

Distortions to Agricultural Incentives in Zambia

Peter Robinson, Jones Govereh and Daniel Ndlela

Zimconsult, Harare
robinson.peter.b@gmail.com

Research Associate, Michigan State University, Lusaka
goverehj@msu.edu

Zimconsult, Harare
dndlela@mweb.co.zw

Agricultural Distortions Working Paper 40, December 2007

This is a product of a research project on Distortions to Agricultural Incentives, under the leadership of Kym Anderson of the World Bank's Development Research Group. The authors are grateful for helpful comments from workshop participants including Marianne Kurzweil and Ernesto Valenzuela, and for funding from World Bank Trust Funds provided by the governments of Ireland, Japan, the Netherlands (BNPP) and the United Kingdom (DfID).

This Working Paper series is designed to promptly disseminate the findings of work in progress for comment before they are finalized. The views expressed are the authors' alone and not necessarily those of the World Bank and its Executive Directors, nor the countries they represent, nor of the countries providing the trust funds for this research project.

Distortions to Agricultural Incentives in Zambia

Peter Robinson, Jones Govereh and Daniel Ndlela

Zambia is a landlocked country in central Africa with a population of 12 million people. The country has abundant land resources (74 million hectares, 47 percent of which is suitable for agriculture), favorable soils, relatively good rainfall (averaging over 1,000 mm/year) and low population density (6.4 ha per person) (World Bank 2006, FAO 2006). A study of regional integration potential in southern Africa concluded that Zambia has the natural resources to be a major food and agricultural producer for the region (African Development Bank 1993), but this potential has never been realized. One important reason for this has been the dominance of copper in the economy. Despite providing a livelihood to the majority of the population, as an export sector agriculture has always been subsidiary to mining.

During the colonial period, agriculture was developed primarily to serve the mining sector. Development was limited to the areas close to the line of rail running through the copper belt and the capital city, Lusaka, to Livingstone (near the Victoria Falls on the Zambezi River). After independence, a more widespread form of development was intended, but squandering of the copper wealth in the first decade of independence (1964-1974), when copper prices were high, was followed by a long period of economic turmoil and decline after the collapse of the copper price in 1975 (Appendix Figure 1). A change of government at the end of 1991 resulted in the interventionist policies of the past being replaced by an orientation towards an open, more liberalized economy.

Changes in agricultural policies started earlier, and agricultural growth has been relatively high since the mid-1980s. By early in the twenty-first century, the share of agriculture in GDP had risen to 20 percent. From the viewpoint of diversifying away from dependence on copper, a more significant change was the growth of agricultural exports, from \$10 million in 1987 to \$222 million in 2004.¹ However, despite recent progress, agriculture is still far from

¹ Throughout the report, '\$' refers to US\$ and uncited values and growth rates are from World Bank (2006).

attaining its full potential as a contributor to the economy and to the well-being of the majority of the population whose livelihood depends directly on it.

In the first decade after independence, GDP grew at an average of 5.6 percent per year. From 1975, when the price of copper collapsed, through to 1999, average GDP growth was only 0.6 percent. Since 2000, this has risen to 4.5 percent, and the incidence of extreme poverty has declined slightly to 53 percent (Government of Zambia data). The IMF estimates GDP growth of close to 6 percent in 2006.

Agricultural GDP growth rates have followed a different pattern to GDP as a whole. From 1971 to 1984, the average annual growth of agricultural GDP was 2 percent. Thereafter, there were two five-year periods of much stronger growth (1985-89 at 5.3 percent and 1995-99 at 7.7 percent). The period 1990-1994 produced an average growth of only 2.5 percent, but this was due to the devastating drought in 1992 (when agricultural GDP declined by one-third) and a severe drought in 1994 (when agricultural GDP declined by one-fifth).

Despite these and other less significant drought episodes, agriculture's contribution to GDP grew between 1985 and 2000 in real terms (see Appendix Figure 2) and as a share of total GDP (from 15 to 20 percent). That increased agricultural output has come principally from crops other than maize (c.f. Appendix Figures 2 and 3). This is further illustrated by the fact that the share of maize in the value of production of key crops has fallen from nearly 80 percent in the early 1980s to barely 50 percent by 2005 (even though the share of maize in household consumption has remained much more stable – c.f. Appendix Figures 4 and 5).²

The growth of the agricultural sector is due not only to the changes in agricultural incentives that are presented in this chapter. The calculations show that agricultural incentives have been depressed over the entire study period (1955-2005). Negative assistance to agriculture was particularly evident in the 1970s and 1980s, but even after the opening up of the economy in the 1990s, agricultural producers have generally continued to receive prices that are well below border equivalents. There are three main reasons for this: the direct influence of agricultural policies, the monopsonistic structure of agricultural markets, and the indirect but significant influence of macro-economic mismanagement, giving rise to the currency being almost always overvalued throughout the five decades covered by the study.

² Detailed analysis of changes in cropping mix amongst small-scale farmers is available in Zulu et al. (2000).

As is discussed in detail later, currency misalignment is significant from the mid-1960s to the mid-1990s, accounting for half or more of the magnitude of the distortions in the 1970s and 1980s. Even after the parallel market and official rates converged in the late 1990s (thereby eliminating currency overvaluation from the calculated distortion measures using the project's chosen methodology), there is still reason to suppose that the Kwacha remained overvalued, depressing agricultural incentives more than has been estimated using the available data.

While the calculations indicate that farmers were most heavily taxed in the 1970s and 1980s, it is important to note that the common perception amongst the farming community, especially smallholder farmers, was that these were the glory decades for farming. Land was even more abundant than it is now, and trading costs were low because the state agency, NAMBOARD, maintained a wide network of depots from which it delivered fertilizer, seed and other inputs and purchased the crop at the farm gate, not at the depot. NAMBOARD, with its deficits met by taxpayers, absorbed the transport costs and was not seeking to make a margin on transactions.

The terms of trade for farmers therefore were perceived to be relatively favorable in the 1970s and 1980s, whereas in the 1990s and beyond farmers are of the view that they have to deal with 'unscrupulous' businessmen, many of whom are not involved in the agricultural sector on a long-term basis. Contrary to what might have been predicted, private marketing costs may have increased after liberalization; and certainly a much higher level of risk has been passed on to farmers.

Over the five decades covered by the study, changes in agricultural and food policies have at no stage brought unambiguous improvements in the lot of the small-scale farmer. The extent to which agriculture and food policies have been conducive to the achievement of national socio-economic goals has been the subject of a number of in-depth studies.³ The broad-brush picture is that the failure to achieve anything like the potential of Zambia's agricultural sector, coupled with largely perverse effects of subsidies and other interventions in food markets, have imposed immense costs on the economy and account to a significant extent for the widespread persistence of poverty.

³ See papers produced by the Food Security Research Project (FSRP), a collaboration between the Agricultural Consultative Forum, the Ministry of Agriculture and Cooperatives, Michigan State University and USAID in Lusaka. FSRP papers are downloadable from <http://www.aec.msu.edu/agecon/fs2/zambia/index.htm>

This is not to say that some policies and actions did not aim to promote agriculture and to alleviate poverty. However, the pattern of public expenditure reflected misplaced priorities, focusing on subsidies requiring large recurrent expenditures and delivering restricted benefits instead of productive investments with more widespread developmental consequences. Channeling resources into long-term investments in infrastructure, extension and market development would have had a larger payoff. The recurrent expenditures also invariably exacerbated differentials, further entrenching dualism. Prior to independence almost all benefits went to European farmers, while after 1964 those subsidies and policies which did benefit producers also disproportionately favored farmers located close to the line of rail, who have better access to inputs, transport and marketing services.⁴

In recent years rapid decreases in poverty have been measured in some rural areas due to rapid growth in output, but this has been very unevenly distributed.⁵ The liberalization of the maize market and the emergence of hammermills able to compete favorably with industrial mills on price and nutritional quality have benefitted those rural households that are net food purchasers plus urban households. However, the removal in the early 1990s of the maize meal subsidies (which had proved unsustainable in the late 1980s) coincided with the loss of employment associated with public sector reform and closures of manufacturing firms that were unable to compete with rapidly liberalized imports. Urban poverty thus rose rapidly in the early 1990s (McCulloch, Baulch and Cherel-Robson 2001).

Agricultural policy in the colonial period

Commercial agriculture was started in the early years of the twentieth century to provide food to the copper mines and the capital city. European settler farmers were settled along the rail line and provided with various forms of assistance to encourage production of maize and other crops to the copper belt and other urban areas. Small-scale black farmers were deliberately

⁴ This conclusion applies even to the effects of pan-territorial prices. See later discussion under 'Policies behind the distortions' and Jansen and Rukovo (1992).

⁵ See McCulloch Baulch and Cherel-Robson (2001), Balat and Porto (2005a) and Siegel and Alwang (2005).

disadvantaged, not least by being given significantly lower prices for their crops. The dualistic agricultural structure, which constituted a basic distortion in the agricultural sector that persists to this day, was the result of deliberate policies initiated a century ago.

The settler farmer production system was well established by the 1920s. The international depression of the 1930s sharply reduced demand for copper. In the face of falling demand for agricultural goods, European and African farmers suffered extreme hardship during that period (McPherson 2004). In 1936, the government promulgated the Maize Control Ordinance, which resulted in the formation of the Maize Control Board (MCB). Its mandate was to stimulate production of maize while protecting European farmers from competition from African farmers. These objectives were achieved by raising the producer price of maize above world market levels for sales to the 'internal pool', three quarters of which was reserved for European farmers. Additional maize was directed to the 'external pool' which involved sales at lower export parity prices (Jansen 1991). Urban consumer prices were set at much lower levels, with the difference being made up by substantial government subsidies to the MCB which mainly served urban consumers.

World War II raised the demand for copper and hence for maize to such an extent that imports became necessary. Producer prices for maize for both African and European farmers were kept below import parity levels. While African farmers consistently received lower prices than European farmers, small-scale African farmers in remote areas had to contend with even lower net returns than their counterparts who were based within the MCB's restricted area of operations (eight districts along the rail line).

After World War II, maize production began to exceed internal demand and exports of maize were resumed. This trend continued during the Federal period (1953-1963), with the Federal Grain Marketing Board keeping producer prices above export parity levels. A discriminatory element was still evident, however. "Not all producers were subsidized, nor were they subsidized equally. The African producer price was still considerably less than the European producer price because the government diverted part of the proceeds from sales of domestic maize to an African farming improvement fund." (Jansen 1991, p. 278).

Measurement of agricultural distortions, 1955 to 2004

The main focus of the present study (Anderson et al. 2008) is to measure the extent to which government-imposed distortionary policies create a gap between domestic prices and what they would be under free markets. The objective is to have simple measures of policy-induced distortions to agricultural prices which are uniform and comparable across time periods and between countries. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology not only estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but it also generates estimates of distortions in non-agricultural sectors for comparative evaluation.

More specifically, this study computes a Nominal Rate of Assistance (NRA) for farmers including an adjustment for direct interventions on inputs. It also generates an NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a Relative Rate of Assistance (RRA).

The basis of the approach is a comparison between the prices actually received by producers (or paid by consumers) and the prices they would have prevailed had there been no policy distortions. This reflects the small country assumption that the relevant opportunity costs are reflected in the international border prices for the commodities adjusted for non-policy price wedges (transport costs, marketing margins, quality differences, etc). Where actual import and export prices are available, these are to be used in preference to the alternative of constructing a synthetic cif/fob prices from international reference prices, adjusted for transport and related costs. Details of the data sources and assumptions made to generate the NRAs are laid out in the Appendix.

In interpreting the NRA results presented below, the reader needs to bear in mind five points which arise from the way the domestic to border calculations have been made (as well as the limitations due to the poor quality of some of the data).

First, the wholesale level has been chosen as the point in the value chain where the ratios are calculated. Prior to economic liberalization, the wholesale level was constituted by the state marketing boards, notably (for the crops covered by this study) NAMBOARD. The calculated NRA measures thus apply to farmers close to the depots and would be lower (which in almost all years means more negative) for farmers living further away from the depots. In order to improve

the position of small farmers in remote areas, the network of marketing board depots was extended after independence into the rural areas beyond the rail line and pan-territorial pricing introduced.

Second, for the period up to 1994, the wholesale prices used in the calculations are the minimum guaranteed prices to farmers. Those farmers able to market their products locally, or engage in informal cross-border trade with neighboring countries (notably the DRC and Malawi), would have received higher prices and hence have been subject to higher (less negative) NRAs than have been calculated. Even in the case of tobacco, which was sold at auction, the prices available for and used in this study are the floor prices which government set to protect farmers. In years where the floor price applied, this should be reflected in positive rates of assistance.

Third, farmers who received inputs from NAMBOARD were required to sell their crops through the official channels, with a 'stop order' system ensuring that the loans due on the inputs were repaid. While this often may have involved low selling prices, the inputs themselves were typically subsidized, and the farmers nonetheless may have tried to enhance their incomes by selling at least part of their crops at higher prices.

Fourth, farmers able to store their crops until later in the season usually did much better than farmers who were forced to sell immediately after harvest at the minimum guaranteed prices. Studies have shown that even small farmers are well aware of the changing prices over the season and try to delay sales, but typically have to sell a portion of their crops immediately after the harvest at the lowest prices to raise some cash (Coulter et al. 1996, Mundia 1999). Even where monthly producer price data are available, there is no corresponding volume data, and so no basis to calculate a proper weighted average price for the year. Data from a 2003 survey on the month when the household had the largest sales, however, suggest that most is sold in the early part of the marketing season. Averaging the prices alone is obviously unsatisfactory when there is a large range of selling prices over a particular cropping season (Appendix Figure 6).⁶

⁶ There are reasons to suspect that the price variations in Kabwe were particularly large in the 1998/99 season, one of the main ones being that the FRA imports were largely channelled to the industrial millers and did not reach the local markets. Much of the locally produced grain was probably sold early in the season due to farmers' cash needs. So with restricted supply and increased demand (to take to hammermills), prices rose dramatically in the later months.

