FOOD SECURITY RESEARCH PROJECT

TRENDS IN AGRICULTURAL AND RURAL DEVELOPMENT INDICATORS IN ZAMBIA

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T.S. Jayne, J. Govereh, P. Chilonda, N. Mason, A. Chapoto and H. Haantuba

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EXECUTIVE SUMMARY

Effective agricultural and food security policies in Africa need to be based on a solid empirical foundation. In Zambia, it is widely perceived that poverty rates are increasing, agricultural growth is stagnant, and real food prices are higher as food production declines. This study examines these trends and finds that all of these perceptions are wrong. Rural poverty rates have declined substantially in rural Zambia since the early 1990s, although they are still unacceptably high. Real staple food prices for consumers have declined by 20% over the past decade, thanks to major reductions in maize milling and retailing margins. And there is evidence of impressive production growth for some crops that are becoming increasingly important sources of income and food security for Zambian farmers, despite evidence of stagnant production for other key crops. This paper examines the relationship between trends in agricultural sector performance and rural poverty in Zambia, the likely factors driving these trends, and the future implications for agricultural policy and investment strategies.

After pursuing a state-led program of agricultural development for decades, Zambia undertook structural adjustment and agricultural market reforms in the early 1990s. Consumer food subsidies were eliminated, marketing board support to smallholder maize production was contracted, and massive fertilizer subsidies were scaled back. In the late 1980s, Zambia's National Agricultural Marketing Board's (NAMBOARD) operating losses were roughly 17% of total government budgets. These programs contributed to macroeconomic instability and forced the government to scale-back state subsidies to both small farmers and consumers in the early 1990s. There has been very little understanding to date as to how Zambia's agricultural sector has fared since this time and how this performance has affected rural poverty.

Data and Methods: Analysis is drawn from crop production estimates of the Post Harvest Surveys (PHS), which are the official estimates of the Government of the Republic of Zambia (GRZ). The nationally representative PHS were initiated in the 1990/91 crop season and conducted thereafter annually by the Central Statistical Office (CSO). The PHS are based on a sample frame of about 8,000 small-scale (0.1 to 5 hectares) and medium-scale (5 to 20 hectares) farm households, 86% which are in the former category. For shorthand, we refer to the full sample of both categories as the "smallholder" sector.

Unfortunately, official data on agricultural production in Zambia's smallholder farm sector during the 1970s and 1980s are considered highly unreliable. These figures, drawn from the CSO's Crop Forecast Surveys, are based on a set of crops that do not match well with smallholder production patterns in the 1990s and 2000s. Because of important shifts over time in cropping patterns, the lack of coverage of certain crops in earlier periods that are known to be important now, the method of relying on local extension workers to derive educated guesses about crop area and production in their districts, and the inclusion of large-scale production in earlier Crop Forecast (CF) estimates, it would be highly misleading to examine trends in the total value of agricultural output from the 1970s to the present time based on the Crop Forecast Survey estimates, although many analyses continue to do so. As a result, such studies' conclusions are prone to be biased and invalid. Even the more recent PHS excludes crops that have risen dramatically in recent years, such as fresh fruits, vegetables, and animal products. Evidence compiled in related nationally-representative surveys using the same sample frame as the PHS find, for example, that in 2002/03, the value of horticultural and animal product sales were each almost as high as the value of maize sales

by the smallholder sector (Zulu, Jayne, and Beaver 2006). It is important to keep these data limitations in mind when trying to understand performance in the sector, particularly prior to 1990. It is likely that official production estimates increasingly underestimate true production to the extent that smallholders' agricultural activities are increasingly dissimilar to the crops covered in the official estimates.

Main Findings: The study highlights six main findings:

1. **The total gross value of agricultural output, while stagnating for the first half of the 1990s, has risen by over 50% between the mid-1990s and the last three seasons for which data is available (2001/02 to 2003/04).** There has been no clear increase or decline in the value of crop output per hectare over the past decade. As stated earlier, these trends probably underestimate actual production growth over this period.

2. **There have been noticeable differences in crop production growth rates.** The worst performance has been registered for the staple grains and beans, while impressive production growth has been achieved for cassava, sweet potatoes, cotton, and groundnuts. Since the early 1990s, government support for maize production has been withdrawn as marketing board depots were closed, maize meal subsidies were eliminated, and massive fertilizer subsidy programs were scaled-back. Production in the more remote regions of northern Zambia declined substantially as area formerly under maize was shifted to cassava, groundnuts, and sweet potatoes. Cassava, sweet potato, and groundnut productivity have all benefited from the introduction of improved varieties in the early to mid-1990s. Cotton has also made big inroads; by 2003/04, one out of every five small farms grew cotton, thanks to substantial private investment in smallholder outgrower arrangements. Horticultural crops and animal products (while unmeasured in the PHS) also appear to be growing rapidly. Nationally-representative survey evidence from 2002/03 indicates that 45% and 17% of smallholder households derive income from the sale of animal products and horticultural products, respectively. The value of animal product and horticultural sales are almost as high as that for maize. Major production growth is being achieved in other unregulated crops as well, notably groundnut, soybeans, and tobacco.

3. **Throughout the liberalization process, fertilizer subsidies have remained important in Zambia.** In the last four years, the government has distributed roughly 45,000 tons each year at a 50% subsidy under its Fertilizer Support Program for use by smallholders on maize. PHS data indicates that roughly 90% of all fertilizer used by small farmers over the past decade has been on maize. Perhaps ironically, these fertilizer subsidies have not been effective in achieving more than a 0.6% growth rate in maize production. On the other hand, the fastest growth is being registered among crops that are handled almost completely by the private sector and to which no fertilizer subsidies are devoted.

4. **Inflation-adjusted maize meal prices have declined significantly** over the 1994-2005 period, for each of the nine provincial markets except one. Very significant downward trends were found in maize marketing margins at the milling and retailing levels. This is good news for consumers, especially for low-income consumers who may spend up to 30% of their disposable incomes on maize meal. Declining marketing margins spurred by increased competition from informal millers and retailers was one of the anticipated benefits of maize market liberalization that appears to have manifested in Zambia.

5. **Rural poverty has declined.** At the start of the liberalization process in 1991, 88% of rural households were estimated to be under the poverty line. Following the major drought of 1991/92, the rural poverty rate increased to 92% in 1993. However, since this point, rural poverty appears to have declined markedly, to 83% in the late 1990s, and to 74% by 2003. Estimates of "extreme poverty" in rural areas have also declined as well over the past decade. This may be considered a remarkable achievement considering the range of adverse processes affecting Zambia during this period, including high rates of HIV prevalence, declining copper revenues up to 2005, frequent drought, and the contraction of public budget support to agriculture. In the 1980s, up to 17% of the national budget was devoted to maize and fertilizer policies, while in the past two to three years, the government has allocated only 6% of its budget to the entire agricultural sector.

It is likely that the reduction in poverty over the past decade has been driven by the combination of growth of increasingly important food crops, such as cassava, sweet potatoes, groundnuts (and most likely, domestically consumed horticultural crops) as well as the export-led growth in cotton and tobacco, which have helped to buoy rural incomes despite the decline in maize production and the well-documented negative shocks affecting rural livelihoods mentioned earlier.

6. **Urban poverty, on the other hand, has risen somewhat between 1991 and 2003.** This may reflect both the decline of the copper industry and the elimination of consumer food subsidies in the early 1990s. The increase in urban poverty and decline in rural poverty is all the more interesting in light of evidence of reverse urban-to-rural migration; rural population growth over the 1990-2000 period was 2.9% compared to 1.5% for urban areas.

Where from Here: The question remains–what about the rural poor? Notwithstanding the positive developments in rural poverty reduction in the past 15 years, still over 60% of the rural population remains in poverty.

Faster progress in bringing down both rural and urban poverty rates will depend on faster agricultural productivity growth. The government has a crucially important role to play in this process. A great deal of research evidence from southern Africa as well as around the world indicates that the greatest contribution that public sector resources can make to sustained agricultural growth and poverty reduction is from sustained investment in crop science, effective extension programs, physical infrastructure, and a stable and supportive policy environment.

Achieving the twin goals of agricultural productivity growth and poverty reduction will require some reallocations of the government budget. Over the past several years, about 70% of the Ministry of Agriculture budget has been devoted to fertilizer subsidies and maize marketing and stockholding programs. Meanwhile, the genetic advances that were a major factor in maize productivity growth in earlier decades, have waned as funding by both donors and government has declined. The GRZ has devoted roughly 6% of its annual budget to the agricultural sector over the past several years, and of this, less than 4% has been allocated to agricultural research and extension. Of this 4%, 75% is for salaries and wages. Effectively, public sector agricultural research and extension has come to a standstill in Zambia. Rural poverty alleviation will require renewed commitment to public investments in these key areas.

