 | 466,625 | 375,216 | |
| Northern | | Adjumani | 0 | 0 | 0 | 0 | 57,434 |
| | | Apac | 0 | 316,045 | 0 | 381,737 | 416,882 |
| | Arua | 43,295 | 0 | 0 | 535,805 | 769,272 | |
| | Gulu | 193,893 | 0 | 0 | 284,245 | 328,406 | |
| | Kitgum | 0 | 319,242 | 0 | 299,998 | 373,672 | |
| | Kotido | 0 | 0 | 94,489 | 164,625 | 77,867 | |
| | Lira | 278,524 | 0 | 0 | 420,759 | 458,236 | |
| | Moroto | 0 | 0 | 0 | 146,492 | 29,716 | |
| | Moyo | 0 | 71,788 | 0 | 147,524 | 53,370 | |
| | Nebbi | 0 | 191,927 | 0 | 266,135 | 327,696 | |
| | Western | Bundibugyo | 0 | 0 | 68,830 | 97,903 | 103,083 |
| | | Bushenyi | 0 | 423,622 | 0 | 483,896 | 530,174 |
| | | Hoima | 0 | 131,968 | 0 | 166,175 | 152,872 |
| | | Kabale | 293,397 | 0 | 0 | 350,420 | 362,464 |
| Kabarole | | 268,325 | 0 | 0 | 627,234 | 487,242 | |
| Kasese | | 0 | 175,860 | 0 | 288,590 | 293,095 | |
| Kibale | | 0 | 0 | 187,115 | 184,997 | 198,751 | |
| Kisoro | | 0 | 0 | 0 | 156,793 | 140,593 | |
| Masindi | | 0 | 0 | 153,405 | 219,042 | 285,681 | |
| Mbarara | | 438,427 | 0 | 0 | 670,888 | 667,399 | |
| Ntungamo | | 0 | 0 | 143,673 | 242,917 | 243,933 | |
| Rukungiri | | 0 | 228,671 | 0 | 328,215 | 326,760 | |

Source: Decentralization Secretariat, various years.

^a Budget estimates.

Appendix Table A16—Fiscal transfers to local governments for secondary education through capitation grants, 1993/04–1997/98 (thousand Ugandan shillings)^a