And fifth, the prices used in the calculations for maize, sorghum, wheat and sunflower after 1994 relate to trades conducted via the Agricultural Commodity Exchange (ACE). Where possible, these are prices from actual sales, but in some months only bid or only offer price data are available. Here too there is the problem of annual average prices having to be calculated without weighting by sales volumes. For these crops, any apparent improvement in NRAs is partly due to the change from a low minimum price reference point to actual market prices received by farmers. ACE prices are Lusaka wholesale prices, which are the highest a farmer can get. All prices outside of Lusaka and the main Copperbelt towns will be lower.

The patterns of distortions, 1955 to 2005

The annual NRA estimates for import-competing products and exportables are illustrated in Figure 1, while five-year averages for individual products are shown in Table 1. Year-by-year data are given in Appendix Table 7. On a five-year average basis, the overall NRA results are very close to (within 2 to 4 percentage points of) those calculated by Jansen (1991), the Zambia case study in the earlier Krueger, Schiff and Valdes (1991) project.⁷

Positive assistance for a decade or so after the Second World War was followed by a sustained half-century period of negative assistance to farmers. Policies encouraging import substitution of rice and wheat did result in positive NRAs for these crops for short periods (1979-84 and 1995-96 for rice, 1981-83, 1994-96 and 2000-04 for wheat and a few other separate years for both commodities). Otherwise, occasional positive rates for maize, sorghum, soybeans, cotton and tobacco are due to coincidental upward movements in domestic prices, currency devaluation and/or reductions in the reference border prices (and vice-versa for negative spikes). These coincidental factors are absorbed in the five-year averages presented in Table 1, where the only positive rates are for rice (1980-84 and 1995-99) and wheat (1980-84, 1995-1999 and 2000-04).

⁷ Jansen's full set of Nominal Rates of Protection estimates for 1966-84 are given in Table 7-7 in Jansen (1991) and are extended for maize, cotton and tobacco to 1990 in Table 7 of Jansen and Rukovo (1992).

The patterns of assistance to or taxation of agriculture are the result of the interplay of a number of different influences. The direct influences arise from the agricultural sector policies, which are discussed in detail in the next two sections. In explaining the changes in NRAs, it is not just the articulated policies that matter, but also the way they are implemented as reflected in the institutional structures, price regulations, and financial flows to the agricultural sector (subsidies, public sector investments, etc.). Particularly in the period since liberalization, the impact of these policies is tempered by the nature and structure of agricultural markets. These structural issues are important in explaining the pattern of assistance to *Zambian farmers*.

Another key part of the explanation for the NRA pattern lies in the indirect effects of the macroeconomic and trade policies pursued. Detailed aspects of these are discussed below, but it is relevant at the outset to stress that the main macroeconomic influence is via exchange rate overvaluation. Using the crude measure of the parallel market premium, the *Zambian Kwacha* appears overvalued from the early 1960s to the end of the 1990s (Appendix Figure 7). In years where the parallel rate is way out of line with the official rate (such as 1977 or 1988), the world parity price in *Kwacha* (which appears in the denominator of the NRA formula) is much higher than the value calculated with the official exchange rate. The NRA values for years such as 1977 and 1988 is thus suddenly much more negative. This results in a mirror image downward swing in the NRA curves, reflecting the upward swing in the exchange rate premium. Except for import-competing products in the 1980-84 period, the growing exchange rate overvaluation over the 1970s and 1980s amplifies what would be (at the official exchange rate) far more modest levels of negative assistance. The progressive reduction in overvaluation since the 1980s brings the calculated NRAs increasingly closer to what they would be had official exchange rates been used in the calculation.

Over the whole period of the present study, the overall patterns which emerge are of increasingly negative assistance to agriculture during the periods of dirigiste control over the economy, which were also years of significant overvaluation of the exchange rate. Economic liberalization is the hallmark of the Third Republic, which started in 1992. During the 1990s, macro-economic stability was progressively restored and many of the former controls over the economy, including those pertaining to agriculture, were unwound. As is clear from Figure 1, these measures are less negative than in the 1980s, but they did not lead to positive NRAs for

agriculture, in part because government in fact adopted a half-hearted approach to liberalizing agricultural markets.

Fertilizer and maize markets provide two key examples where the government did not completely move out, and where full liberalization is yet to occur. However, consumers did benefit from increased competition in the more liberalized market environment, this resulting in lower processing and marketing margins. Ministry of Agriculture data show that real maize meal prices had a downward trend, while real grain prices remained virtually stable between 1990 and 2005.

NRAs by commodity

Maize constitutes an average of two thirds of the total value of the commodities being studied and hence the maize NRA to a large degree determines the overall average NRA for agriculture as a whole. The NRA for maize suggests producer prices have been between one-fifth and two-thirds below what they would be in an open-economy environment, peaking at -68 percent in 1985-89. The other traded **cereal crops** (sorghum, wheat and rice) generally have very large negative five-year average NRAs, but in some periods they reverse to low negative or even positive values. In the most recent ten years, the government has had a 15 percent import duty on wheat, to compensate those farmers who have invested in wheat production but face high costs of fuel and electricity compared with competitor wheat producers.

Amongst the traded oilseeds, the NRA for **groundnuts** is severely and consistently negative, with soybeans also always negative but less severely so in the last decade. The NRAs for the export cash crops, **cotton** and **tobacco**, tend also to be large and negative up to 1990, the worst period being 1985-1989. Even in the most recent period, 2000-2004, tobacco NRAs are still very negative (Burley -58 percent, Virginia -29 percent), as is the NRA for cotton (-51 percent).

Assistance patterns for tradable products and for agriculture as a whole

The patterns for import-competing products and exportables both follow the overall pattern of exchange rate misalignment. Thus the largest negative NRA values for both were in 1985-1989,

followed by 1975-1979, with a continuous improvement for import-competing products since 1990. For any particular commodity, a change from import-competing to exportable would tend to make its NRA less negative because the cif import price is almost always higher than the fob export price. *Ceteris paribus*, the average NRA for import-competing products might be expected to be more negative than the average NRA for exportables, but this is not the case for Zambia. The reason is that in the weighted average across all import-competing products there is a preponderance of import-competing foodstuffs which (via relatively higher producer prices) are less taxed than exportable cash crops. By 2000-2004, the NRA for import-competing products improves to -10 percent while the exportables' NRA becomes even more negative than in the 1995-99 period (-53 percent as compared with -46 percent).

The third-to-last row of Table 1 gives the weighted average rates of assistance for all of the commodities covered in this study. This is the same as the first row in Table 2. When the guesstimated NRAs for non-covered products (which account for between one-sixth and one-quarter of the gross value of farm production) and for non-product-specific agricultural subsidies are included, the sector's negative NRA is considerably reduced. The tradables part of agriculture is more discriminated than the nontradables part though. By contrast, the tradables part of non-agriculture has a positive weighted average NRA, with trade taxes and distortions to the exchange rate assisting import-competing producers more than they are hurting exporters (mainly the mining sector). Thus the relative rate of assistance (RRA) is more negative than the NRA for agricultural tradables (Figure 2 and Table 2).⁸

The growth in agriculture's contribution to GDP and exports took off with a lag following the changing levels of disincentives to agriculture, that is, not until the early 1990s (Appendix Figure 2). The most significant development was the growth of floriculture and horticulture, whose exports contributed significantly to the impressive rise in overall agricultural exports, from under US\$ 20 million in the late 1980s to over US\$ 150 million per annum in the new millennium. That represents an annual growth rate of more than 30 percent. But note that

⁸ Given the many assumptions behind the RRA calculations, weight needs to be given to the direction of change from the NRA numbers rather than the absolute magnitudes. In particular, the data on subsidies are not complete or consistent over the whole period. After 1990, subsidies throughout the economy were sharply reduced but in agriculture there was a continuation of some subsidies, particularly in 1992 and 1993, to counter the effects of the extreme drought. There was also significant support to the agricultural sector via the large Agriculture Sector Investment Project (ASIP) over the period 1994 to 2001. In the new millennium, subsidies to agriculture have been increased again, notably on fertilizers and other inputs.

floriculture and horticulture – whose NRAs have not been estimated – enjoyed special assistance in terms of duty drawback arrangements on imported equipment and a zero rating VAT status (claiming VAT on inputs without being charged VAT on output sold in the domestic market). This rapid export growth occurred alongside negative NRAs for the export crops covered in this study. Had these new industries been included, the estimated NRA for agriculture as a whole would have been somewhat less negative.

Had the exchange rate not been distorted, the agricultural NRAs and RRA would have been only slightly less negative (bottom rows of Table 2), suggesting that that is not the major reason for the anti-agricultural and anti-trade bias.

Consumer tax equivalent patterns

In this study, the NRAs and CTEs are calculated at the wholesale level. Consequently, it is only when farmers or consumers receive direct product price subsidies that the calculated primary producer NRA will differ from the CTE. In the case of Zambia, there are no such subsidies (only farm input subsidies) and thus the primary product CTE is always numerically identical to the corresponding NRA. The negative assistance to the primary producer is mirrored by an implicit subsidy of the same magnitude for the consumer. In a country where the power base of the ruling party is drawn from the urban areas, it is not surprising that agricultural pricing policies should have produced this result.

The only processed product for which the data exists to do a separate CTE calculation at the retail level is maize meal. Roller meal has been chosen as the benchmark product and the results are presented in Figure 3. The basic data used for the CTE maize calculation are the wholesale producer price and the cif import price of maize. For the roller meal CTE calculation, the numerator is the maize price plus processing and wholesale margins, while the denominator is the cif price of maize meal. The subsidy is calculated as the theoretical price of roller meal (the wholesale price of maize adjusted for the extraction rate, processing, wholesale and retail margins) as compared with the actual retail price as given by Central Statistics Office data for roller meal. The wholesale and retail margins are assumed fixed at 12 percent and 8 percent, respectively, while the processing margin is assumed to be 24 percent before liberalization and

to adjust from 1993 so that the retail price reflects the fact that consumer subsidies were no longer provided by government.

Given these assumptions, Figure 3 suggests that, in the 1970s and 1980s, the CTE for maize meal was even more favorable to consumers than the CTE for maize grain. From 1991, however, the results suggest that the implicit consumer subsidy to maize meal has been less than that available for maize grain, with the graph moving into the positive range (an implicit consumer tax) in 1994, 1998 and 2003. The consumer subsidy graph shows how hazardous calculations of this sort are. This estimation approach produces plausible results in most years (cumulated margins dropping from 50 percent to 33 percent as a result of liberalization) but also some aberrant years (1989 and 1992). There are also implausible processing margins (in 1996, 1999 and 2001). This reflects the fact that these calculations are made for the industrial millers, whereas many consumers switched to buying maize grain and having it milled by small hammer-mills at a more modest cost (see below).

Policies behind the distortions: the period to 1991

At independence in 1964, there were high hopes for Zambia. Per capita incomes then averaged three times those of South Korea, copper prices were high, and the new government was committed to using copper wealth to raise education and living standards and diversify the economy. By the end of the Second Republic in 1991, the economy was in crisis with zero growth in GDP, savings and investment at low levels (8.4 percent and 11 percent of GDP, respectively), shortages of basic goods, inflation in triple digits, the budget deficit (excluding grants) at 16.2 percent of GDP, and debt service the equivalent of 66 percent of export revenues (Robinson 2004). Poverty was widespread with 58 percent of the population deemed to be living in extreme poverty.

Background

After independence in 1964, it was expected that policies would be put in place to significantly enhance the position of black farmers. President Kaunda responded to calls to boost small-scale agriculture by announcing a “fair price” policy for agriculture. But as McPherson (2004, p. 306) put it, “Though originally intended to raise the prices received by African producers, the initiative quickly became a ‘low price’ policy designed to reduce the cost of staple food for urban workers.” This pro-urban bias, reflecting the base of political support for the ruling party, set the tone for pricing in the Kaunda era which lasted until the end of 1991. However, to keep farmers from becoming politically agitated, low producer prices were offset somewhat by the provision by government of subsidized farm inputs.

In the first year of independence, the world price of copper rose by 50 percent and copper prices remained high throughout the so-called First Republic (1964-1973). Despite the problems associated with the imposition of international sanctions on the post-1965 illegal regime in Rhodesia, economic conditions in independent Zambia were buoyant initially. Output of agricultural commodities increased, though rather modestly. The five-year moving average of total cereal production increased from 740,000 tonnes in 1964 to 850,000 tonnes in 1969 and over 1,000,000 tonnes by 1974 (FAO data). This is equivalent to only 3.1 percent pa growth, while the average population growth rate over the decade was 3.4 percent pa.

One of the main strategies adopted by the government to pursue its agenda of diversifying away from copper and creating greater social equity was to have greater direct control over the economy. After 1968, a vigorous program of nationalization was launched through which the government acquired a majority stake in many large private enterprises and also created a number of new parastatals. This shifted the locus of economic decision-making decisively to the public sector, while at the same time the government became progressively more interventionist in its approach to economic policy-making. In the agricultural sector, the setting of producer and consumer prices for agricultural commodities became the norm, while trade policy came to be characterized by import licensing, foreign exchange allocation and quantitative import controls.

The start of the Second Republic in 1973 was marked by the formal introduction of a one-party state. In the aftermath of the 1973 global oil crisis, there was a collapse of commodity markets. The copper price fell sharply (by 40 percent in 1975), while at the same time the price of fuel and other key imports rose sharply. Copper prices in real terms have never returned to the

high levels of the first decade of Zambia's independence (although they are coming close in the present boom period). In the mid-1970s the government assumed that low copper prices would be a temporary phenomenon and did not therefore seek to fundamentally change the patterns of consumption and production in the economy. In the short-term, however, levels of imports had to be sharply reduced, GDP growth turned negative, government revenues fell sharply, inflation and domestic debt rose. More significantly, Zambia began to accumulate significant levels of external debt which henceforth became a major restraining factor in macro-economic policy-making.

The introduction of the one-party state in 1973 heralded an intensification of the dirigiste tendencies in economic management which had been evident in the early years of independence. As macro-economic and balance of payments problems grew, the government increasingly turned to donors for assistance. The government's orientation ran counter to donor policy prescriptions, particularly those of the World Bank and the IMF. This resulted in a succession of half-hearted reform attempts in the 1980s, interspersed by populist measures intended to head off growing political discontent.