Only 20% of small farmers use fertilizer in Zambia. Growth in fertilizer use will be a precondition to achieve appreciable income growth and sustained poverty reduction. However, fertilizer promotion must be considered holistically. It is not simply a technical or logistical problem of delivering large amounts of fertilizer to small farmers and expecting a sustainable solution. Achieving sustained growth in fertilizer consumption involves building farmers' effective demand for fertilizer, by making its use profitable, and by developing output markets and regional trade patterns that can absorb the increased production that higher levels of fertilizer will bring. This involves the same kinds of government commitment as identified above: (1) well-functioning crop science and extension programs to improve crop productivity, particular for the staple food crops, for small farmers; (2) extension programs that stop assuming all farmers are the same, and which focus on taking advantage of the higher marginal rates of return at the lower ends of the production function; and (3) investing in rural infrastructure and rehabilitation of the regional rail and port facilities to drive down the costs of input and output marketing. Greater investment in road and rail infrastructure are likely to be necessary to sufficiently reduce the farm-gate price of inputs, such as fertilizer to make its use profitable to smallholder farmers. Once this is achieved, Zambian agriculture will be on a much more competitive and productive footing in the region and internationally.

Last, achieving sustainable smallholder-led agricultural growth will also require a supportive policy environment that attracts local and foreign direct investment in building fertilizer, credit, seed, and crop output markets. The phenomenon of subsidized government intervention in the market, or the threat of it, leading to private sector inaction, is one of the greatest problems plaguing the food and input marketing systems in the region. While targeted assistance to vulnerable households will remain an important component of a comprehensive food security and poverty reduction strategy in almost all African countries, such programs must be carefully designed so as not to interfere with the long-term development of agricultural markets, which will be critical for sustained poverty reduction.

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LIST OF ACRONYMS

AFC	Agricultural Consultative Forum
AIM	Agricultural Inputs Development Plan
AMDP	Agricultural Market Development Plan
CF	Crop forecast
CSO	Central Statistical Office
FAO	Food and Agricultural Organization
FRA	Food Reserve Agency
FSRP	Food Security Research Program
GRZ	Government of the Republic of Zambia
IOPV	Improved open-pollinating varieties
MACO	Ministry of Agriculture and Cooperatives
MATEP	Market Access, Trade and Enabling Policies Project
MFNP	Ministry of Finance and National Planning
MSU	Michigan State University
NAMBOARD	National Agricultural Marketing Board
PHS	Post-harvest surveys
SAKSS-SA	Regional Strategic Analysis and Knowledge System for Southern Africa
USAID	United States Agency for International Development

1. INTRODUCTION

There is growing debate over the appropriate role of the government to promote agricultural growth and reduce poverty in southern Africa. Proponents of liberalization and market reform are somewhat on the defensive now, as policies perceived to be implemented in the early 1990s appear to have borne little fruit. It is widely perceived that poverty rates are increasing, agricultural growth is stagnant, and real consumer food prices are rising after consumer food subsidies were eliminated. This study examines these trends in Zambia and finds that all of these perceptions are wrong. Rural poverty has actually declined since the early 1990s. There is evidence of impressive production growth for some crops that are becoming increasingly important sources of income and food security for Zambian farmers, despite evidence of stagnant production for other key crops. However, there is ample room for improved agricultural performance in Zambia, and this report highlights changes in policy and public investments that may promote smallholder productivity growth and food security. The paper highlights the fact that despite appearances of liberalization, the government continues to intervene heavily in food and fertilizer markets in Zambia, in ways that greatly influence the response of the private sector, the performance of markets, and thus the well-being of smallholder farmers. These findings render conclusions linking increased poverty and agricultural stagnation with market reform to be not only unfounded according to available data, but also based on a superficial understanding of the agricultural policy environment that has existed in many countries over the past decade. The case of Zambia, described in this paper, provides one case in point.

Effective agricultural and food security policies in Africa need to be based on a solid empirical foundation. This study takes stock of key development indicators in Zambia's agricultural and rural sector, assessing trends in crop output, the value of output per hectare, household assets, real food prices, and poverty. To the extent possible, how these major trends have been influenced over time by shifts in the agricultural policy environment have been traced. However, this is admittedly a difficult undertaking because of both data limitations and the numerous other exogenous shocks affecting the agricultural sector besides agricultural policy change.

Analysis is drawn primarily from official crop production estimates of the small- and medium-scale farm sector from the PHS, which are the official production estimates of the GRZ. However, also presented are trends in agricultural performance according to FAO statistics, which have the advantage of going back to the 1960s, but have the disadvantage of being highly unreliable and unable to give an accurate picture of trends in smallholder welfare over time.

2. DATA

The nationally representative PHS are conducted annually by the CSO of the GRZ. The PHS covers a consistent set of crops annually since the 1990/91 crop season (Zulu et al. 2000). The PHS is based on a sample frame of about 8,000 small-scale (0.1 to 5.0 hectares) and medium-scale farm households, defined as those cultivating areas between 5 to 20 hectares. About 86% of the farms in this nationally-representative survey are in the small-scale (0.1 to 5.0 hectares) category. For shorthand, the full sample of both categories is referred to as the "smallholder" sector.

A major limitation of the PHS is that it began in the 1990/91 season, therefore offering no ability to examine trends in the 1970s and 1980s, and how this compares with more current production patterns. FAO production statistics are available for these earlier periods, based largely on the national CF estimates. The CF estimates were based on local extension worker estimates of cultivation patterns in their wards, which were then aggregated up to the national level. The CF is considered a highly unreliable indicator of smallholder production trends for several reasons. First, the CF estimates include production estimates from the large-scale farm sector. It is likely that large-scale farm production has declined for many crops over the past three to four decades, thus making it difficult to detect possibly different trends in the smallholder farm sector over this long period. Second, the CFs are based on impressions of national extension workers rather than statistically valid surveys of farm smallholder households like the PHS. Third, the CFs are based on a set of crops that were dominant in production patterns in the 1970s, which may not match well with smallholder production patterns in the 1990s and 2000s. Because of important shifts over time in cropping patterns, the lack of coverage of certain crops in earlier periods that are known to be important now, and the inclusion of large-scale production in earlier CF estimates, it is potentially misleading to examine trends in the total value of agricultural output from the 1970s to the present time based on the set of crops that were found to be most important in the 1970s. And even the PHS excludes crops that have risen dramatically in recent years, such as fresh fruits, vegetables, and animal products. Evidence compiled in related nationally-representative surveys using the same sample frame as the PHS find, for example, that in 2002/03, the value of horticultural and animal product sales were each almost as high as the value of maize sales by the smallholder sector (Zulu, Jayne, and Beaver 2006). It is important to keep these data limitations in mind when trying to understand performance in the sector, particularly prior to 1990. It is likely that official production estimates increasingly underestimate true production to the extent that smallholders' agricultural activities are increasingly dissimilar to the crops covered in the official estimates. Keeping these caveats in mind, trends in the agricultural sector are now examined.

3. AGRICULTURAL POLICY SHIFTS AND PRODUCTION TRENDS

3.1. The 1960-1990 Period

Current food policy issues in Zambia, as in much of eastern and southern Africa, are rooted in a historical context. Understanding the political and economic pressures propelling food policy in the region requires an understanding of the role of maize as the strategic political crop in this region of Africa. Maize became the cornerstone of an implicit and sometimes explicit "social contract" that the post-independence governments made with the African majority to redress the neglect of smallholder agriculture during the former colonial period (Jayne and Jones 1997). The controlled marketing systems inherited by the new governments at independence were viewed as the ideal vehicle to implement these objectives. The benefits of controls for settler farmers during the colonial period generated the belief that the same system could also promote the welfare of millions of smallholders if it were simply expanded (Jenkins 1997).[1] The social contract also incorporated the understanding that governments were responsible for ensuring cheap food for the urban population.