| Region | District | 1993/94 | 1994/95 | 1995/96 | 1996/97 ^b | 1997/98 ^b | |
|-----------|-------------|------------|---------|---------|----------------------|----------------------|---------|
| Central | Kalangala | 0 | 0 | 1,236 | 13,751 | 9,453 | |
| | Kampala | 0 | 364,897 | 407,368 | 650,282 | 446,435 | |
| | Kiboga | 0 | 0 | 14,911 | 118,935 | 107,513 | |
| | Luwero | 0 | 86,321 | 96,367 | 377,694 | 326,198 | |
| | Masaka | 152,348 | 104,452 | 116,609 | 704,452 | 560,084 | |
| | Mpigi | 151,378 | 217,721 | 243,061 | 767,554 | 654,776 | |
| | Mubende | 0 | 62,494 | 69,767 | 420,768 | 323,731 | |
| | Mukono | 144,228 | 181,505 | 202,630 | 692,583 | 660,061 | |
| | Nakasongola | 0 | 0 | 0 | 0 | 90,649 | |
| | Rakai | 78,850 | 66,223 | 73,931 | 322,101 | 347,710 | |
| | Sembabule | 0 | 0 | 0 | 0 | 105,156 | |
| | Eastern | Bugiri | 0 | 0 | 0 | 0 | 140,138 |
| | | Busia | 0 | 0 | 0 | 0 | 129,679 |
| Iganga | | 0 | 136,597 | 152,495 | 794,361 | 600,590 | |
| Jinja | | 120,105 | 95,902 | 107,063 | 243,130 | 208,181 | |
| Kamuli | | 0 | 0 | 54,855 | 407,530 | 374,284 | |
| Kapchorwa | | 0 | 0 | 38,882 | 98,018 | 93,078 | |
| Katawi | | 0 | 0 | 0 | 0 | 208,932 | |
| Kumi | | 0 | 0 | 28,220 | 198,799 | 231,192 | |
| Mbale | | 160,899 | 243,780 | 272,153 | 597,150 | 657,766 | |
| Pallisa | | 0 | 0 | 97,833 | 300,394 | 294,200 | |
| Soroti | | 0 | 83,840 | 93,598 | 361,483 | 370,380 | |
| Tororo | | 89,394 | 226,522 | 252,886 | 466,625 | 375,216 | |
| Northern | | Adjumani | 0 | 0 | 0 | 0 | 57,434 |
| | Apac | 0 | 98,944 | 110,460 | 381,737 | 416,882 | |
| | Arua | 124,128 | 110,725 | 123,612 | 535,805 | 769,272 | |
| | Gulu | 75,091 | 82,872 | 92,517 | 284,245 | 328,406 | |
| | Kitgum | 0 | 23,141 | 25,834 | 299,998 | 373,672 | |
| | Kotido | 0 | 0 | 17,211 | 164,625 | 77,867 | |
| | Lira | 104,088 | 154,837 | 172,859 | 420,759 | 458,236 | |
| | Moroto | 0 | 0 | 14,005 | 146,492 | 29,716 | |
| | Moyo | 0 | 22,704 | 25,346 | 147,524 | 53,370 | |
| | Nebbi | 0 | 39,088 | 43,637 | 266,135 | 327,696 | |
| | Western | Bundibugyo | 0 | 0 | 24,736 | 97,903 | 103,083 |
| | | Bushenyi | 0 | 20,597 | 108,265 | 483,896 | 530,174 |
| | | Hoima | 0 | 49,355 | 55,100 | 166,175 | 152,872 |
| Kabale | | 138,871 | 109,571 | 122,323 | 350,420 | 362,464 | |
| Kabarole | | 103,224 | 142,292 | 158,853 | 627,234 | 487,242 | |
| Kasese | | 0 | 48,481 | 54,124 | 288,590 | 293,095 | |
| Kibale | | 0 | 0 | 29,266 | 184,997 | 198,751 | |
| Kisoro | | 0 | 63,508 | 70,899 | 156,793 | 140,593 | |
| Masindi | | 0 | 0 | 53,078 | 219,042 | 285,681 | |
| Mbarara | | 149,002 | 177,697 | 191,655 | 670,888 | 667,399 | |
| Ntungamo | | 0 | 0 | 52,434 | 242,917 | 243,933 | |
| Rukungiri | | 0 | 105,373 | 117,638 | 328,215 | 326,760 | |

Source: Decentralization Secretariat, various years.

^aThe UPE “capitation” grant is intended to provide the facilities and resources necessary for school-aged children to complete primary education, including improving equitable access by removing the burden of school fees from parents.

^bBudget estimates.