The clearest example of such populism is provided by the heavy commitment to consumer subsidies of maize meal. The budgetary requirements for these subsidies grew to proportions which by the mid-1980s destabilized the national budget. When the price of breakfast meal was doubled in December 1986, there were riots on the Copperbelt and the increases were hastily withdrawn. In May 1987, President Kaunda announced a break with the Bretton Woods Institutions and the introduction of a home-grown recovery program, but this did not last. By 1989, the country had negotiated a Policy Framework Paper with the World Bank and the IMF. Devaluation, removal of price controls and institutional reform followed.

In the food sector, this involved a tripling of the maize price, offset by the introduction of a coupon system to provide a targeted subsidy, and the scrapping of the parastatal marketing organization (NAMBOARD). This led in June 1990, to fresh maize meal riots, in which 19 people died, and a coup attempt. An opposition party emerged soon after, and it was legalized in time to contest the October 1991 elections. The maize meal subsidy was increased again before the election, but this did not prevent the defeat of President Kaunda's party.

Agricultural and food policies

At independence in 1964, the new government's agriculture and food policies were shaped by concerns about equity and food self-sufficiency. Equity required increasing the involvement of small-scale farmers in the market economy, while the food concerns revolved around feeding the rapidly growing urban population. These objectives had immediate in-built tensions for food prices, which were always biased towards the urban workers who constituted the bedrock of the ruling party's power base. The agricultural measures the government adopted to offset low producer prices were to broaden the range of agricultural services (credit, fertilizer, tractor ploughing, marketing provided at subsidized rates) and to extend these throughout the country, most visibly through expanding the network of the Agricultural Rural Marketing Board (ARMB) depots. This did have some positive equity impacts, increasing the participation of households in remote areas in producing for the market.

Uniform pan-territorial pricing, introduced in the 1974-75 crop season, gave further assistance to farmers in surplus-producing provinces not near the rail line who had hitherto had to meet the high cost of transport to urban markets. It penalized, however, farmers in deficit areas who received lower prices than they would have done. Under the old system, they sold their crops locally at prices above the national average, but they now had to sell at the pan-territorial price. Uniform pricing was billed as being synonymous with equity, but analysis of the consequences indicates that the opposite had been the case. "Uniform pricing depressed the price received by the poorest segment of the population, i.e., farmers in the distant (non-border) deficit areas and has inflated the price received by better-off (and more politically vocal) farmers in surplus regions, particularly the Eastern province" (Jansen and Rukovo 1992). Pan-territorial and pan-seasonal pricing encouraged the production of maize in areas not suited to the crop and also greatly increased the transport costs that had to be covered by subsidies to NAMBOARD, which had taken over the ARMB marketing depot network.⁹ Combined with consumer subsidies on maize meal, fertilizer subsidies and smaller subsidies for other crops, the fiscal requirements of agricultural subsidies grew to be a significant drain on national resources, reaching a peak of 6.7 percent of GDP in 1980 (McPherson 2004).

⁹ Jansen (1991) cites a linear programming transport model exercise as demonstrating that transport costs increased 20 percent as a result of pan-territorial pricing.

In addition to maize, minimum producer prices were set for the other major crops, and it is these prices which have been used for the NRA calculations. Jansen (1991) notes that these prices were set on the basis of costs of production and were always well below border equivalent levels, with partially compensating direct assistance being given to farmers in the form of subsidies on inputs and transport. The producer prices were adjusted to influence crop choice vis-à-vis maize, the prices of other crops being depressed when greater encouragement to maize production was felt necessary and vice versa. Parastatal procurement agencies had a mix of legal and *de facto* monopsonistic control over primary agricultural markets and were either inefficient (in the case of groundnuts, for example) or enjoyed high rents from the low farm-gate prices (in the case of cotton)¹⁰. Tobacco was marketed via an auction, but the government provided a floor price to encourage farmers to produce tobacco without the risk of prices being below costs of production in poor years.

Macro and exchange rate policy

While the above agriculture and food policies were becoming entrenched, poor macroeconomic policies following the crisis induced by the dramatic fall in the world copper price in 1975 plunged the country into persistent internal and external imbalance. Appendix Figure 7 showing the parallel market premium over the official exchange rate provides one visual illustration of this.

Following the rise in imported petroleum prices in 1973 and the subsequent copper price crash in 1975, Zambia's macro-economic problems were induced by failure to adjust the exchange rate in the face of high inflation, this leading to falling export receipts. Increasing reliance was then placed on quantitative restrictions and tariffs to restrain imports, and increasingly levels of foreign borrowing were undertaken in order to sustain import levels. When borrowings from international private banks dried up, the government was forced to approach the Bretton Woods institutions for assistance.

Over the next decade, the economic reform promises that were made were never fully supported by the political elite, and the result was a series of failed reform programs and surges

¹⁰ For details, see Jansen (1988).

and withdrawals of foreign aid. The first of these was an Extended Fund Facility granted by the IMF in 1981 and discontinued in 1982. The Memorandum of Development Objectives and Policies agreed with the World Bank in early 1983 included increased prices of maize meal and fertilizer and flexibility in setting other prices (subject to ex-post review) as well as significant macro-economic and trade policy reforms, but the Bank suspended disbursements in October 1983 when the government fell into arrears after unilaterally suspending debt payments.

After the 1983 elections, President Kaunda promulgated an intensified version of the economic reforms, but the policy improvements had to contend with a further slide in copper prices, drought, and a dip in aid. Popular dissatisfaction with economic conditions led to student riots in February 1984 and industrial unrest in the first half of 1985. In response, financial policies were relaxed, thereby aggravating Zambia's fiscal and external debt problems, leading to a fresh appraisal of the government's policy stance.

In October 1985, a comprehensive structural adjustment program was launched. This included a foreign currency auction which resulted in rapid depreciation of the Kwacha. Food prices rose dramatically as a result of the depreciation and reduction in subsidies, leading to the food riots referred to earlier in December 1986. This incident led to policy reversals, including the suspension of the foreign exchange auction in early 1987 and full-scale repudiation of the structural adjustment program on May Day 1987, at which a home-grown program was announced. However, by October 1987, the government had re-opened discussions with the World Bank and there was a gradual return to structural adjustment measures over the period 1988-1990. Exchange rate policy remained central: the Kwacha was devalued and a new foreign exchange auction system was introduced (more to allocate foreign currency than to set the rate). Exporter retention schemes and (from 1989) a formal multiple exchange rate system became operational.¹¹

In 1989, all consumer prices except maize were decontrolled and NAMBOARD was abolished. The fiscal burden of maize subsidies was reduced through tripling of the maize price and introduction of a coupon system to allow for targeting of the remaining maize subsidy. The country was still cut off from assistance from the multilateral institutions, but the positive

¹¹ For most of the time this was in operation, the surrender requirement on exporters was 50 percent of their export proceeds with the other 50 percent being sold at parallel market rates. These are the values used in the spreadsheet. The multiple exchange rate system was unwound in 1992 with full unification of the exchange rate by early 1993.

measures taken in respect of exchange rates and subsidy reductions paved the way for a Policy Framework Paper to be agreed in 1989 and relations to be restored in early 1990. In the run-up to the elections, adjustment was, however, abandoned one last time by the Kaunda government. Expansionary fiscal measures included increases in wages and in maize and other subsidies. President Kaunda's United Independence Party (UNIP) was nonetheless defeated in the October 1991 elections, ushering in a fresh epoch under a new party, the Movement for Multiparty Democracy (MMD).

Policies behind the distortions: the period since 1992

The new government of President Chiluba committed itself to the program that its predecessor had negotiated and then abandoned. Donors pledged extensive support, including substantial food aid to counter the effects of the 1991-92 drought, which was of a once-in-a-century severity. The government acted swiftly on several economic policy fronts, particularly the exchange rate and trade liberalization. The foreign exchange auction was broadened, bureaux de change were introduced in September 1992 and this led to the unification of the exchange rate by December 1992. Export bans (except for ivory, oil, maize and fertilizers) were removed and all imports, bar a small negative list, were liberalized by September 1992. Import tariff rates were reduced to 6 levels in the 1991 budget, with the new minimum and maximum rates being set at 15 percent and 50 percent respectively and the number of duty exempt goods was reduced. These changes resulted in a dramatic opening up of the economy to imports, not least from neighboring countries, which enjoyed 70 percent preferences (rising to 100 percent in later years) under COMESA and bilateral agreements.

The outcome was positive in terms of greatly improved availability of basic goods but not without large-scale closures of businesses and loss of jobs, particularly in the manufacturing sector. The social impact of the loss of employment could have been mitigated by a more gradual approach being adopted. The pace and sequencing of trade and other economic reforms have also

been criticized (for example by Botchwey et al. 1998) as being a major cause of the persistent instability of the macro-economy throughout the 1990s. The period was characterized by high inflation, a volatile and generally overvalued exchange rate, high real interest rates and a banking system oriented to financing the government deficit rather than servicing the credit needs of productive enterprises. The long delay in the privatization of the copper mines was extremely costly both within the copper sector itself and in undermining the pro-growth orientation the Chiluba government supposedly stood for.

Overall, the economic environment in the 1990s was not conducive to fulfilling one of the basic intentions of the new government, namely that private investment would spearhead economic growth. The fact that non-traditional exports, including agricultural exports, grew significantly over the period, is claimed as contrary evidence. A more pertinent question arises from the counterfactual – by how much more would the non-traditional exports have grown if there had been an environment truly conducive to private sector growth?¹²

The pattern of growth of agricultural exports provides interesting perspectives on this question. The removal of exchange controls, improvement in input supplies, opening of markets and improvement in transport services did encourage an expansion of agricultural exports, but the persistence of negative NRAs for the main agricultural commodities, particularly exportables, can be interpreted as *prima facie* evidence that agricultural exports could have grown even faster than they did in the 1990s. The agricultural sub-sectors exhibiting the most dramatic growth – floriculture and horticulture –involved very few farmers who, having gained access to European markets, exploited them by insulating their operations from domestic policy changes through establishing offshore arrangements for inputs and spare parts (McPherson 2004). In particular, they benefited from duty drawback arrangements and VAT zero rating and can be said to have grown to a significant extent because of the policy environment.¹³

Growth in exports of traditional agricultural products, on the other hand, together with growth in processed food exports (notably maize meal exports to the DRC), were rather more “in spite of” than “because of” the policy environment.¹⁴ Much the same can be said of other

¹² These issues are discussed in more detail in Robinson (2004).

¹³ More recently, floriculture and horticulture have experienced declines. Sugar, cotton and tobacco have exhibited more sustained growth

¹⁴ Between 1987 and 2003, the bulk of non-traditional exports were primary agricultural products (33 percent), floriculture and horticulture (23 percent), processed food (20 percent) and textiles (20 percent).

changes in the agricultural sector. At first gloss, a good deal was achieved very soon after the new government came to power in fulfilling its stated commitment to government withdrawing from direct intervention in the agriculture sector. In the midst of the drought and large imports of food that this required, maize meal and fertilizer subsidies were removed. Various agricultural reform programs were launched in 1992-1993, notably those targeted at liberalization of maize, agricultural input markets and agricultural credit schemes. In 1995, the milling industry was privatized and the World Bank-led Agricultural Sector Investment Program (ASIP) was initiated.

However, these reform programs were not carried through with the vigor that was needed to produce the required results. The government commissioned a Maize Marketing Study that recommended that the government should fully withdraw from maize and fertilizer marketing and retain only a small role in establishing an agency to hold modest stocks for food security purposes. The Food Reserve Agency (FRA) was duly established in 1996, but soon was required to take on additional roles. The justification given for extending its mandate is that the private sector response to the government's withdrawal from input supply and marketing had been inadequate. This is ironic, because the supposedly poor response is clearly a result of continued intervention by the public sector and the associated unpredictability and risks that this involves for private entities.¹⁵

The resources associated with agricultural credit schemes initiated by the new government were used inefficiently and/or misappropriated, so that the objectives of the schemes were thwarted. The fate of the marketing and fertilizer credits made available to lending institutions in 1992/93 and 1993/94 were subject to a special investigation commissioned by the Minister of Finance (Brown 1995). The Agricultural Credit Management Program launched in 1994 suffered a similar fate of being poorly implemented, giving rise to high administrative costs, low credit recovery and corruption. McPherson (2004) concludes that the principal function of agricultural credit in Zambia has been to redistribute wealth to relatively well-off farmers, rather than to expand agricultural output.

The Agriculture Sector Investment Program (ASIP), which was supposed to be a landmark example of a coordinated multi-donor sector-wide approach, unifying 180 separate

¹⁵ Specific examples of the government's stop-go approach and the resulting increasing intrusion of the public sector have been documented in, for example, Jayne et al (1999), Govereh et al. (2002), IMCS (2003), Mwanaumo et al. (2005), Siegel and Alwang (2005).

donor-funded projects, has also largely been deemed to be a failure. The World Bank itself, through its Operations Evaluation Department, rates the outcome as unsatisfactory, sustainability unlikely and institutional development modest (World Bank 2003). These ratings are with respect to the original objectives - improve household food security, make better use of natural resources, generate employment, raise incomes and increase exports – ‘which were not achieved’. The project was later restructured, but even the scaled down project failed at the time to achieve most of its revised targets.

In the light of the recent developments of the sector, however, it would appear that ASIP has been more successful than had earlier been appeared to be the case. Firstly, the agriculture sector experience impressive growth of exports and sector has shown reasonably good average growth rates throughout 2000s despite drought in 2001/02 season, suggesting perhaps some positive lag effects. On sustainability, the ASIP created the Agricultural Consultative Forum (ACF) which is still active and one of the leading think-tanks which facilitates policy dialogue between the Ministry of Agriculture and sectoral stake holders. Thirdly, the Rural Investment Fund (RIF), which was the largest component of the ASIP, is still active and continues to facilitate investments into rural infrastructure. Recent field visits by World Bank staff have reportedly shown that many infrastructure facilities which were initially built under RIF and were dormant during early 2000s are coming back to productive use (small dams and sheds/storage facilities) and some are developed even further by local communities (i.e. development of small-scale irrigation schemes). Finally, ASIP managed to scale down the Ministry of Agriculture and focus it on core functions, although the latter has been hampered more recently by fertilizer subsidy programs and FRA maize market interventions, which have crowded out agriculture budget for core functions.¹⁶

In the new millennium, there was another change in government. After serving two terms, President Chiluba was not eligible to stand in the elections in 2001. Following some controversy over the conduct and results of the elections, President Mwanawasa came to power, representing the same party as President Chiluba. There have not therefore been any dramatic shifts in policy in recent years. The macro-economy has continued to improve and GDP growth has picked up significantly to 5-6 percent per year.