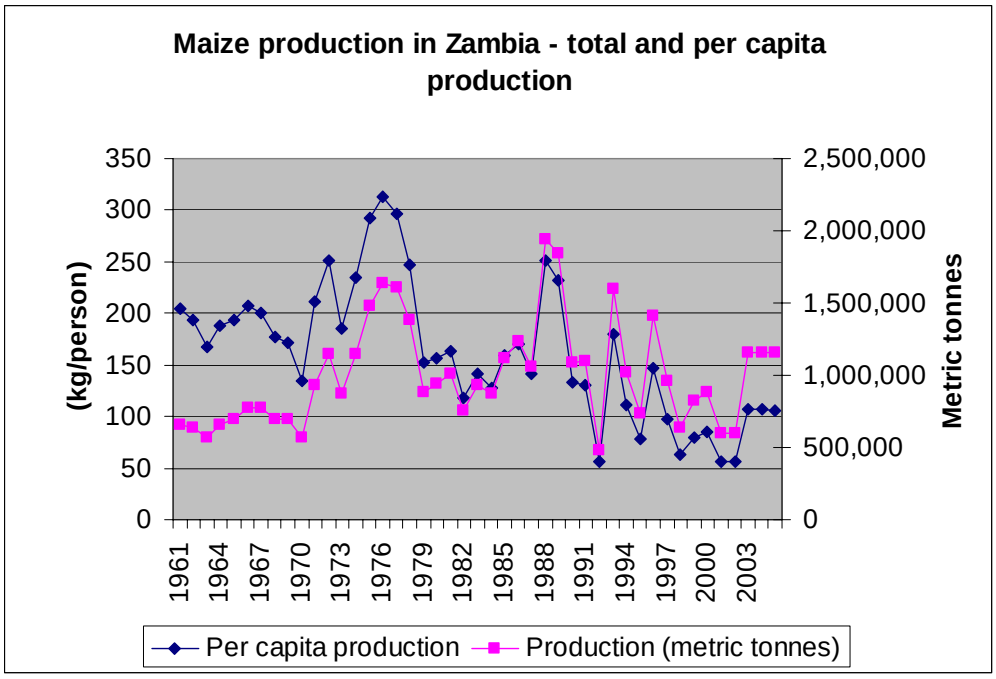
Starting at Independence in the mid 1960s, a prominent goal of government policy was to promote smallholder welfare, using maize production incentives as the main vehicle. This goal was achieved with great success in the 1970s and 1980s (Figure 1). Two main ingredients drove this production growth: input and crop marketing policies, broadly defined, and improved seed breakthroughs. The key features of the marketing policies were (a) expansion of state crop buying stations in smallholder areas; (b) direct state control over grain supplies and pricing; (c) developing a system of cooperatives to link farmers to the services provided by the marketing boards; (d) heavy subsidization of fertilizer to encourage its use by small farmers; (e) efforts to stabilize and subsidize urban consumer prices without reliance on imports; and (f) shifting the massive cost of these government investments and subsidies onto the Treasury. The expansion of state market infrastructure in smallholder areas combined with massive expenditures devoted to fertilizer subsidies fueled an impressive increase in maize production over the 1970s and 1980s.

Improved maize seed varieties were the other central aspect of the maize production increase (Byerlee and Eicher 1997). Maize yields rose dramatically between 1960 and 1980 (Figure 2).[2] The germplasm produced by the Zambian maize program from the mid-1970s through the early 1990s included an impressive array of ten double and three-way crosses, and two flint-type, early-maturing, improved open-pollinating varieties (IOPV) (Howard 1994). In all but the most difficult growing environments, the hybrids outyielded local (and improved) open-pollinated varieties even without fertilizer. But the improved maize varieties also raised the returns to fertilizer use, and clearly the seed, fertilizer, and crop marketing investments were highly synergistic. Unlike the single cross SR52, the new hybrids were double and three-way crosses, so their yield advantages lost with recycling were not so great. Achieving these advances depended on access to both international breeding expertise and international germplasm collections (Smale and Jayne 2003).

[1] For an analysis of how the agricultural controls in the colonial period were used to support colonial settler farmers, often at the expense of African farmers, see Mosley (1975) for the case of Kenya; Keyter (1975) for southern Rhodesia/Zimbabwe; and Jansen (1977) for Northern Rhodesia/Zambia.

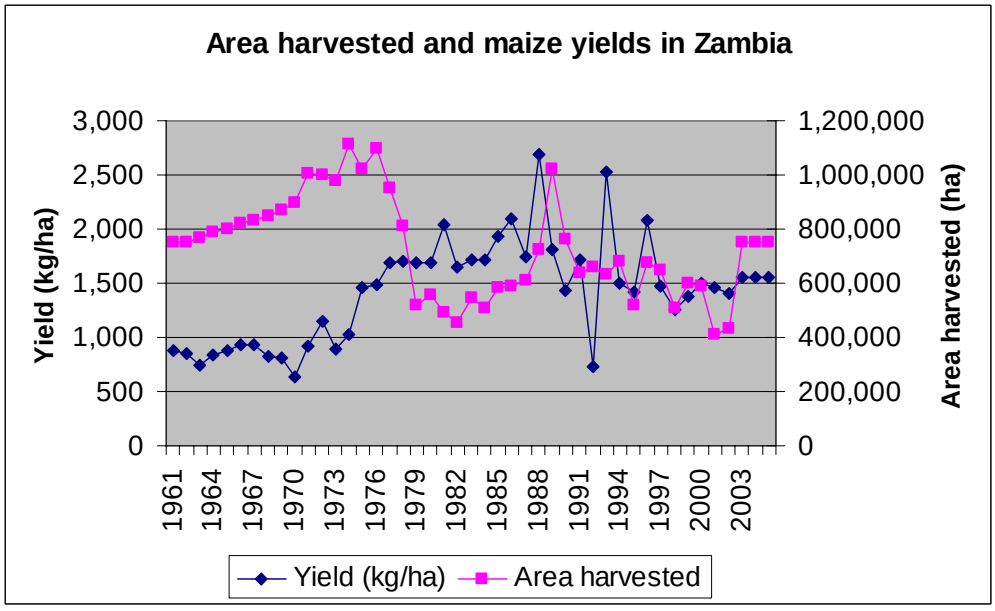
[2] The reader is cautioned to keep in mind the caveats about the CF estimates as mentioned in section 2.

Figure 1. Maize Production in Zambia



Source: FAOStat data, drawn from CF estimates

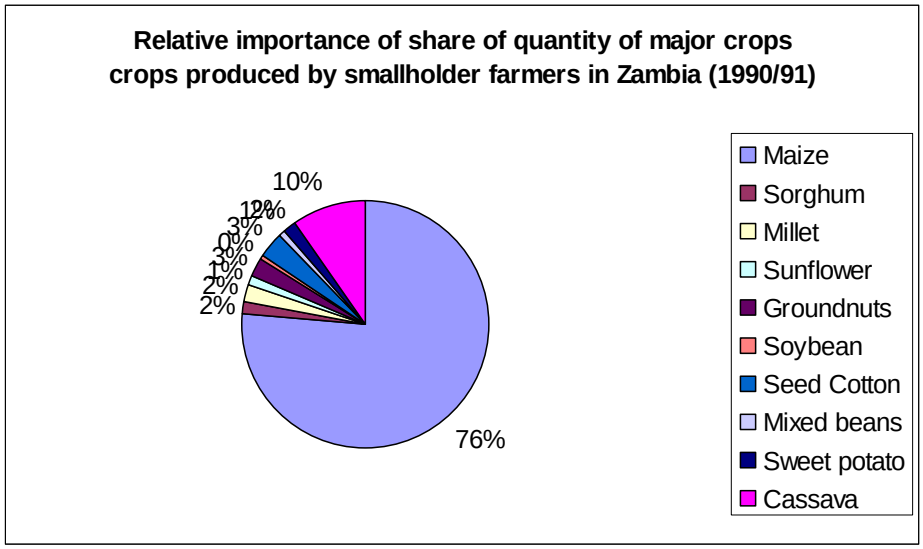
Figure 2. Maize Yield and Area Cultivated in Zambia



Source: FAOStat data, drawn from CF estimates

During this period of the 1970s, 1980s, and up to the early 1990s, smallholder production patterns appear to have been dominated by maize (Figure 3). Maize accounted for 76% of the total value of smallholder crop production, based on the sub-set of crops covered in the new PHS surveys fielded in 1990/91. Cassava's share of total smallholder crop income was 10%, while all other crops were under 3%.