**Appendix Table A17—Fiscal transfers to local governments for health, 1993–1997/98
(thousand Ugandan shillings)**

| Region | District | 1993/94 | 1994/95 | 1995/96 | 1996/97 ^a | 1997/98 ^b |
|----------|-------------|---------|---------|---------|----------------------|----------------------|
| Central | Kalangala | 0 | 0 | 6,409 | 51,608 | 64,585 |
| | Kampala | 0 | 885,991 | 0 | 0 | 69,516 |
| | Kiboga | 0 | 0 | 170,606 | 156,024 | 167,185 |
| | Luwero | 0 | 404,509 | 283,212 | 244,893 | 184,972 |
| | Masaka | 811,077 | 798,333 | 659,350 | 677,223 | 593,405 |
| | Mpigi | 849,910 | 848,664 | 609,158 | 525,294 | 457,401 |
| | Mubende | 0 | 450,642 | 420,460 | 374,508 | 352,741 |
| | Mukono | 767,832 | 765,770 | 537,149 | 466,215 | 300,000 |
| | Nakasongola | 0 | 0 | 0 | 0 | 73,028 |
| | Rakai | 274,478 | 356,139 | 210,236 | 175,556 | 337,600 |
| Eastern | Sembabule | 0 | 0 | 0 | 0 | 72,183 |
| | Bugiri | 0 | 0 | 0 | 0 | 170,444 |
| | Busia | 0 | 0 | 0 | 0 | 75,882 |
| | Iganga | 0 | 850,757 | 584,591 | 504,415 | 213,955 |
| | Jinja | 630,151 | 315,721 | 719,551 | 909,927 | 1,086,696 |
| | Kamuli | 0 | 0 | 189,964 | 152,959 | 160,397 |
| | Kapchorwa | 0 | 0 | 152,845 | 150,959 | 162,670 |
| | Katawi | 0 | 0 | 0 | 0 | 77,815 |
| | Kumi | 0 | 0 | 199,822 | 177,749 | 236,777 |
| | Mbale | 817,255 | 713,713 | 843,078 | 1,101,540 | 1,047,239 |
| Northern | Pallisa | 0 | 0 | 247,180 | 215,881 | 182,972 |
| | Soroti | 0 | 406,587 | 460,428 | 671,112 | 580,927 |
| | Tororo | 551,603 | 515,935 | 457,857 | 408,220 | 365,350 |
| | Adjumani | 0 | 0 | 0 | 0 | 99,461 |
| | Apac | 0 | 408,839 | 285,099 | 246,411 | 199,290 |
| | Arua | 916,103 | 621,585 | 722,202 | 837,581 | 896,869 |
| | Gulu | 558,664 | 343,441 | 509,814 | 743,936 | 798,266 |
| | Kitgum | 0 | 321,297 | 327,102 | 298,239 | 366,928 |
| | Kotido | 0 | 0 | 391,183 | 371,189 | 424,322 |
| | Lira | 469,525 | 494,382 | 505,344 | 464,357 | 497,699 |
| Western | Moroto | 0 | 0 | 195,467 | 178,743 | 308,952 |
| | Moyo | 0 | 157,997 | 233,012 | 210,070 | 204,749 |
| | Nebbi | 0 | 285,029 | 231,210 | 203,022 | 291,476 |
| | Bundibugyo | 0 | 0 | 156,797 | 155,029 | 169,677 |
| | Bushenyi | 0 | 662,377 | 333,891 | 284,755 | 240,369 |
| | Hoima | 0 | 177,972 | 209,469 | 321,534 | 273,710 |
| | Kabale | 540,130 | 416,610 | 422,491 | 537,073 | 482,065 |
| | Kabarole | 548,955 | 722,677 | 551,523 | 597,303 | 568,124 |
| | Kasese | 0 | 309,078 | 251,691 | 221,763 | 354,130 |
| | Kibale | 0 | 0 | 193,389 | 175,563 | 186,348 |
| Western | Kisoro | 0 | 167,924 | 208,280 | 190,860 | 197,237 |
| | Masindi | 0 | 0 | 366,482 | 340,046 | 386,074 |
| | Mbarara | 996,416 | 864,363 | 727,303 | 354,939 | 355,261 |
| | Ntungamo | 0 | 0 | 113,231 | 91,174 | 87,897 |
| | Rukungiri | 0 | 351,517 | 260,149 | 226,323 | 211,462 |

Source: Decentralization Secretariat, various years.

^aBudget Estimates, including district hospital services, referral hospitals and health training schools.

^bBudget estimates, including district hospital services, referral hospitals, NGO hospitals, and health training schools.