¹⁶ This is discussed further below in the concluding ‘Prospects for Future Reform’

In respect of agricultural policies, the Mwanawasa government has made a few positive steps in response to criticisms of the weaknesses and inconsistencies of the agricultural liberalization to date, but has also taken some backward steps. On the positive side, it has acceded to the arguments against the formation of a Crop Marketing Authority (e.g., Nijhoff et al. 2003) and has accepted that intervention should be limited to the more restricted roles established for the Food Reserve Agency. On the negative side, the government has used a tariff review in 2005 to raise border tariffs on agricultural goods¹⁷ and continues to depress private sector involvement in maize marketing by continuing (through the FRA) pan-territorial pricing and procurement and by injecting uncertainty about export bans, tariff waivers, public sector import levels and subsidies when there is a maize shortfall.¹⁸

The main specific policy change has been to increase the level of maize and fertilizer subsidies. Producers have also benefited from a more certain policy environment, as there has been increased consistency in policy. Despite the inherent policy inadequacies, the so-called ‘new deal’ government has not made different pronouncements during its tenure. Participants in the agricultural sector have thus learnt how to deal with the inadequacies in a relatively stable environment free of the uncertainties associated with policy shifts.

Despite the agricultural policy environment since 1992 not being as open and growth-oriented as had initially been expected, there have been some notable positive changes which have benefited small-scale farmers and poor consumers. Two sectors illustrate this point. First, removal of subsidies and other aspects of maize liberalization undermined the monopolistic position of the large milling companies, making it profitable for small hammermills to produce maize meal, often on a service milling basis (charging a fee to producers or to maize-deficit households able to buy grain or obtain it through food aid sources). Not only is the cost of the maize meal from hammermills significantly cheaper than the commercial product (Jayne et al.

¹⁷ Using the GTAP product classifications, between 2003 and 2005 the applied Zambian import tariffs have gone up as follows: paddy rice from 4.6 percent to 15 percent, wheat from 5 percent to 10 percent, cereal grains from 4.8 percent to 12.4 percent and oilseeds from 4.5 percent to 5.6 percent (WITS database).

¹⁸ Mwanaumo et al. (2005) document the significant direct costs involved in public sector prevarication in response to the 2005 maize shortfall (such as fourth quarter imports costing \$256 and \$320 per tonne, as compared with \$210 and lower transport costs if the maize had been purchased in June). The authors also allude to the long-term costs of subverting the potential role of the private sector in expanding and reducing the costs of marketing food and other crops.

(1999) estimate 20-30 percent cheaper), it is also (in its straight run or mugaiwa form) more nutritious (Mwiinga et al. 2002). A 1997 study estimates that there were at least 5,000 hammermills in the country, by that time providing a significantly cheaper source of mealie meal while also employing 10,000 people. In addition, “the presence of the hammermill has been reported to have stimulated increased crop production” (Temba 1997).

Second, in the case of cotton, the dissolution of LINTCO and its replacement by a variety of purchasers of seed cotton has been associated with a dramatic rise in the production of seed cotton (from 48,000 MT in 1993 to 144,000 in 2004, according to the Central Statistics Office). Unlike other export crops which grew rapidly in the 1990s (fresh flowers and sugar), cotton is primarily a smallholder crop. “Its potential role in poverty alleviation and food security is thus very large” (Tschirley Zulu and Shaffer 2004).

Neither of these positive developments is reflected in the above NRA calculations. In the case of maize and maize meal, the data used is for commercial operations, while in the case of cotton the calculated NRAs are simply not consistent with developments in the sector. This may well be due to the monopsonistic structure of the industry.¹⁹ After liberalization, LINTCO gave way to several cotton companies but they operate in restricted areas, in effect having local monopsonies. However, unlike similar companies in other countries, the Zambian cotton companies sell inputs to farmers at cost, preferring to make their margin on the product side. The approach of the companies was to create order and predictability and this has paid off in terms of increased production. Cotton and tobacco production expanded also because they were profitable relative to other crops. Maize production was adversely affected by the dissolution of NAMBOARD and many small-scale producers reduced their maize areas and started growing cotton and tobacco (Tschirley, Zulu and Shaffer 2004).

The unexpectedly negative post-1991 NRA results for most of the commodities studied (especially exportables) may also in part be that the monopsonistic buying that is evident in the cotton sector is also present in the purchase of cereal and oilseed crops. Despite the fact that there are many buyers of those crops and not just a small number of big companies, the buyers nonetheless operate in specific localities, where competition is limited.

¹⁹ This would not be unique to Zambia. See “Why liberalization did not lead to price competition in Zimbabwe” in Goreux (2003, Section 2.6).

Furthermore, the buyers would be aware of the cash needs of farmers and would therefore offer the lowest prices just after the harvest, accepting that somewhat higher prices would have to be paid later in the season, but with the average for the year being very low relative to border prices.

Analogous market stickiness must also exist in trades involving large-scale producers, even those using the Agricultural Commodities Exchange. This is because in theory producer prices should rise to match border prices, and in so doing there would be strong incentives for increased production of the affected crops and hence rapid growth of the agricultural sector. This has not happened. To the extent that this can be attributed to market imperfections, the difference could be labeled as a “market imperfection margin”. Assuming the most recent five-year period (2001-2005) to be the most liberal, for Zambia the results suggest that this margin may have averaged across all crops as much as 30 percent gross or 25 percent net of input subsidies, even including a positive NRA for a major import-competing product (wheat). The market imperfection margin for just exportables is estimated to be 39 percent.²⁰

Prospects for further reform

In the last five-year period covered, with the sole exception of wheat, all the NRA estimates for our covered products remain stubbornly negative (Table 1). If the levels of distortion are to be reduced in the future, attention will have to be given to both microeconomic and macroeconomic factors. The changes in government positions that are needed are to shift expenditure priorities in agriculture from short-term recurrent subsidies to long-term investments, to promote the development of competitive private-sector involvement in input supply and marketing, and to ensure a competitive exchange rate to enhance the profitability of traded agricultural commodities.

²⁰ The conundrum of negative NRAs after liberalization is even more difficult to explain to the extent that the Kwacha arguably remained overvalued after the liberalization of the foreign exchange market, yet our NRA estimates assume it has been in equilibrium since 1992. The possibility of the Kwacha being overvalued when it is ‘market determined’ is denied by the IMF and the Bank of Zambia. However, when monetary and international

As regards government expenditure on agriculture, the present policy is biased towards short-term, high-visibility expenditures which have obvious political pay-offs but do nothing to overcome structural weaknesses in the agricultural sector. Thus of the Kw 650 billion allocated to agriculture in 2006, over 30 percent (Kw 199 billion) was for fertilizer subsidies. The present expenditure pattern is seasonal, exposed to drought and has poor returns. As concluded in a recent study on the poverty-reducing potential of smallholder agriculture, what is required is a comprehensive and holistic long-term approach to rural development, ‘not just an agricultural or commodity-specific strategy’ (Siegel and Alwang 2005). Government expenditure should thus be directed to higher investment in social payoff such things as roads, energy, water, telecommunications, and agricultural research and extension.²¹

In respect of building the capacity of the private sector, the government needs to recognize that its own activities often undermine the private sector in a counter-productive fashion. In areas close to the rail line it should be profitable for the private sector to supply inputs and market production, but in practice private operators often find their efforts being undercut by cheaper inputs supplied by the public sector and higher prices being paid to purchase crops. Parallel, subsidized delivery systems in the districts along the line of rail are suppressing commercial investments.

The government would do better to revert to targeting subsidies to areas that are difficult for the private sector to serve due to underdeveloped infrastructure and sparse populations. In a recent Food Security Research Project study, districts in which at least 25 percent of sampled households purchased fertilizer from commercial outlets were all along the line of rail. Subsidies could be provided to households in more remote districts by adopting incentive-based subsidy mechanisms, similar to those that are now commonly used in infrastructure sectors to leverage private sector capital and skills into serving remote areas. Such output-based aid approaches, or ‘smart’ subsidies, involve potential private operators bidding to provide specified services, and the bidder requiring the lowest level of subsidy is given the tender. Mechanisms for monitoring implementation and penalizing non-performance would be needed though.

reserve policies are taken into account, one estimate, for the period 1996-2000 suggests that the Kwacha was 60 percent overvalued (Robinson 2004).

²¹ Similarly, Balat and Porto (2005a) conclude that while expanded trade opportunities in crops such as cotton, tobacco and hybrid maize offer the prospect of significantly higher rural incomes, these gains will not materialize without ‘complementary policies, like the provision of infrastructure, credit, and extension services’.

Finally, as regards the macro economy, it has to be recognized that despite the liberalizations of the past 15 years and the consequent diversification that has occurred, copper still remains the lead sector in Zambia's economy, particularly in terms of foreign currency generation. The key macroeconomic issues at present are the level and variability of the exchange rate. With the reduction of Zambia's external debt, resumption in confidence, as exemplified by foreign purchases of government securities, and the copper price rising steeply (from \$1,560/MT in 2002 to over \$8,000/MT in 2006), the nominal exchange rate has appreciated 60 percent between June 2005 and June 2006, with the real appreciation being even larger than this. The exchange rate keeps moving, however, for example from Kw 2,900 in mid-June to Kw 4,000 to the US\$ in mid-August. Appreciation of the Kwacha and variability of the exchange rate pose significant threats to the sustainability of the recent achievements in increasing agricultural and other non-traditional exports.

As highlighted above, the government with the support of the IMF is treating the appreciated exchange rate as a valid measure of the opportunity cost of foreign currency. In contrast, other major copper exporters, such as Chile, are attempting to limit the Dutch disease effects by building up offshore reserves, thereby sterilizing the impact in the local economy.²² Sterilizing resource rents in boom periods to maintain a competitive exchange rate and promote alternative exports is one of the main recommendations that emerges from the literature on why so few resource rich countries have performed better than resource scarce ones.²³ As long as Zambia continues with a policy whereby the real exchange rate is effectively made hostage to the vagaries of the copper market, there will be continuous under-achievement in the goal of economic diversification.²⁴

Part of the problem at present is that, after the firm Anglo American withdrew, the operators who took over the copper mines were given extraordinarily generous terms. At this juncture, there are virtually no taxes payable and no mining royalties to the government. The main benefits to the economy are via employment and multiplier effects, both of which are

²² 'Coping with the Copper Boom', *The Economist*, May 25, 2006.

²³ See, for example, Reinhardt (2000), Auty (2001, 2004) and Esanov et al. (2004).

²⁴ Kayizzi-Mugerwa (1991) uses a multisector general equilibrium model to show the complexity of the interlinkages in an economy subject to Dutch disease shocks because of the dominance of copper. He also argues for a more competitive exchange rate but observes that 'in practical terms, the size of the devaluation of the nominal exchange rate necessary to realize a favorable change in the real exchange rate might be politically unacceptable. Success thus depends...on the political work put into selling the adjustment package' (p. 862).

limited in the mining sector. Without abrogating agreements, it is important for the government to investigate ways of increasing its share in copper revenues.²⁵ Any additional resources which can be gleaned should be used to build up infrastructure, human capital and productive capacity in diverse sectors. The key sector which should be made to grow is agriculture, where there is so much untapped potential and where the equity and poverty reduction benefits would be substantial.

References

- African Development Bank (1993), *Economic Integration in Southern Africa*, Volume 2, Cote D'Ivoire, Abidjan: African Development Bank.
- Anderson, K., M. Kurzweil, W. Martin, D. Sandri and E. Valenzuela (2008), "Methodology for Measuring Distortions to Agricultural Incentives," Agricultural Distortions Working Paper 02, World Bank, Washington DC, revised January.
- Auty, R.M. (2001), 'The Political State and the Management of Mineral Rents in Capital-surplus Economies: Botswana and Saudi Arabia', *Resources Policy* 27: 77-86.
- Auty, R.M. (2004), "Economic and Political Reform in Distorted Oil-Exporting Economies", paper prepared for workshop on Escaping the Resource Curse: Managing Natural Resource Revenues in Low-income Countries, Columbia University, New York, February.
- Balat, J.F. and G.G. Porto (2005a), "Globalization and Complementary Policies: Poverty Impacts in Rural Zambia", World Bank Policy Research Working Paper XXXX, Washington DC, July.
- Botchwey, K. et al. (1998), *Report of the Group of Independent Persons Appointed to Conduct an Evaluation of Certain Aspects of the Enhanced Structural Adjustment Facility, Part 2 Country Profiles*, Washington DC: International Monetary Fund.
- Coulter, J., J. Sondhi, P. Kotecha and R. Boxall (1996), "The Economics of Warehousing in Zambia and its Role in Agricultural Development", Research Report R2323 (S)

²⁵ Certain tax concession periods for KCM and Kanshansi have now expired.