Figure 3. Shares of Crop Production Value of Major Crops Produced By Smallholder Farmers in Zambia, 1990/91



Source: PHS, 1990/91, CSO, Lusaka

While the post-independence model of service provision for smallholder maize production appears to have had important successes in boosting rural incomes in some rural areas, by the mid-1980s major problems had emerged that propelled the input and crop marketing systems toward reform. First, marketing board costs escalated as the scale and complexity of their activities increased. Losses consisted of two types: those which government forced on the board by mandating it to carry out activities that were unprofitable, but fulfilled "social" functions like buying maize at above-market prices in remote areas (which encouraged maize production expansion), and those related to operational inefficiency (which probably had little effect on smallholder maize production). Pan-territorial pricing was particularly burdensome in Zambia, since it raised the share of grain delivered to the boards by smallholders in remote, but often agronomically high-potential, areas where transport costs were high. Stockpiling white maize, a consequence of government preoccupation with maize self-sufficiency, was also costly (Howard and Mungoma 1996). Operational inefficiency and allegations of corruption were widespread. The treasury costs of state fertilizer and maize marketing operations were so large that they contributed to macroeconomic instability and hyperinflation (Jansen and Muir 1994). Zambia's NAMBOARD's operating losses were roughly 17% of the total government budgets in the late 1980s (Howard and Mungoma 1996).

Howard (1994) provides a detailed analysis of the rate of return to the maize seed research and marketing policies of the 1970s and 1980s in Zambia. Her analysis explicitly includes the cost of a full range of investments leading to hybrid maize adoption by smallholder farmers. Marketing costs accounted for roughly 59% of the total cost of all investments, in contrast to the seed research investments, which were only 3% of the total. Extension and other service provision programs accounted for the remaining 38%. The rate of return on maize research was favorable when the cost of marketing was not included. After the cost of all related investments (research, extension, seed, and marketing), however, the average rate of return to maize research in Zambia was negative over the 1987-91 period.

3.2. The Period After 1990

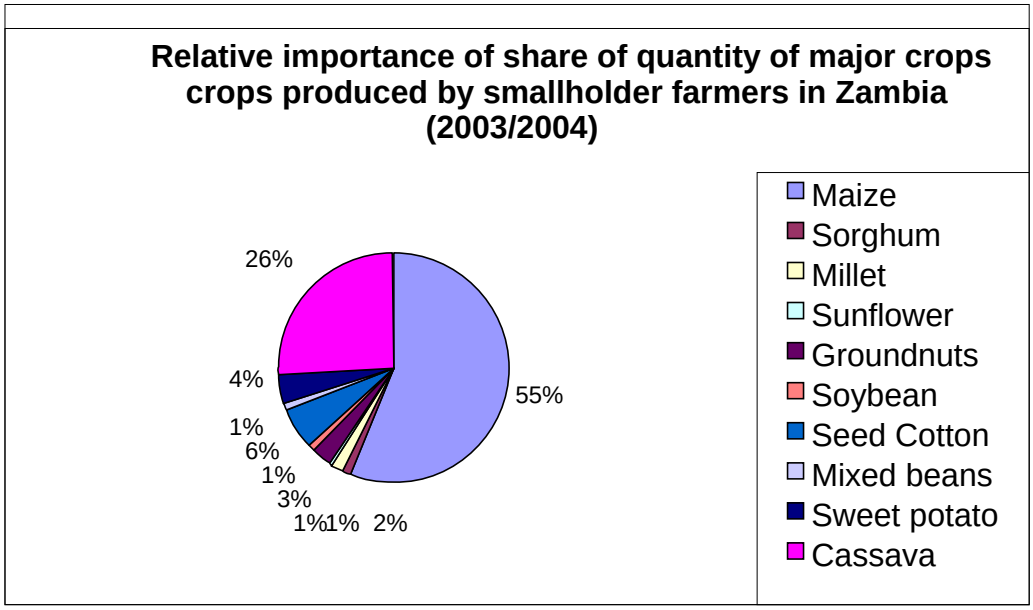
Fiscal crises and increased donor leverage over policy pushed the grain marketing systems of eastern and southern Africa toward liberalization in the mid-1980s. Largely because of the financial unsustainability of its massive input, credit, output market, and maize meal price subsidies, and a slump in its copper revenues, the Zambian government became increasingly dependent on external lenders, thereby losing some degree of control over its agricultural policies. The early 1990s brought much tighter fiscal constraints on government social activities, and led to the infamous "structural adjustment" and market reform policies designed to reign in state spending on agriculture to a level that could be sustained given its revenue base.

Dissatisfaction with market reform has also been exacerbated by its association with a retreat from the "social contract" marketing investments in support of smallholder welfare. The first five years of the post-1990 period have been associated with a decline in *absolute* grain production in Zambia (Figure 1). Some local reform champions counter that blame should not be laid at the door of market liberalization, which only made it more difficult to hide the unsustainable subsidies of the controlled systems. When these deficits accumulated to such proportions as to cause macroeconomic instability, Zambia and other countries in the region became dependent on international lenders, such as the IMF and World Bank, who insisted on measures to solve the causes of the problem before granting loans.

However, by the late 1990s, donors relaxed the condition that loans to the government be linked to specific policy changes, based on the experience that "buying" reform was an ineffective way to secure government commitment and ownership of policy change. In fact, throughout the liberalization process, the Zambian government has remained a major player in the grain and fertilizer markets, and continues to hold great influence over private trade decisions through import tariffs, export bans, marketing board operations, and input subsidies. The Food Reserve Agency (FRA), originally conceived to hold buffer stocks to dampen price variability and provide liquidity in the maize market during the initial years of market liberalization, has, since 1997, handled roughly 22% of the country's domestically marketed maize (Jayne, Zulu, and Nijhoff 2006). Although FRA's original mandate did not include the provision of price support to farmers, FRA maize purchases were increasingly relied upon to shore up prices. In the most recent year for which data is available, 2003, the FRA is believed to have purchased roughly 34% of the country's domestically marketed maize. The combination of FRA maize operations and subsidized fertilizer distribution programs accounted for 63% of the 2004 national budget allocated to MACO in 2004 and almost 80% in 2005. Nevertheless, the subsidies allocated to maize production are substantially smaller in real value terms than public sector subsidy outlays in the 1980s.

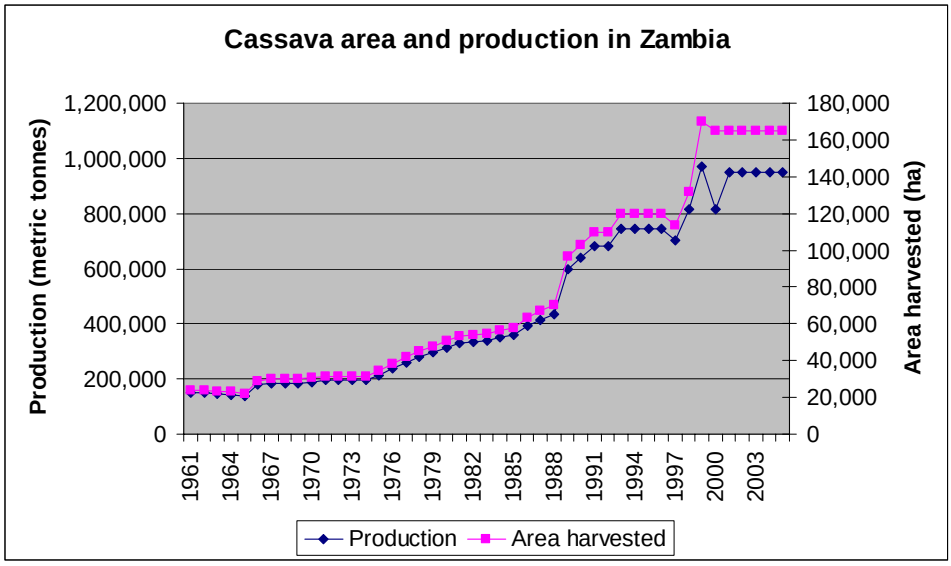
The overall reduction in subsidies to support maize production and consumption appear to have caused important shifts in cropping patterns over time (comparing Figures 3 and 4). Over the 12-year period between the 1990/91 and 2002/03 seasons, the share of maize in total smallholder crop output declined from 76% to 55%. Cassava rose from 10% to 26%, largely replacing maize in areas of northern Zambia where it had been grown prior to the introduction of the maize marketing and fertilizer subsidies (which favored maize production). Seed cotton's share has risen from 3% to 6%. The post-1990 production trends for cassava and the traditional smallholder cash crops–sunflower, soybeans, groundnuts, and cotton–are presented in Figures 5 and 6.