Appendix Table A18—Fiscal transfers to local governments for feeder road maintenance, 1993/94–1997/98 (thousand Ugandan shillings)

| Region | District | 1993/94 | 1994/95 | 1995/96 | 1996/97 ^a | 1997/98 ^a |
|----------|-------------|---------|---------|---------|----------------------|----------------------|
| Central | Kalangala | 0 | 0 | 22,880 | 23,823 | 24,261 |
| | Kiboga | 0 | 0 | 40,968 | 49,751 | 50,665 |
| | Luwero | 0 | 69,116 | 0 | 140,789 | 58,938 |
| | Masaka | 80,542 | 0 | 0 | 232,523 | 157,139 |
| | Mpigi | 152,673 | 0 | 0 | 237,312 | 241,671 |
| | Mubende | 0 | 56,454 | 0 | 149,438 | 152,183 |
| | Mukono | 96,769 | 0 | 0 | 239,714 | 244,117 |
| | Nakasongola | 0 | 0 | 0 | 0 | 84,437 |
| | Rakai | 0 | 0 | 0 | 114,932 | 117,043 |
| | Sembabule | 0 | 0 | 0 | 0 | 79,655 |
| Eastern | Bugiri | 0 | 0 | 0 | 0 | 128,802 |
| | Busia | 0 | 0 | 0 | 0 | 51,817 |
| | Iganga | 0 | 83,018 | 0 | 290,939 | 167,481 |
| | Jinja | 22,560 | 0 | 0 | 73,392 | 74,740 |
| | Kamuli | 0 | 0 | 54,758 | 140,428 | 143,007 |
| | Kapchorwa | 0 | 0 | 35,929 | 33,550 | 34,166 |
| | Katawi | 0 | 0 | | | 70,734 |
| | Kumi | 0 | 0 | 38,924 | 71,208 | 72,516 |
| | Mbale | 30,970 | 0 | | 206,255 | 210,043 |
| | Pallisa | 0 | 0 | 46,360 | 103,243 | 105,139 |
| Northern | Soroti | 0 | 53,865 | 0 | 136,634 | 68,410 |
| | Tororo | 29,684 | 0 | 0 | 167,478 | 118,738 |
| | Adjumani | 0 | 0 | 0 | 0 | 37,681 |
| | Apac | 0 | 59,394 | 0 | 135,275 | 137,760 |
| | Arua | 84,698 | 0 | 0 | 202,170 | 205,883 |
| | Gulu | 40,271 | 0 | 0 | 135,513 | 138,002 |
| | Kitgum | 0 | 47,858 | 0 | 148,582 | 151,311 |
| | Kotido | 0 | 0 | 37,041 | 86,719 | 88,312 |
| | Lira | 65,799 | 0 | 0 | 156,259 | 159,129 |
| | Moroto | 0 | 0 | 46,058 | 82,470 | 83,985 |
| Western | Moyo | 0 | 39,037 | 0 | 62,852 | 26,326 |
| | Nebbi | 0 | 48,061 | 0 | 99,072 | 100,892 |
| | Bundibugyo | 0 | 0 | 39,540 | 40,545 | 41,290 |
| | Bushenyi | 0 | 65,145 | 0 | 166,839 | 169,903 |
| | Hoima | 0 | 38,203 | 0 | 60,276 | 61,383 |
| | Kabale | 31,762 | 0 | 0 | 115,200 | 117,316 |
| | Kabarole | 75,397 | 0 | 0 | 234,066 | 238,365 |
| | Kasese | 0 | 44,322 | 0 | 94,532 | 96,268 |
| | Kibale | 0 | 0 | 48,759 | 69,862 | 71,145 |
| | Kisoro | 0 | 36,473 | 0 | 49,304 | 50,210 |
| Western | Masindi | 0 | 0 | 46,460 | 90,249 | 91,907 |
| | Mbarara | 98,946 | 0 | 0 | 260,073 | 264,850 |
| | Ntungamo | 0 | 0 | 51,751 | 85,098 | 86,661 |
| | Rukungiri | 0 | 61,656 | 0 | 113,635 | 115,722 |

Source: Decentralization Secretariat, various years.

^a Budget Estimates.