- completed under the ODA Crop Post-Harvest Research Program - Proj No Z0610, Natural Resources Institute, December.
- Economist, The (2006) *Coping with the Copper Boom*, London, 25 May.
- Esanov, A., M. Raiser and W. Buiter, (2004), "Nature's Blessing or Nature's Curse: The Political Economy of Transition in Resource-Based Economies", ZEF Discussion Papers on Development Policy, No 81, Bonn, January.
- FAO (1992), *Zambia: Export Diversification Project Preparation Mission*, Report No 37/92 CP-ZAM 31, Investment Centre FAO/World Bank Cooperative Program, 7 April.
- Goreux, L. (2003), "Reforming the Cotton Sector in Sub-Saharan Africa", Africa Region Working Paper Series No. 62, World Bank, Washington DC, November.
- Govere, J. T.S. Jayne, J.J. Nijhoff, J.J. Shawa, H. Haantuba, A. Belemu, E. Ngulube, B. Zulu, and A.K. Banda (2002), *Developments in Fertilizer Marketing in Zambia: Commercial Trading, Government Programs and the Smallholder Farmer*, FSRP No 3, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum. Michigan State University, May.
- Hill, C.B. and M.F. McPherson (eds.) (2004), *Promoting and Sustaining Economic Reform in Zambia*, Harvard: Harvard University Press.
- IMCS (2003), *Maize Market Assessment and Baseline Study for Zambia*, prepared for Regional Agricultural Trade Expansion Support Centre, Nairobi, May.
- Jansen, D. (1988), *Trade, Exchange Rate, and Agricultural Pricing Policies in Zambia*, World Bank Comparative Studies on The Political Economy of Agricultural Pricing Policy project, Washington DC.
- Jansen, D. (1991), "Zambia", Ch. 10 in A.O. Krueger, M. Schiff and A. Valdes (eds.), *The Political Economy of Agricultural Pricing Policy, Volume 3: Africa and the Mediterranean*, Baltimore: Johns Hopkins University Press for the World Bank.
- Jansen, D.J. and A. Rukovo (1992), 'Agriculture and the Policy Environment: Zambia and Zimbabwe', *OECD Development Centre, Working Paper No 74*, July.
- Jayne, T.S., M. Mukumbu, M. Chisvo, D. Tschirley, M.T. Weber, B. Zulu, R. Johansson, P. Santos and D. Soroko (1999), *Successes and Challenges of Food Market Reform: Experiences from Kenya, Mozambique, Zambia and Zimbabwe*, MSU International

- Development Working Paper No 72, Department of Agricultural Economics, Michigan State University.
- Kayizzi-Mugerwa, S. (1991), "External Shocks and Adjustment in a Mineral Dependent Economy: A Short-Run Model for Zambia", *World Development* 19(7): 851-865.
- Krueger, A.O., M. Schiff and A. Valdes (1991), *The Political Economy of Agricultural Pricing Policy, Volume 3: Africa and the Mediterranean*, Baltimore: Johns Hopkins University Press for the World Bank.
- McCulloch, N., B. Baulch and M. Cherel-Robson (2001), Poverty, Inequality and Growth in Zambia during the 1990s, WIDER Discussion Paper, No 2001/123, United Nations University, Helsinki, November.
- McKenzie, J., D. Mawebe, F. Chikomba and B. Mwiinga (1994), *The Potential for Growth in Zambia's Agricultural Sector: A Quantitative Assessment*, Policy and Planning Division, Ministry of Agriculture, Food and Fisheries, November.
- McPherson, M.F. (2004), "The Role of Agriculture and Mining in Sustaining Growth and Development in Zambia", Ch. 10 in Hill C.B. and M.F. McPherson (eds.), *Promoting and Sustaining Economic Reform in Zambia*, Harvard: Harvard University Press.
- Ministry of Agriculture (1995), *A Review of Maize Marketing Liberalisation during 1994: The Transition Program 1995/96*, prepared and produced in collaboration with FAO's Marketing Management Assistance Project, Zambian Ministry of Agriculture, Food and Fisheries, Food Security Division, Lusaka, March.
- Mistry, P. (1993), "Zambia: Are Stabilisation and Adjustment Measures Working? A Prognosis for the Short and Intermediate Term", Oxford International Associates, November.
- Mukuka, F (1997), *Agriculture Policy and Practices in Zambia*, unpublished Master of Policy Studies dissertation, Universities of Dar-es-Salaam, Fort Hare and Zimbabwe, June.
- Mundia, D.D. (1999), "Market research Study aimed to Lead to the Design of Agricultural Marketing Intervention Strategies for Muswishi Small Scale Farming Community", Project ZAM 99-02, December.
- Mwanauma, A., T.S. Jayne, B. Zulu, J. Shawa, G. Mbozi, S. Haggblade and M. Nyembe (2005), *Zambia's 2005 Maize Import and Marketing Experiences: Lessons and Implications*, FSRP No 11, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum, Michigan State University, December.

- Mwanaumo, A., W.A. Masters and P.V. Preckel (1997), "A Spatial Analysis of Maize Marketing Policy Reforms in Zambia", *American Journal of Agricultural Economics* 79(2): 514-23.
- Mwiinga, B., J.J. Nijhoff, T.S. Jayne, G. Tembo, J. Shaffer (2002), *The Role of Mugaiwa in Promoting Household Food Security: Why it Matters Who Gets Access to Government Maize Imports*, FSRP No 5, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum, Michigan State University, October.
- Ndulo, M., M. Sakala and W. Siwale (1990), *The Impact and Efficiency of Currency Devaluations in Zambia*, University of Zambia, Lusaka.
- Nijhoff, J.J., G. Tembo, J.D. Shaffer, T.S. Jayne, and J. Shawa (2003), *How Will the Proposed Crop Marketing Authority affect Food Market Performance in Zambia? An ex ante Assessment to inform Government Deliberation*, FSRP Working Paper No 8, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum, Michigan State University, June.
- Nokkala, M. (2001), "Sector Investments as Part of National Fiscal Policy: Experience from ASIP in Zambia", WIDER Discussion Paper, No 2001/117, United Nations University, October.
- Page, S. (2002), "Streamlining Zambia's Trade Agreements to Support Export Diversification", ODI Report prepared for the World Bank, Washington DC, October.
- Rakner, L., N. van der Walle and D. Mulaisho (2001), in S. Devarajan, D. Dollar and T. Holmgren (eds.), *Aid and Reform in Africa - Lessons from Ten Case Studies*, The World Bank, Washington DC, December.
- Reinhardt, N. (2000), "Back to Basics in Malaysia and Thailand: The Role of Resource-Based Exports in their Export-Led Growth", *World Development* 28(1): 57-77.
- Republic of Zambia (1995), *Report on Financial Consultancy to investigate the Utilisation of GRZ Marketing and Fertilizer Credit 1992/3 and 1993/4 by the Lending Institutions and SPCMU*, prepared by Veronica Brown in collaboration with FAO's Marketing Management Assistance Project for Ministry of Agriculture Food and Fisheries, Food Security Division (FIN-017 BRO), Lusaka.
- Republic of Zambia, Ministry of Agriculture and Co-operatives, *National Agricultural Policy 2004-2015*, Lusaka.

Republic of Zambia, Ministry of Agriculture Food and Fisheries, Food Security Division, *Recent Developments and Future Potential of Zambia's International Maize Trade: A brief Analysis of the Potential Role for Zambia on the International Grain Market*, Market Liberalization Impact Studies No 11, prepared and produced in collaboration with FAO's Marketing Management Assistance Project, December.

Republic of Zambia, Ministry of Agriculture, Food and Fisheries (1996), *Zambia: From Transition to Consolidation, A Critical Policy Review of the Liberalization of Maize and Agricultural Input Markets, 1993-96*, Market Liberalization Impact Studies No 18, prepared and produced in collaboration with FAO's Marketing Management Assistance Project (EDU-013 MAR), December.

Republic of Zambia, Ministry of Agriculture, Food and Fisheries, Food Security Division (1995), *The Development of Maize Grain Wholesale Prices during the 1994/95 Marketing Season: An Abnormal or Recurrent Phenomenon?*, Market Liberalization Impact Studies No 5, prepared and produced in collaboration with FAO's Marketing Management Assistance Project, April.

Republic of Zambia, Ministry of Commerce, Trade and Industry (1993), *An Evaluation of Pricing Policies employed by selected Parastatal Management Groups in Zambia's Maize Milling Industry*, A Summary of Cost Data used in conducting the Analysis, March.

Robinson, P.B. (2004), "Evaluation of World Bank Trade Assistance to Zambia (1987-2002)", Operations Evaluation Department, World Bank, Washington DC.

Rodrik, D. (1998), "Why is Trade Reform so Difficult in Africa", *Journal of African Economies* 7(Supplement 1): 10-36.

Sanjeev, K.S.N. (2004), *Zambia*, Overseas Development Institute, London, February.

Siegel, P.B. and J. Alwang (2005), "Poverty Reducing Potential of Smallholder Agriculture in Zambia: Opportunities and Constraints", Africa Region Working Paper Series No. 85, World Bank, Washington DC.

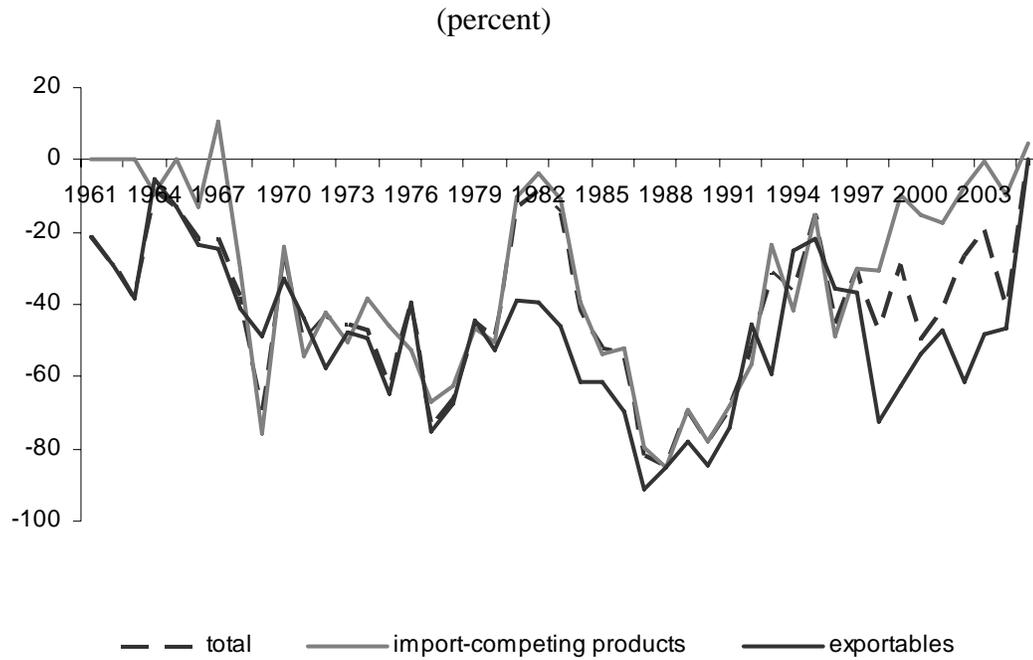
Temba, J. (1997), *The Hammermill Industry in Zambia*, The Study Fund, Social Recovery Project, GRZ/World Bank NCDP, Serial No 36, February.

Tschirley, D. and B Zulu (2003), *Zambian Cotton in a Regional Context: Performance under Liberalization and Future Challenges*, FSRP No 7, Food Security Research Project,

- Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum Michigan State University, May.
- Tschirley, D., B. Zulu and J. Shaffer (2004), *Cotton in Zambia: An Assessment of its Organisation, Performance, Current Policy Initiatives, and Challenges for the Future*, FSRP Working Paper No 10, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum Michigan State University, February.
- UNCTAD (2004), *Least Developed Country Report 2004: Linking International Trade with Poverty Reduction*, Geneva: UNCTAD, May.
- University of Zambia, Institute of Economic and Social Research (1999), *Agricultural Sector Performance Analysis 1997-1998*, Vol 1, Main Summary Report, prepared for Ministry of Agriculture, Food and Fisheries, December.
- World Bank (1984), *Zambia: Policy Options and Strategies for Agricultural Growth*, Eastern Africa Projects Department, Southern Agriculture Division, Report No 4764-ZA, World Bank, Washington DC.
- World Bank (1995), *Republic of Zambia Public Expenditure Review*, Macro, Industry and Finance Division, Southern Africa Department, Africa Region, Report No 13854-ZA (FIN-017 PUB), World Bank, Washington DC.
- World Bank (2000); *Global Economic Prospects 2001*, Washington DC: World Bank, December.
- World Bank (2003), *Agricultural Sector Investment Program*, PPAR, World Bank, Washington DC, 23 June.
- World Bank (2003), *Project Performance Assessment Report, Zambia: Agricultural sector Investment Program (Credit 2698-ZA)*, Sector and Thematic Evaluation Group, Operations Evaluation Department, Report 26086, World Bank, Washington DC, June.
- WTO (1996 and 2002), *Trade Policy Review – Zambia*, Geneva: World Trade Organization.
- Yagci, F. (2003), “Zambia Trade Policies and Performance”, mimeo, October.
- Yagci, F. and R. Kirk (2005), *Zambia: Diagnostic Trade Integration Study*, Trade Component of Private Sector Development Program for Zambia, Diagnostic Trade Integration Study, June.
- Zimconsult (2004), “Firm Strategies under Trade Liberalisation – Zambia”, COMESA Country Report, Harare.

Zulu, B., J.J. Nijhoff, T.S. Jayne and A. Negassa (2000), "Is the Glass Half Empty or Half Full? An Analysis of Agricultural Production trends in Zambia", FSRP No 2, Food Security Research Project, Ministry of Agriculture and Cooperatives, Agricultural Consultative Forum, Michigan State University, January.