Figure 4. Shares of Crop Production Value of Major Crops Produced By Smallholder Farmers in Zambia, 2003/04



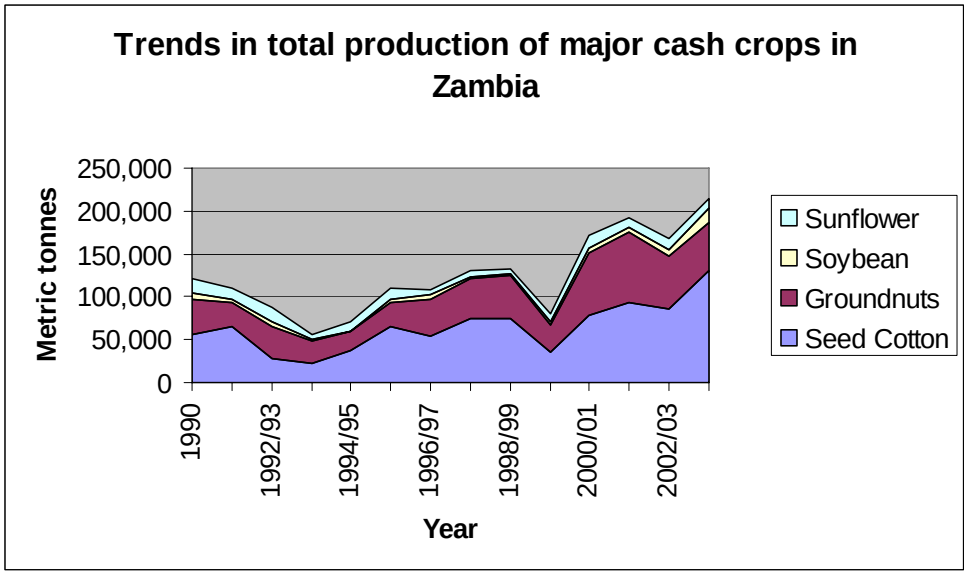
Source: PHS, 1990/91, CSO, Lusaka

Figure 5. Cassava Area and Production in Zambia



Source: FAOStat data

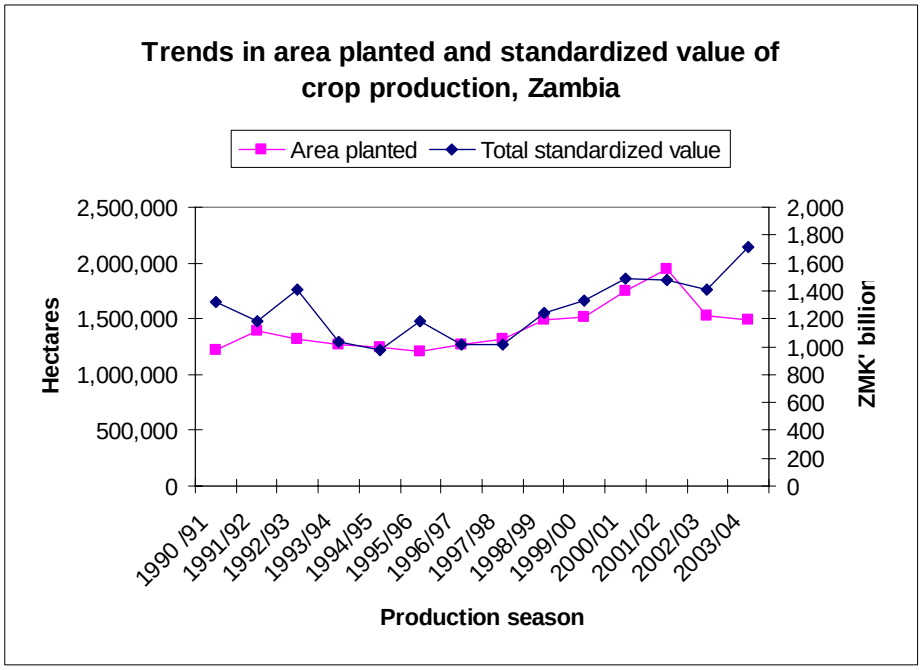
Figure 6. Trends in Smallholder Production of Major Cash Crops in Zambia



Source: PHS, 1990/91, CSO, Lusaka

Figure 7 presents post-1990 trends in total smallholder cropped area and the inflation-adjusted value of total agricultural production from the smallholder sector, based on the PHS. Cropped area was largely unchanged during the first half of the 1990s, then increased gradually until 2001/02 before dropping again to levels close to area cropped in 1990. The total gross value of agricultural output also stagnated for the first half of the 1990s, but has risen by over 50% between the 1997/98 season and the last three seasons for which data is available (2001/02 to 2003/04). Also, as indicated earlier, activities believed to have grown rapidly in recent years (fresh fruits, vegetables, and animal products) are not counted in these production statistics. Therefore, the overall picture indicates that, although maize production has declined greatly from former levels in the 1980s, to a large extent this decline has been offset by increased production of other crops, most notably cassava, cotton, and groundnut (and horticulture and animal products, as indicated by other survey evidence).

Figure 7. Trends in Area Planted and Standardized Value of Crop Production in Zambia



Source: Govereh, Jayne, and Beaver 2007, based on raw data from PHS surveys, CSO, Lusaka

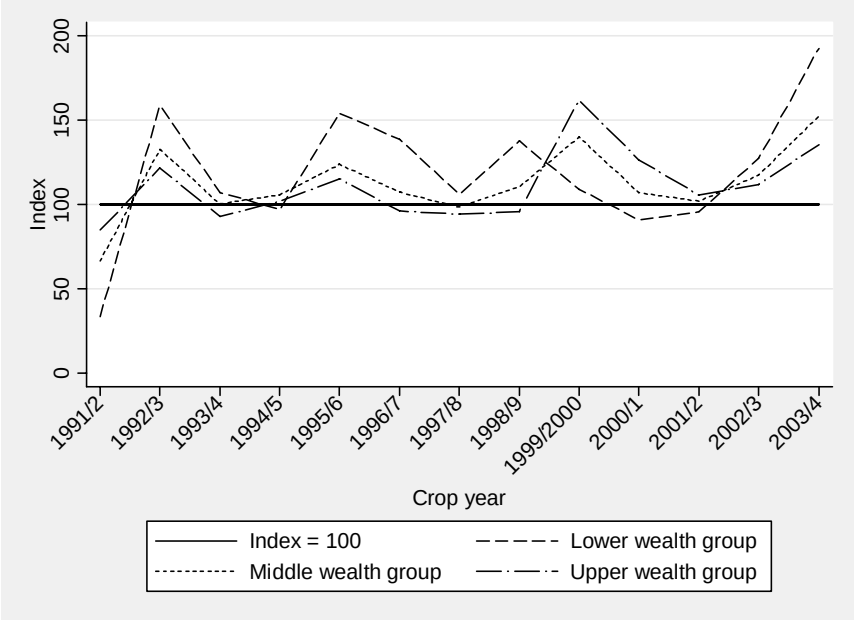
Figure 8 presents trends in the value of crop output per hectare. For each year, households were separated into low-, medium-, and high-wealth groups, based on the value of crop output per hectare; this was done to detect potential differences in trends according to wealth group. Crop output per hectare is normalized to the mean of the first three seasons of the PHS.[3] For each of the three wealth groups, there is no clear increase or decline in the value of crop output per hectare, although recent productivity gains appear to have been achieved by the lowest wealth group in the past two seasons. At this stage, it is difficult to identify the factors driving this, or even whether the data indicate a clear upturn.

There have been noticeable differences in crop production growth rates (Table 1). The worst performance has been registered for the staple grains and beans, while impressive production growth has been achieved for cassava, sweet potatoes, cotton, and groundnuts. The well-documented decline in maize production has been driven largely by policy. Since the early 1990s, government support for maize production has been withdrawn as marketing board depots were closed, maize meal subsidies were eliminated, and massive fertilizer subsidy programs were scaled back. Production in the more remote regions of northern Zambia declined substantially as area formerly under maize was shifted to roots, tubers, and groundnuts.[4] Cassava, sweet potato, and groundnut productivity have all benefited from the

[3] This includes the major drought year of 1991/92, but also contains 1992/93, which registered the greatest value of agricultural production of the 1990s.

[4] Some analysts contend that the increasing role of cassava, a drought tolerant crop that can be stored in the ground, provides new potential to stabilize food consumption in the face of maize production shortfalls (Haggblade 2006). The availability of a drought-tolerant crop that is less prone than maize to extreme production fluctuations provides some relief in the degree to which maize supplies can fluctuate from year to year without seriously aggravating food insecurity.

Figure 8. Mean Household Crop Output Per Hectare, 1991/92-2003/04 Crop Seasons



Source: Mason et al. 2006, based on raw data from PHS surveys, CSO, Lusaka
Note: Split years, e.g., 1991/92=planted in late 1991, harvested in May-June 1992

introduction of improved varieties in the early- to mid-1990s. Cotton has also made big inroads; by 2003/04, one out of every five small farms grew cotton, thanks to substantial private investment in smallholder outgrower arrangements. Horticultural crops and animal products (while unmeasured in the PHS surveys) also appear to be growing rapidly. Nationally representative survey evidence from 2002/03 indicates that 45% and 17% of smallholder households derive income from the sale of animal products and horticultural products, respectively (Zulu, Jayne, and Beaver 2006). The value of animal product and horticultural sales are almost as high as that for maize. Major production growth is being achieved in other unregulated crops as well, notably groundnut, soybeans, and tobacco (Govereh et al. 2006).

Table 1. Growth Rates (% Per Annum) for Selected Crops Produced By Smallholder Farmers, Zambia, 1991-2004

Crop	Area	Yield	Production	Sales
Maize	0.2	0.5	0.6	-1.8
Sorghum	-0.3	0.7	0.4	2.4
Millet	0.0	0.5	0.6	1.9
Cassava	1.6	1.7	3.3	5.2
Groundnuts	0.9	3.0	4.0	3.9
Cotton	3.6	1.7	5.3	5.4
Soybean	2.9	1.8	4.8	3.5
Sunflower	-0.5	1.4	0.9	-1.5
Sweet potatoes	4.6	2.0	6.6	6.6
Mixed beans	1.8	-1.3	0.6	1.0

Source: Govereh et al. (2006), computed from raw PHS data, CSO, Lusaka

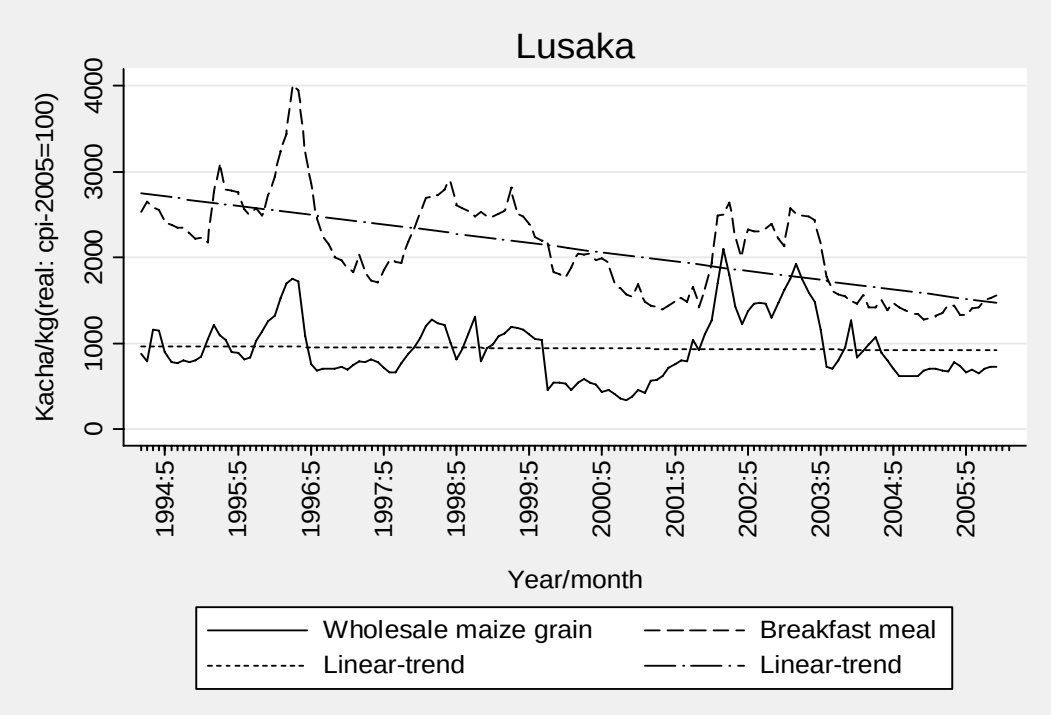
Throughout the liberalization process, fertilizer subsidies have remained important in Zambia. In the last four years, the government has distributed roughly 45,000 tons a year at a 50% subsidy under its Fertilizer Support Program for use by smallholders on maize. PHS data indicates that roughly 90% of all fertilizer used by small farmers over the past decade has been on maize. Perhaps ironically, these fertilizer subsidies have not been effective in achieving more than a 0.6% growth rate in maize production. On the other hand, the fastest growth is being registered among crops that are handled almost completely by the private sector and to which no fertilizer subsidies are devoted.

4. FOOD PRICE TRENDS

Despite the decline in per capita maize production over the past 15 years, inflation-adjusted wholesale maize prices show a basically flat trend over time, with high annual variations (Figure 9, shown for Lusaka only, but similar patterns emerge for eight of the nine provincial markets in Zambia). Real wholesale maize prices regressed on time trends show statistically insignificant, though mostly increasing trends over time. These findings suggest that maize price incentives for farmers are, in at least these provincial market areas, not declining over time.

On the other hand, real maize meal prices exhibit a significant downward trend over the 1994-2005 period, for each of the nine provincial markets except Chipata. Moreover, very significant downward trends in maize marketing margins at the milling and retailing levels were found (Chapoto and Jayne 2006). This is good news for consumers, especially for low-income consumers who may spend up to 25% of their disposable incomes on maize meal. Ten years into the reform process, real breakfast meal prices have declined by 40%, while milling/retailing marketing margins have been cut in half (Figure 9). Based on estimates of 3.5 million urban "adult equivalent" consumers purchasing 120 kg of breakfast meal per year, the declining maize meal milling and retailing margins have saved Zambian consumers roughly US$29.4 million (123 billion kwacha) each year (Chapoto, Jayne, and Zulu 2006).

Figure 9. Trend in Maize Grain and Breakfast Meal Prices in Zambia By Market in 01/1994-10/2005



Source: Chapoto, Jayne, and Zulu 2006

There are two general explanations for the reduction in maize milling/retail margins in Zambia. First, the maize market reforms initiated in the early 1990s brought about a more competitive market structure in urban areas. Prior to market liberalization, a few officially registered maize-processing firms had a *de facto* oligopoly on milling maize and supplying the retail sector. Regulations made it difficult for non-registered millers and traders to transport grain into urban areas or acquire grain from the marketing board. Market reform opened this system to greater competition as small-scale millers and retailers who were previously excluded from entering the market were now allowed to procure and transport grain freely across district boundaries. Rapid investment in medium- and small-scale milling and retailing networks occurred almost immediately after the reforms were implemented. In response to greater competition, the registered large milling companies cut their prices in an attempt to regain lost market share. Greater competition in milling and retailing exerted downward pressure on the milling/retailing margins of the large-scale firms' products, thereby benefiting consumers.

The small millers, who rapidly entered the market after the reforms, produced a range of relatively refined and unrefined maize meal products. Studies indicate that these small-scale millers have become the primary means by which relatively low-income consumers procure their staple maize meal, as long as grain is available in local markets (Mwiinga et al. 2003).

5. TRENDS IN RURAL LIVELIHOODS AND POVERTY

Poverty in Zambia has always been high. At the start of the liberalization process in 1991, 88% of rural households were estimated to be under the poverty line. Following the major drought of 1991/92, the rural poverty rate increased to 92% in 1993. However, since this point, poverty appears to have declined to 83% in the late 1990s (Table 2). Poverty estimates in 2003 suggest a further reduction to 74% in rural areas; however, the survey design and methodology used to produce the 2003 estimates differed from the approaches used to generate the earlier estimates (MFNP 2002; Demombynes 2005). Hence, it is unclear whether there was indeed a substantial reduction in poverty rates from 1998 to 2003. Estimates of "extreme poverty" appear to have also declined markedly over the past decade. Assuming that the actual 2003 rural poverty rates were significantly lower than rural poverty rates in the early 1990s, such reductions are remarkable considering the range of adverse processes affecting Zambia during this time. Such negative shocks include high rates of HIV prevalence, the slumping copper industry, frequent drought, and the contraction of state fiscal outlays in support of smallholder fertilizer use and maize marketing. The apparent reduction in rural poverty is all the more interesting in light of evidence of reverse urban-to-rural migration; rural population growth over the 1990-2000 period was 2.9% compared to 1.5% for urban areas (Govereh et al. 2006).