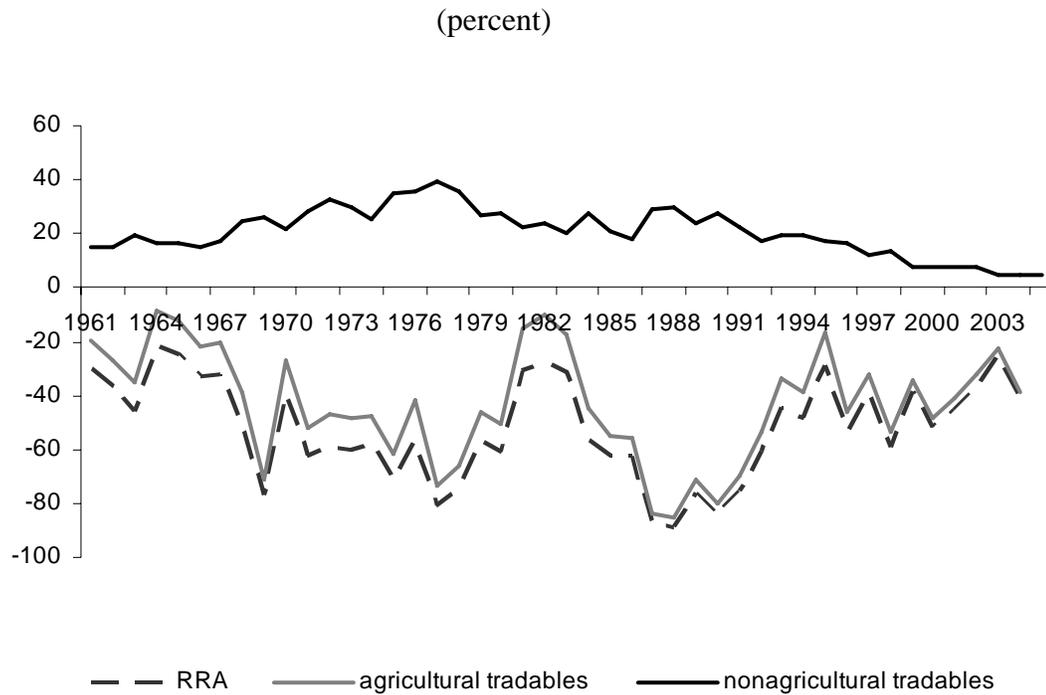
Figure 1: Nominal rates of assistance to exportables, import-competing and all^a agricultural products, Zambia, 1961 to 2004



Source: Authors' spreadsheet

a. The total NRA can be above or below the exportable and import-competing averages because assistance to nontradables and non-product specific assistance is also included.

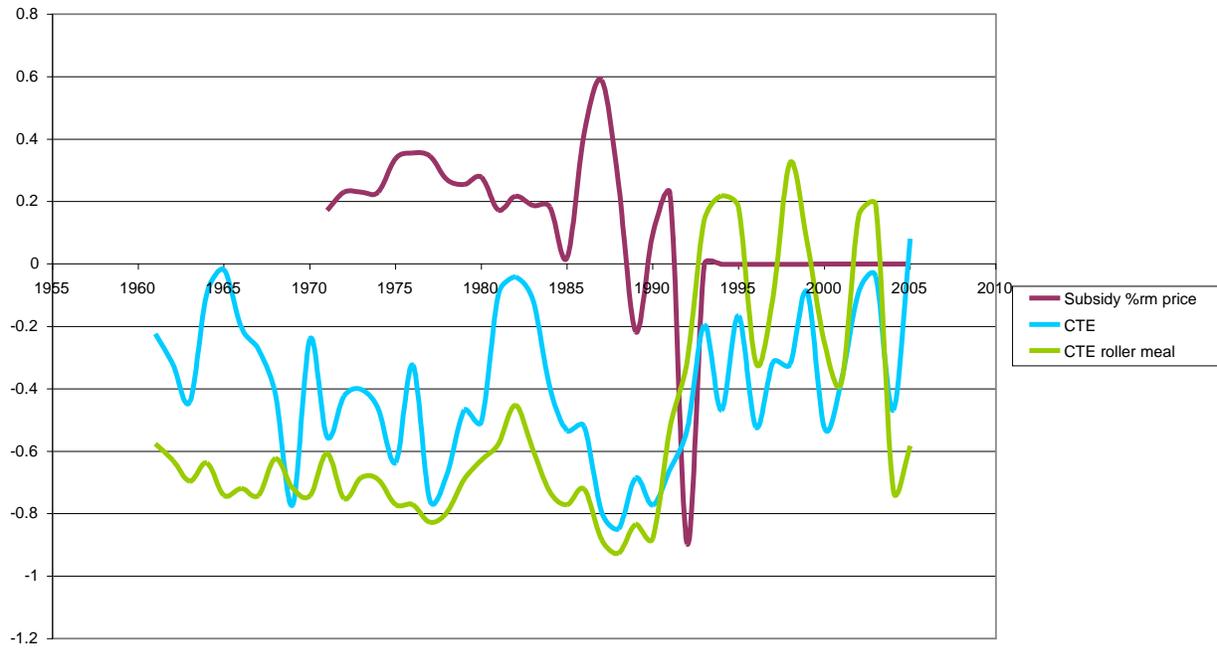
Figure 2: Nominal rates of assistance to all nonagricultural tradables, all agricultural tradable industries, and relative rates of assistance^a, Zambia, 1961 to 2004



Source: Authors' spreadsheet

- a. The RRA is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Figure 3: Maize and roller meal CTEs and consumer subsidy payment, Zambia, 1955 to 2004



Source: Authors' spreadsheet

Table 1: Nominal rates of assistance to covered farm products, Zambia, 1961 to 2004

	(percent)								
	1961-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Exportables^{a, b}	-23.4	-30.3	-46.4	-58.2	-47.7	-77.0	-57.7	-45.9	-52.6
Groundnut	na	-41.5	-59.4	-68.7	-66.4	-78.2	-77.2	-66.7	-69.2
Cotton	na	-31.6	-36.6	-38.9	-37.7	-76.6	-34.9	-27.5	-51.4
Tobacco (V)	-9.1	-18.4	-30.6	-57.2	-26.9	-77.1	-30.9	-5.2	-29.3
Tobacco (B)	-12.0	-47.7	-37.1	-50.1	-37.6	-80.0	-23.4	-23.9	-58.1
Import-competing products^{a, b}	-9.4	-21.6	-41.8	-55.0	-23.0	-67.8	-53.7	-27.0	-10.1
Rice	na	-14.6	-52.9	-13.9	29.8	-50.5	-27.2	9.5	-23.8
Wheat	na	-76.7	-60.0	-28.2	12.4	-69.3	-60.2	11.8	23.2
Nontradables									
Millet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sunflower	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mixed trade status^b									
Maize	-27.0	-33.7	-41.6	-57.1	-23.1	-67.6	-52.4	-28.3	-29.8
Sorghum	na	-15.4	-34.4	-64.1	-57.1	-73.7	-53.8	-50.9	-25.0
Soybean	na	-77.6	-71.3	-39.8	-33.4	-60.7	-54.7	-31.0	-15.7
Total of covered products^a	-24.3	-32.8	-42.2	-57.3	-25.5	-68.2	-53.4	-33.6	-34.2
Dispersion of covered products ^c	21.8	32.6	26.8	36.2	35.1	33.8	39.4	35.7	33.2
% coverage (at undistorted prices)	78	77	76	75	74	72	71	69	67

Source: Authors' spreadsheet

a. Weighted averages, with weights based on the unassisted value of production.

b. Mixed trade status products included in exportable or import-competing groups depending upon their trade status in the particular year.

c. Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

Table 2: Nominal rates of assistance to agricultural relative to nonagricultural industries, Zambia, 1961 to 2004

	(percent)								
	1961-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Covered products	-24.3	-32.8	-42.2	-57.3	-25.5	-68.2	-53.4	-33.6	-34.2
Non-covered products	-4.0	-15.2	-23.9	-34.7	-16.5	-51.6	-36.3	-26.5	-23.0
All agricultural products	-19.7	-28.0	-36.8	-49.5	-22.6	-60.8	-46.5	-31.3	-31.3
Non-product specific (NPS) assistance	na	5.8	22.4	13.7	20.9	2.7	18.1	2.7	2.8
Total agricultural NRA (incl. NPS)^b	-19.7	-22.6	-15.8	-37.3	-2.7	-58.9	-30.8	-28.6	-28.5
Trade bias index ^b	-0.21	0.10	-0.06	-0.08	-0.30	-0.28	-0.08	0.00	-0.41
<i>Assistance to just tradables:</i>									
All agricultural tradables	-22.6	-33.1	-44.3	-57.9	-27.7	-70.0	-55.3	-36.7	-36.5
All non-agricultural tradables	16.1	20.0	27.6	34.5	24.1	24.2	21.2	13.5	6.4
Relative rate of assistance, RRA^c	-33.4	-43.6	-56.2	-68.5	-41.5	-75.4	-62.7	-44.2	-40.3
MEMO , ignoring exchange rate distortions:									
NRA, all agric. products	-19.1	-18.3	-11.3	-17.9	-9.2	-63.1	-31.4	-25.3	-24.8
Trade bias index ^b	-0.16	0.45	0.63	1.17	0.10	1.63	0.64	0.12	-0.41
RRA (relative rate of assistance) ^c	-30.8	-36.3	-48.4	-49.0	-41.8	-74.2	-61.6	-38.9	-36.1

Source: Authors' spreadsheet

a. NRAs including product-specific input subsidies and non-product-specific (NPS) assistance. Total of assistance to primary factors and intermediate inputs divided to total value of primary agriculture production at undistorted prices (percent).

b. Trade bias index is $TBI = (1 + NRA_{ag_x}/100)/(1 + NRA_{ag_m}/100) - 1$, where NRA_{ag_m} and NRA_{ag_x} are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

c. The RRA is defined as $100 * [(100 + NRA_{ag}^t)/(100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Appendix: Key quantity and price data, assumptions and sources

For a landlocked country, it would generally be expected that fob import prices for crops imported from world markets would be significantly higher than cif export prices. The figures for Zambia indicate a small gap between import and export prices. For a crop such as maize, there are even years in which the import price is less than the export price. This is because much of the trade in agricultural commodities takes place within the region, rather than internationally, and because trade prices are averages for each calendar year. The main summer agricultural season runs from November to May/June of the following year, with wheat being grown under irrigation in the winter months (April/May to September). A calendar year thus covers part of two summer seasons, plus the winter crops. Imports and exports are undertaken according to circumstance and opportunity in each season, making the relationship between average annual import and export prices unpredictable.

The import and export parity prices are converted to local currency terms at an equilibrium exchange rate that is estimated from the official rate and the proportion of export receipts traded on the parallel market (sanctioned secondary market, such as variants of export retention schemes) and/or the black market (illegal secondary market for foreign currency). The export proportion traded on the parallel market covers all exports: in the case of Zambia, institutional arrangements for the trade of agricultural commodities have been such that up to the early 1990s almost all import and export transactions involving the main crops have taken place at the official exchange rate. From an economic viewpoint, importation of food at the official rate was a very wasteful policy, with the government giving away all of the rent associated with the overvalued currency. The willingness of the government to do this is a reflection of the political importance assigned to keeping down the price of foodstuffs for the urban electorate.

Crop coverage, data requirements and sources

The crops covered in the study include exportable, import-competing and non-tradable products. The trading status of three crops (maize, sorghum and soybeans) is allowed to vary on a year-to-year basis. Wheat and rice are import-competing products, millet and sunflowers are nontradables, and groundnuts, cotton and tobacco (Burley and Virginia) are exportables. In the case of rice, groundnuts and cotton, we estimate NRAs for the lightly processed products (milled rice, shelled groundnuts and cotton lint plus seed and its products, namely cotton seedcake and oil). The only crop that is analyzed both as in primary and lightly processed form is maize (maize grain and roller meal).

The data requirements of the methodology as laid out in Anderson et al. (2008) far exceed the range, quality and consistency of data available for Zambia. The longest series of trade data is from FAOSTAT, but in several years data are missing or, alternatively, dividing value by price often produces aberrant unit values that clearly would not have applied in practice (e.g., when dividing two small numbers with few significant digits available). The gaps have been filled and the aberrant unit values 'smoothed' by using either national trade data (where available) or the international commodity reference price approach, noting also that much of Zambia's agricultural trade is within the southern African region rather than to/from international ports. As a result, the reference prices for the Zambia case study are an amalgam of the two approaches outlined in the methodology.

The only crops for which producer price data over the entire time period (1955-2004) are available are maize and tobacco, and then only from different sources which are not directly compatible with one another. For most of the commodities analyzed in detail in this study, basic producer price and production data are only available from 1966 to the mid-1990s. For the crops that have been traded through the Agricultural Commodity Exchange, which was established in 1994, the price series extend up to the present but with estimates made from other data to fill gaps in 2001 and 2002.

Given the five-decade time period for the study, the primary sources of data were affected by the political, administrative and policy changes which took place. Thus the initial data sources were publications of the Federal Statistics Office, with a separate Central Statistics Office (CSO) for Zambia only being established after independence in 1964. The regular publications at that time, such as the *Monthly* and *Quarterly Digests of Statistics*, gradually changed their emphasis and coverage, eventually ceasing to be published. A similar fate befell the invaluable annual *Agricultural Statistics Bulletin*. These changes reflect in part the changing orientation of donor agencies, with the flagship CSO publications in recent years having a poverty and livelihood orientation, a result of which is a relative neglect of basic macro-economic and sectoral data. Complete series of the most relevant publications no longer exist in the libraries of the CSO or the Ministry of Agriculture. Where national data are not available, or are inconsistent, recourse has been made to FAOSTAT data which (for production and trade) are available from 1961.

Prior to liberalization, the marketing boards were the main source of data. The key data relevant for the study were on marketed production and the minimum or floor prices paid to producers or the maximum or ceiling prices paid by purchasers. Total production data are estimated from the marketed tonnage figures, together with crop forecast surveys (CFS) and post-harvest surveys (PHS).

Following liberalization of agriculture in the mid-1990s, the collection and publication of agricultural data changed dramatically. For production, the Ministry of Agriculture and Coops (MACO) collects and publishes CFS data for large-medium-and small-scale farmers. CSO collects PHS data on small (0-5 ha), medium-scale (5-20 ha) and large-scale farmers, but until recently has published data only for small and medium-scale farmers. Published data for the smaller crops – such as wheat, cotton and tobacco – have suffered from the fact that production of these crops, unlike maize is concentrated in few locations, and are not adequately covered by nation-wide studies. Hence the survey estimates tend to have wide confidence intervals. Wherever possible, this study has used industry estimates of production (e.g., tobacco data from the Tobacco Association of Zambia) which are generally considered more accurate than government figures.