Table 2. Trends in Poverty, HIV Prevalence Rates and Drought, Zambia, 1991-2005

Year	Overall Urban Poverty	Overall Rural Poverty	Extreme Rural Poverty	Drought	Estimated HIV Prevalence Rate
1991	48.6	88.0	80.6		
1992				X	
1993	44.9	92.2	83.5		
1994				X	
1995					16.7
1996	46.0	82.8	68.4		
1997					
1998	56.0	83.1	70.9	X	
1999					
2000					15.8
2001				X	15.6
2002				X	15.2
2003	52.0*	74.0*	52.4*		14.8
2004					14.4
2005					13.9

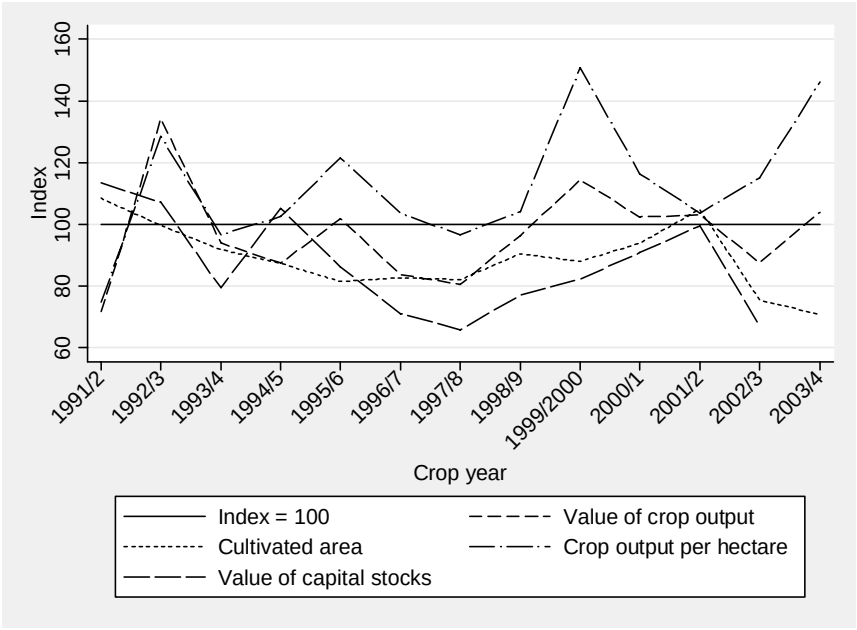
Sources: Mason et al. 2006, drawing from the Zambia Poverty Reduction Strategy Paper 2002-2004 (2002) and CSO (2003). HIV Epidemiological Projections are from CSO (2005). Drought information from Govereh and Wamulume (2006); and Del Ninno and Marini (2005).

*The methodology and survey design used to establish these poverty rates differ from those used to calculate poverty rates in previous years, calling into question the comparability of the poverty rates.

It is indeed difficult to find sources of economic dynamism in Zambia that could explain this apparent reduction in rural poverty rates other than the impressive agricultural growth registered for the non-maize crops shown in Table 1. Fynn and Haggblade (2006) contend that the reduction in poverty over the past decade has been driven by the combination of growth of increasingly important food crops, such as cassava, sweet potatoes, groundnuts (and most likely, domestically consumed horticultural crops) as well as the export-led growth in cotton and tobacco, which have helped to buoy rural incomes despite the decline in maize production and the well-documented negative shocks affecting rural livelihoods mentioned earlier.

Figure 10 presents trends in key indicators of rural household livelihoods over time: values of crop output, output per hectare, capital stocks (farm assets and animals), and area cultivated. They are presented in "per household" terms to control for population growth in rural areas. For each indicator, the mean of the first three seasons is indexed at 100. The general picture is one of slightly declining indicators of welfare during the first half of the 1990s, followed by a recovery in the latter half of the 1990s and into the early part of the current decade. Droughts in the 2001/02 and 2002/03 season make it difficult to discern whether there has been another downturn or not.

Figure 10. Trends in Indicators of Rural Household Welfare, 1991/92-2003/04



Source: Mason et al. (2006), based on raw data from PHS surveys, CSO, Lusaka
Note: split years, e.g., 1991/92=planted in late 1991, harvested in May-June 1992

6. CONCLUSIONS

The main trends in Zambia's smallholder agricultural and rural sector over time can be summarized as follows:

1. Smallholder maize production expanded rapidly after independence and up to the late 1980s, as part of the new government's commitment to support smallholder welfare. Subsidies on inputs, fertilizer and seed credit, marketing board subsidization of transport costs in remote areas, farmer debt forgiveness, and maize meal subsidies all contributed to this growth in maize production. However, the massive deficits accumulated through these policies sowed the seeds for their unsustainability, prompting major reforms and subsidy reduction starting in the early 1990s.

2. The downward trend in maize production in the first half of the 1990s was accompanied by shifts into other crops, notably cassava, seed cotton, and groundnuts. Looking at the smallholder sector in its entirety, the value of crop production declined very little from 1990 to 1995, and then has experienced gradual growth since 1995.

3. The value of crop output per hectare has remained largely constant over the 1990 to 2004 period. Productivity growth remains a challenge. Crop value per hectare also remains highly variable, due to the reliance on rainfed agricultural systems and the lack of irrigation, despite tremendous irrigation potential in the country.

4. The conventional wisdom of ever increasing rural poverty, escalating food prices, and declining productivity of smallholder agriculture is not supported by available evidence in Zambia over the period 1990-2005. Poverty rates in rural areas appear to be declining. At the start of the liberalization process in 1991, 88% of rural households were estimated to be under the poverty line. Following the major drought of 1991/92, the rural poverty rate increased to 92% in 1993. However, since this point, rural poverty appears to have declined markedly, to 83% in the late 1990s, and to 74% by 2003.[5] Estimates of "extreme poverty" in rural areas have also declined over the past decade. Assuming the 2003 poverty estimates are accurate, such a decline in poverty may be considered a remarkable achievement considering the range of adverse processes affecting Zambia during this period, including high rates of HIV prevalence, declining copper revenues up to 2005, frequent drought, and the contraction of public budget support to agriculture.

5. Urban poverty, on the other hand, rose somewhat between 1991 and 1998. This may reflect both the decline of the copper industry and the elimination of consumer food subsidies in the early 1990s. The increase in urban poverty and decline in rural poverty is all the more interesting in light of evidence of reverse urban-to-rural migration; rural population growth over the 1990-2000 period was 2.9% compared to 1.5% for urban areas (Govereh et al. 2006).

6. The apparent decline in rural poverty may reflect some element of agricultural productivity growth not entirely reflected in available agricultural statistics. There is a lack of solid information on total factor productivity, but trends in partial land productivity and total production per household based on available data do not reveal clear upward growth.

[5] The reader is cautioned to keep in mind the caveats about the comparability of the 2003 poverty estimates with poverty estimates for earlier years as discussed in section 5.

But a disaggregated look at trends in crop production growth over the past decade show very impressive growth for a number of food and cash crops: cassava, sweet potato, cotton, and groundnuts. Moreover, other evidence indicates that horticultural crops and animal product sales have grown rapidly. If there were major growth in these crops, they would not be detected in official agricultural production statistics in Zambia (neither the CF nor PHS collect information on fresh fruits and vegetables or animal products). Other largely unmeasured sources of productivity growth appear to have occurred in the marketing system. Milling and retailing marketing margins for maize meal, the staple food, have declined substantially over the past few years, enabling trend consumer prices to fall by 25% in real terms since the early 1990s without any decline in trend wholesale prices.

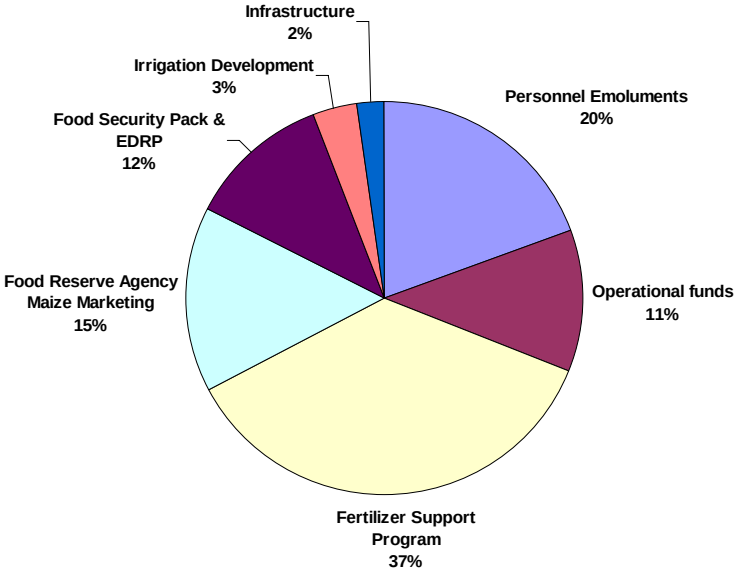
7. Still, notwithstanding the positive trends over the past decade, over 70% of the rural population remains mired in poverty. It is possible that current poverty rates are higher than in the 1970s and 1980s, although poverty data is not available for this period.

8. There are also important misperceptions about the agricultural policy environment. Almost 15 years since liberalization programs were initiated in Zambia, food marketing policies retain fundamental similarities to the controlled marketing systems of its earlier history. The GRZ remains an important player in the maize market, both through the direct procurement and sale operations of the FRA and through its frequent use of trade policy instruments. Though the quantities traded by the FRA are smaller than what NAMBOARD traded during the controlled market era of the 1980s, the FRA still exerts a dominant presence in the maize marketing system, handling about 20% of marketed volumes. Private trade was indeed legalized, but was seldom supported. Public investment to improve the functioning of markets has remained low, partly because public budgets to agriculture continued to be disproportionately channeled to marketing board activities. Instead of purchasing the entire marketed surplus, as was the goal during the former control period, the FRA now attempts to influence market prices and supplies through its operations in the market. The government has recently announced that, for the 2006 season, the FRA intends to purchase 236,000 metric tons of maize at a price of 38,000 kwacha/50 kgs (this converts roughly to US$225 per ton) at a projected cost of US$52 million.

9. Fertilizer subsidies have also been a continuous feature since the beginning of the agricultural reform process (Pletcher 2000). Over the past several years, about 40% of the MACO budget has been devoted to its Fertilizer Support Program (Figure 11), which has distributed 35,000 to 50,000 tons of fertilizer to small farmers at 50% of the full cost. Smallholders purchase another 50,000 to 60,000 tons of fertilizer commercially from private dealers. This is still considerably less than the 150,000 or so tons distributed by the government during the 1980s, although private sector fertilizer distribution continues to rise steadily. In any event, an empirical assessment of agricultural and poverty trends in Zambia since the early 1990s reflects not the impacts of unfettered market forces, but rather the mixed policy environment of legalized private trade within the context of continued strong government operations in food and input markets.

10. Meanwhile, the genetic advances that were a major factor in maize productivity growth in earlier decades have waned as funding by both donors and government has declined. The GRZ has devoted roughly 6% of its annual budget to the agricultural sector over the past several years, and of this, less than 4% has been allocated to agricultural research. Of this 4%, 75% is for salaries and wages (Figure 11). Effectively, public sector agricultural research has come to a standstill in Zambia.

Figure 11. Public Sector Budget Allocation to the Agricultural Sector, Zambia, 2005



Source: GRZ, Ministry of Finance, Lusaka

Despite this pattern of public resource allocation, many aspects of smallholder agriculture are growing impressively. Cassava, sweet potato, and groundnut productivity have all benefited from earlier investments in R&D in the 1980s, resulting in improved varieties released in the early-1990s. Cassava has also substituted for maize area in remote areas after the withdrawal of pan-territorial maize pricing policies. Cotton has expanded rapidly, and is now grown by about 20% of smallholder farmers. Horticultural crops and animal products (while unmeasured in the PHS surveys) also appear to be growing rapidly. The value of animal products and horticultural sales are, individually, almost as high as that for maize (Zulu, Jayne, and Beaver 2006). Major production growth is being achieved in other unregulated crops as well, notably groundnut, soybeans, and tobacco. Ironically, the crop benefiting almost exclusively from public fertilizer subsidy programs–maize–has registered less than 1% annual production growth over the past decade.

Of course, there is a great deal more to be done. Fortunately in Zambia's case, a comprehensive review of programs and strategies to expand agricultural productivity has been undertaken, and is laid out in two plans: the Agricultural Market Development Plan (AMDP) and the Agricultural Inputs Development Plan (AIM). Both of these plans take a holistic approach to promoting equitable rural productivity and income growth. While a complete description of the AMDP and AIM are beyond the scope of this study, the remainder of this paper highlights a few of the important challenges and programmatic responses outlined in these two strategies.

6.1. Where from Here? Key Challenges and Strategic Responses

The question remains–what about the rural poor? Notwithstanding the apparent positive developments in rural poverty reduction in the past 15 years, still over 70% of the rural population remains in poverty.

Faster progress in bringing down both rural and urban poverty rates will depend on faster agricultural productivity growth. The government has a crucially important role to play in this process. A great deal of research evidence from southern Africa, as well as around the world, indicates that the greatest contribution that public sector resources can make to sustained agricultural growth and poverty reduction is from sustained investment in crop science, effective extension programs, physical infrastructure, and a stable and supportive policy environment (Mellor 1976; Byerlee and Eicher 1997; Alston et al. 2000; Evenson 2001).

Achieving the twin goals of agricultural productivity growth and poverty reduction will require some reallocations of the government budget. Over the past several years, about 40% of the MACO budget has been devoted to its Fertilizer Support Program, which has distributed 35,000 to 50,000 tons of fertilizer to small farmers at 50% of the full cost. Meanwhile, the genetic advances that were a major factor in maize productivity growth in earlier decades have waned as funding by both donors and government has declined. The GRZ has devoted roughly 6% of its annual budget to the agricultural sector over the past several years, and of this, less than 4% has been allocated to agricultural research and extension. Of this 4%, 75% is for salaries and wages. Effectively, public sector agricultural research and extension has come to a standstill in Zambia. Rural poverty alleviation will require renewed commitment to public investments in these key areas.

Only 20% of small farmers use fertilizer in Zambia (28% for small farmers growing maize). Growth in fertilizer use will be a precondition to achieve appreciable income growth and sustained poverty reduction. However, fertilizer promotion must be considered holistically. It is not simply a technical or logistical problem of delivering large amounts of fertilizer to small farmers and expecting a sustainable solution. Achieving sustained growth in fertilizer consumption involves building farmers' effective demand for fertilizer, by making its use profitable, and by developing output markets and regional trade patterns that can absorb the increased production that higher levels of fertilizer will bring. This involves the same kinds of government commitment as identified above: (1) well-functioning crop science and extension programs to improve crop productivity, particular for the staple food crops, for small farmers; (2) extension programs that stop assuming all farmers are the same, and which focus on taking advantage of the higher marginal rates of return at the lower ends of the production function; and (3) investing in rural infrastructure and rehabilitation of the regional rail and port facilities, to drive down the costs of input and output marketing. High transport costs are a major constraint on the profitability of (and hence demand for) commercial fertilizer by small farmers.

Building sustainable growth in fertilizer consumption also requires a supportive policy environment that attracts local and foreign direct investment in building fertilizer and crop output markets. The case of Kenya shows how a stable government policy environment has generated an impressive private sector response that has enabled more than 65% of smallholder farmers nationwide to use fertilizer (Ariga, Jayne, and Nyoro 2006). In other countries, the implementation of large subsidy programs, while designed to make fertilizer

more accessible to small farmers, has inhibited the type of private investment response seen in Kenya, due to the risks that this introduces for private firms. In countries where government involvement in food and input markets is seen as part of a transitional phase towards full market reform, predictable and transparent rules governing state involvement in the markets would reduce market risks and enable greater coordination between private and public decisions in these markets. The phenomenon of subsidized government intervention in the market, or the threat of it, leading to private sector inaction, is one of the greatest problems plaguing the food and input marketing systems in the region. While targeted assistance to vulnerable households will remain an important component of a comprehensive food security and poverty reduction strategy in almost all African countries, such programs must be carefully designed so as not to interfere with the long-term development of agricultural markets, which will be critical for sustained poverty reduction. The strategic interactions between government and private sector and their potential effects on food security underscore the need for greater transparency and consultation between private and public market actors in both input and output markets to achieve reasonable levels of food price stability, productivity growth, and sustained poverty reduction.

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