Similar problems bedevil the producer and consumer price data. Prices are time and location specific, and averaging to a single price for each product each calendar year is problematic. After liberalization, the Ministry of Agriculture established an Agricultural Market Information Centre (AMIC) which in principle collects price data from all the main provincial market centers on a monthly basis. Data exist but much of it has not been put in a data base and managed. Most of the data is on consumer prices; wholesale prices were collected only for a brief period (1994-98). AMIC also no longer goes to millers and stock feed companies to collect factory gate prices. Prices are also collected in the production surveys: the PHS gives prices for smallholder farmer sales, while CHS is more likely to report prices in sales by commercial traders and farmers.

Data has also been used from the Agricultural Commodities Exchange (ACE), which was established in 1994 to allow large farmers and brokers to trade in the main cereal crops. There are gaps in the data at a time of change of ownership (around 2002), but since 2003 CHC Commodities Ltd has published ACE prices on a weekly basis together with a report on market developments. It has also more recently begun to published futures prices from the South Africa Exchange SAFEX. These are ex-Randfontein prices, with estimates of transport and other costs being supplied so as to report landed import parity Lusaka prices (see example in Appendix Table 5).

Transport and marketing margins

Data on margins are not collected on a regular and systematic basis in Zambia. Not all of the margin data found during the course of this study has been directly used in making the NRA and CTE calculations. For example, bringing international commodity prices to cif or fob Lusaka equivalents was found to be particularly difficult in circumstances where agricultural trade was actually within the region, but regional price reference series were not available. Adding transport margins - which are multiples of the commodity price at the port in the international price series - often produces results which do not accord with recorded trade unit values for Zambia. As already mentioned, it was thus decided that wherever possible actual cif or fob prices would be used in the denominator of the NRA and CTE ratios, and where there were gaps or implausible values in the data series these would be filled by adding margins to the international reference prices which were close to margins in years immediately preceding or following the year in question. In practice, this implied very different margins and even different signs for various years in different time periods.

As mentioned above, CHC Commodities Limited publishes weekly estimates of future import parity prices of various commodities based on SAFEX futures prices. An example, showing the detailed assumptions, is given in Appendix Table 5. In principle, after liberalization, the NRAs (excluding any non-policy price wedges) should gravitate towards the import duties (0 percent on maize and 15 percent on soy, sunflower and wheat). In fact, other than for wheat the NRAs calculated in this study remain stubbornly negative more than a decade after liberalization.

Various studies give sporadic information on internal transport costs. The Export Diversification Project (FAO 1992), for example, notes that intra year seasonal variations in transport costs are significant. In 1992, rates negotiated between the government and the Truckers Association of Zambia, plus Contract Haulage Limited (which together controlled 70 percent of the road fleet) were Kw 11.6 per tonne-km for short distances (less than 50 km) to about Kw 7.8 per tonne-km for distances over 200 km. By December 1996, road transport over 200 kms was reported to be Kw 117 per tonne-km (Coulter et al. 1996, Table 6). Rail transport rates in 1992 are reported in Appendix Table 6.

Marketing margins have been intensively studied by the Food Security Research Project and related studies (Jayne et al. 1999, Mwanaumo 1997). The margin between the maize price and the retail price of maize meal during the pre-reform period was found to be between 30 percent and 50 percent. This was significantly reduced after the reforms, not least because of the advent of hammer mills.

Quantity data for agricultural products and lightly processed food

Production volume data are primarily from CSO and MACO publications, in early years the CSO Quarterly Digest of Statistics and MACO's annual Agricultural Statistics Bulletin. The main source of data was the marketing boards and the crop forecast and post-harvest surveys. In recent years, data has been collected by MACO's Agricultural Market Information Centre and supplied mainly in electronic form. Where possible, production figures were cross-checked with FAOSTAT data. Quantity data for cotton and tobacco have also been obtained from industry sources (main cotton companies and the Tobacco Association of Zambia, respectively).

Export and import volume data are from FAOSTAT, with some cross-checking and values for the most recent years being obtained from CSO data supplied electronically.

Apparent consumption data are derived with some reference to the 'marketed production' data supplied by CSO and MACO for most of the crops studied. In the case of tobacco, an estimate of per capita consumption for burley and virginia tobaccos were combined with CSO population figures.

Wholesale product prices

The main sources again are CSO, MACO and AMIC publications and electronic data. Prior to 1994, the prices are the minimum guaranteed prices, with actual prices received by farmers in principle being higher (in practice net realizations may have been lower where farmers had to meet transport costs). From 1994, some primary product prices have also been available from the Agricultural Commodity Exchange ACE. These are actual realized prices on the commodity exchange and are published on a weekly basis by CHC Commodities Ltd. Prices in other markets are generally lower.

Border prices

Where possible, fob and cif prices are calculated from the value of the country's exports or imports divided by the volume of that trade, with those data extracted from FAOSTAT (1996) from 1961 to 2004. As noted in the text, some clearly aberrant values are 'smoothed' using national trade data (supplied electronically by CSO) or international trade commodity price data (extracted from the World Bank's Global Economic Monitor Database). No quality difference adjustments are made.

Exchange rates

Official exchange rates are from the IMF (2006 and earlier years)

Parallel exchange rates are assumed to be the black market rates, as reported in International Currency Analysis (1993 and earlier years) and reproduced as premia in Easterly (2006). The proportion of export revenues realized on the parallel market is assumed to be 10 percent in most years but 5 percent from 1955-1970, 25 percent in 1984 and 1992 and 50 percent from 1985 to 1991. From the mid-1980s to 1993, multiple exchange rates operated, the main impact being that food imports were generally at the official rate (keeping the domestic currency cost of food down) while agricultural exports were at a blend rate. At the margin, however, even food imports were at the higher parallel market rate.

Conversion factors and other parameters

The background paper for the KSV study (Jansen 1988) was an invaluable source of information, not least for conversion factors, margins and other parameters.

Missing data

Categories where insufficient data were found to construct time series of any significant duration for Zambia were: farm-gate product prices, transport, handling and processing margins, intermediate input prices and input-output value coefficients, production, consumption, input and trade taxes. Subsidy data were compiled from disparate sources, including Jansen (1988) and various World Bank publications on Zambia. The NRAs for non-agricultural tradable goods assumes there are no distortions for exportables and that the only ones for import-competing non-farm goods producers are tariffs, taken from COMTRADE (2006).

Principal data sources

Bank of Zambia, Quarterly *Financial & Statistical Review*, Lusaka, various editions
Central Statistics Office, Government of Zambia, *Quarterly Digest of Statistics*, Lusaka, various editions.

COMTRADE (2006), [The United Nation Statistical Division](#) Commodity Trade Data Base, data compiled through the World Integrated Trade Solution (WITS). World Bank, and the United Nations Conference on Trade and Development (UNCTAD). Available at wits.worldbank.org, accessed September.

Easterly, W. (2006), *Global Development Network Growth Database*, accessed 23 June <http://www.nyu.edu/fas/institute/dri/global%20development%20network%20growth%20database.htm>

FAO (2006), *Zambia Country Profile*, Rome: Food and Agriculture Organization.

FAOSTAT (2006), *Food and Agriculture Organization Statistics Databases*. Available at: [//faostat.fao.org](http://faostat.fao.org). Accessed various dates during May and July 2006.

IMF (2005 and earlier years) *Zambia - Selected Issues and Statistical Appendix*, Washington DC: International Monetary Fund.

IMF (2005 and earlier years), *Exchange Arrangements and Exchange Restrictions: Annual Report*, Washington DC: International Monetary Fund (available back to 1950).

IMF (2006 and earlier years), *International Financial Statistics*, Washington DC: International Monetary Fund (annual).

International Currency Analysis (1993 and earlier years), *World Currency Yearbook* (formerly *Pick's Currency Yearbook*), Brooklyn NY: International Currency Analysis, Inc.

Jansen, D. (1988), *Trade, Exchange Rate, and Agricultural Pricing Policies in Zambia*, World Bank Comparative Studies, The Political Economy of Agricultural Pricing Policy, Washington DC.

Ministry of Agriculture, Government of Zambia (published annually up to end of 1990s), *Agricultural Statistics Bulletin*, Lusaka, various editions.

Ministry of Finance & Economic Development, Government of Zambia, *Macroeconomic Indicators*, various editions.

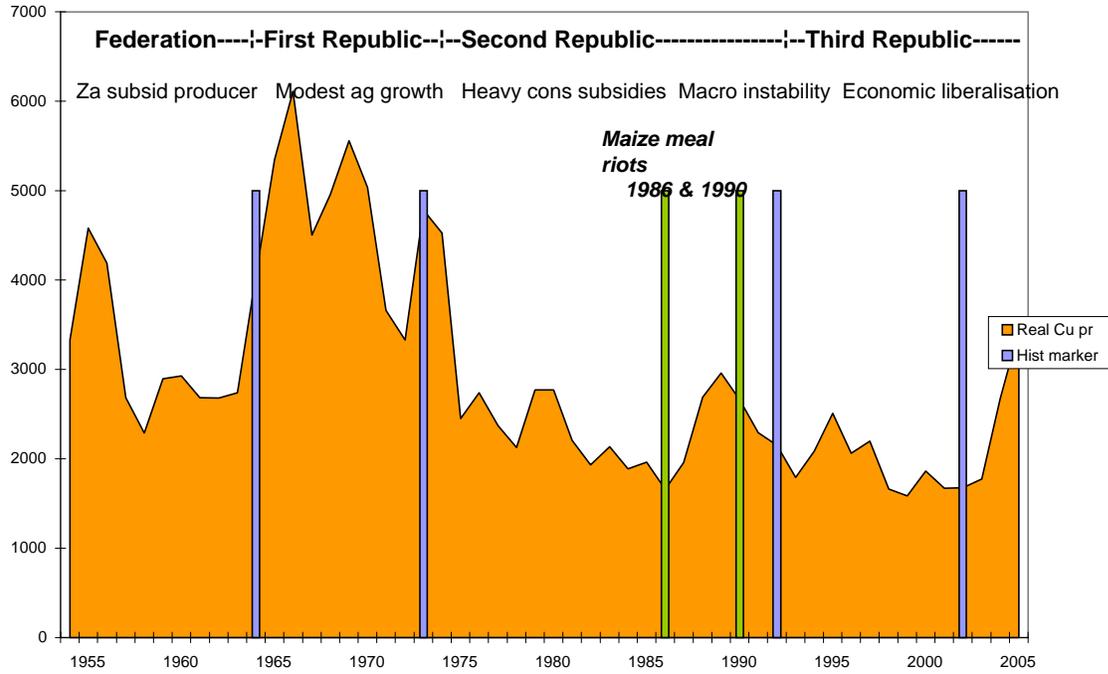
World Bank (2006a), *Global Economic Monitor Database*, Washington DC, World Bank

World Bank (2006b), *World Development Indicators*, Washington DC: World Bank (online time series data).

Acronyms

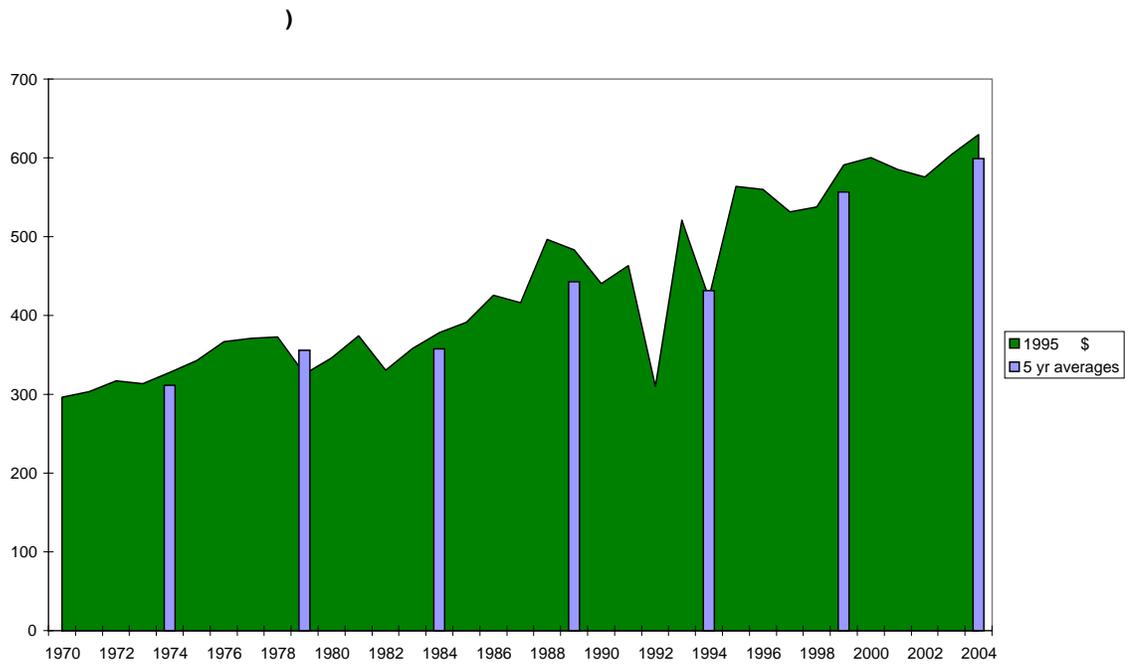
ACE	Agricultural Commodities Exchange
AMIC	Agricultural Market Information Centre (part of MACO)
CSO	Central Statistics Office (established at independence in 1964)
FAOSTAT	Food and Agricultural Organization Statistical Database
MACO	Ministry of Agriculture and Cooperatives (in early years just Ministry of Agriculture, Food and Fisheries)

Appendix Figure 1: International copper price and Zambian development phases, 1955 to 2004



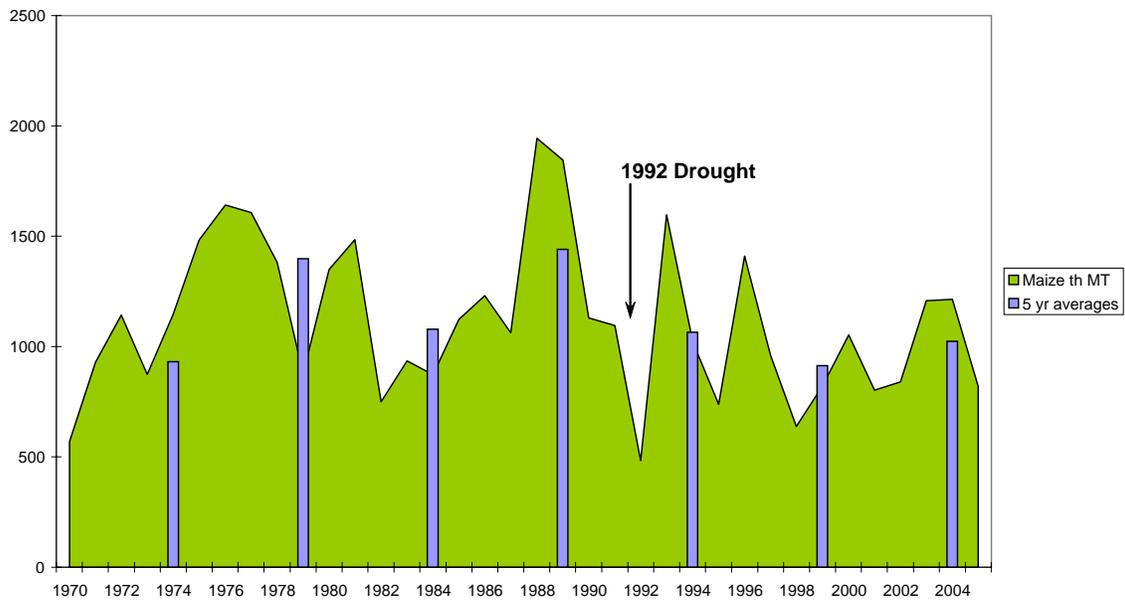
Source: Appendix Table 3 and World Bank (2006a).

Appendix Figure 2: Agricultural GDP, Zambia, 1970 to 2004



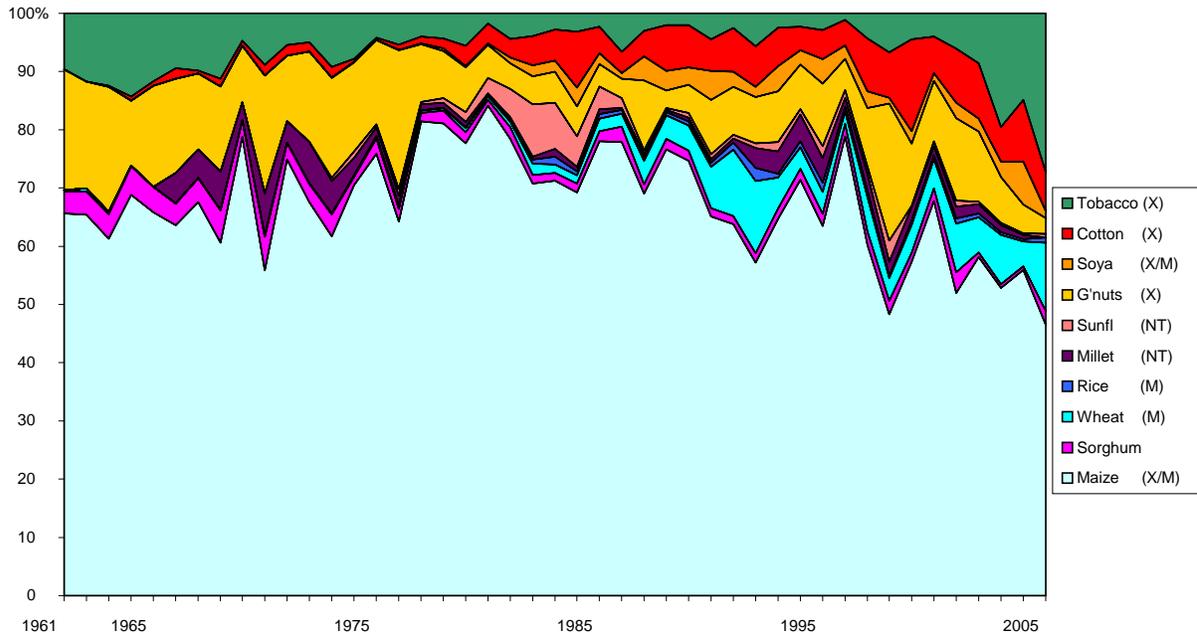
Source: FAOSTAT (2006) and World Bank (2006b).

Appendix Figure 3: Maize production, Zambia, 1970 to 2005



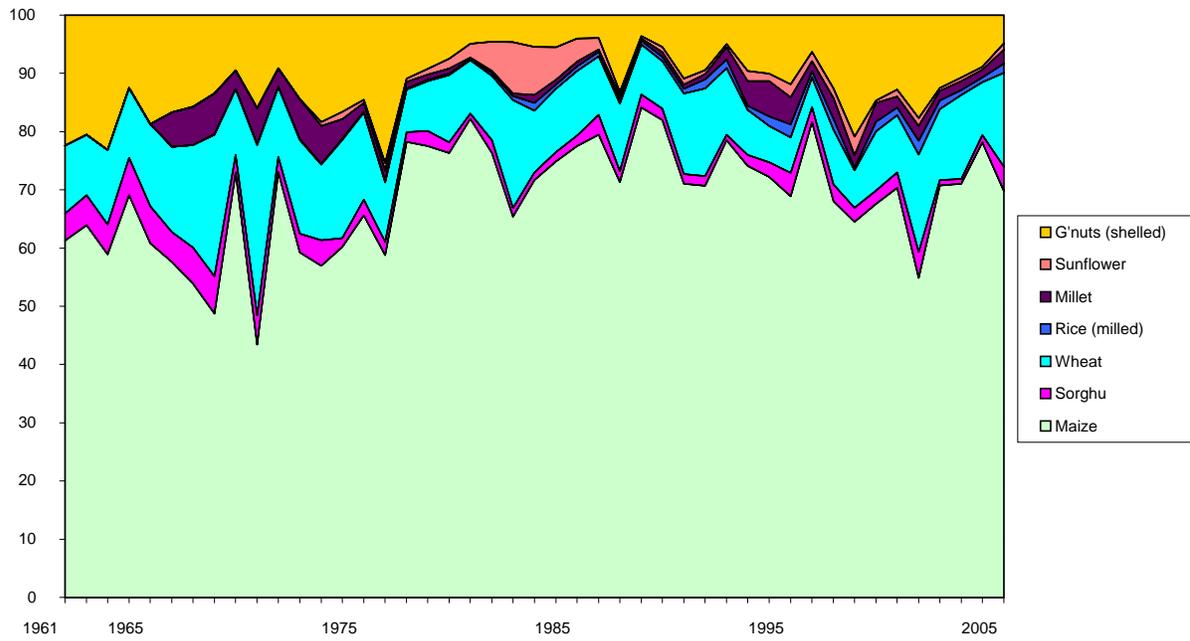
Source: FAOSTAT (2006).

Appendix Figure 4: Product shares of food production value, Zambia, 1961 to 2005 (percent)



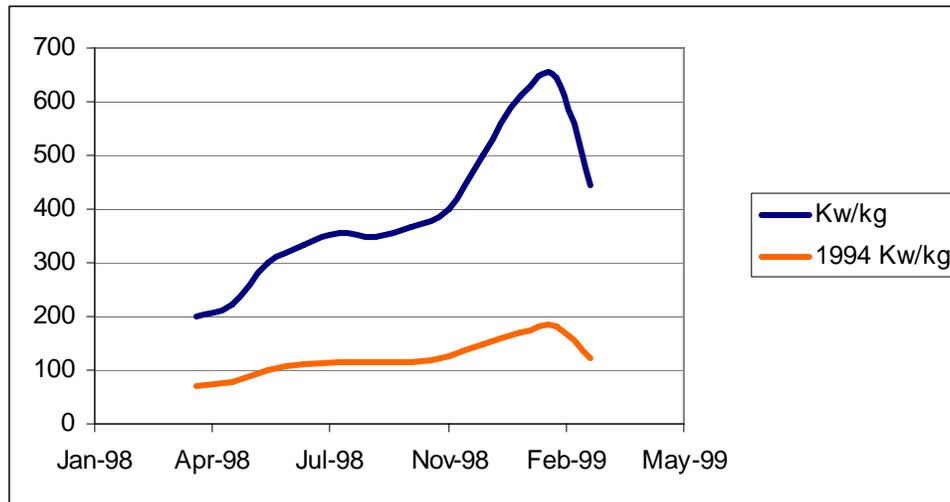
Source: Authors' spreadsheet

Appendix Figure 5: Product shares of food consumption expenditure, Zambia, 1961 to 2005
(percent)



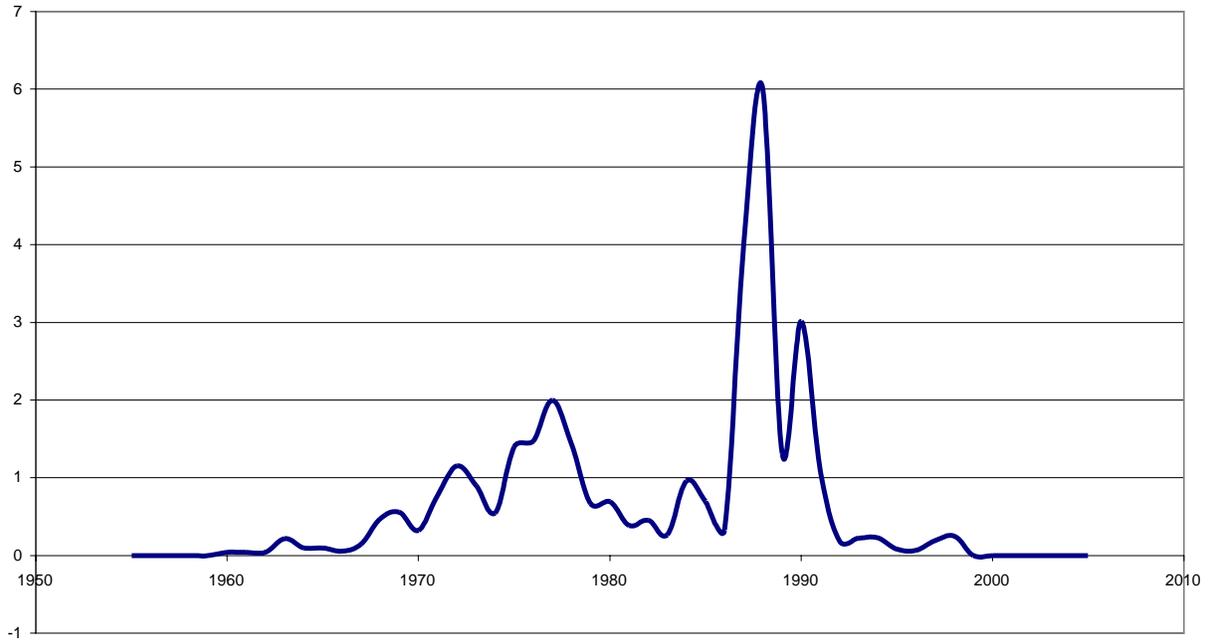
Source: Authors' spreadsheet

Appendix Figure 6: Seasonal Price Variability (nominal and real), Zambia, 1998-99



Source: Maize producer prices at public markets in Kabwe 1998/99 - Mundia (1999)

Appendix Figure 7: Exchange rate parallel market premium, Zambia, 1965 to 2005
(proportion by which parallel rate exceeds official rate)



Source: Authors' spreadsheet using methodology from Anderson et al (2006).

Appendix Table 1: Prices for primary products, Zambia, 1955 to 2005

(a) Maize, sorghum and wheat

	<u>MAIZE</u>			<u>SORGHUM</u>			<u>WHEAT</u>		
	Domestic price per MT	Border price per MT	<u>DP-</u> <u>BP</u> BP	Domestic price per MT	Border price per MT	<u>DP-</u> <u>BP</u> BP	Domestic price per MT	Border price per MT	<u>DP-</u> <u>BP</u> BP
1955	40	45	-0.11						
1956	42	36	0.19						
1957	41	29	0.41						
1958	42	38	0.11						
1959	39	38	0.03						
1960	40	39	0.01						
1961	40	51	-0.22						
1962	35	51	-0.32						
1963	31	56	-0.44						
1964	41	45	-0.09						
1965	41	42	-0.02						
1966	37	46	-0.20	39	44	-0.12	57	210	-0.73
1967	34	47	-0.27	52	46	0.13	56	232	-0.76
1968	32	55	-0.42	52	74	-0.30	59	250	-0.76
1969	36	156	-0.77	52	77	-0.32	59	321	-0.82
1970	39	51	-0.24	52	67	-0.22	61	165	-0.63
1971	44	99	-0.55	52	66	-0.21	68	239	-0.71
1972	48	83	-0.42	52	93	-0.44	68	211	-0.68
1973	48	80	-0.40	52	104	-0.50	83	179	-0.54
1974	48	89	-0.46	56	86	-0.36	133	238	-0.44
1975	56	153	-0.64	67	127	-0.48	178	269	-0.34
1976	70	104	-0.32	67	173	-0.62	178	253	-0.30
1977	70	288	-0.76	67	245	-0.73	178	354	-0.50
1978	76	233	-0.68	67	241	-0.72	222	301	-0.26
1979	100	187	-0.47	67	196	-0.66	222	225	-0.01
1980	130	263	-0.51	67	234	-0.72	222	236	-0.06
1981	150	166	-0.10	100	223	-0.55	289	236	0.22
1982	178	185	-0.04	100	210	-0.52	356	256	0.39
1983	203	230	-0.12	178	310	-0.43	397	308	0.29
1984	272	452	-0.40	207	576	-0.64	472	608	-0.22
1985	315	676	-0.53	299	822	-0.64	502	1,248	-0.60
1986	611	1,273	-0.52	475	1,183	-0.60	960	1,655	-0.42
1987	867	4,202	-0.79	822	4,106	-0.80	1,233	9,441	-0.87
1988	889	5,845	-0.85	844	7,478	-0.89	2,111	16,243	-0.87
1989	1,200	3,803	-0.68	1,148	4,842	-0.76	2,509	8,622	-0.71
1990	3,158	13,829	-0.77	3,000	17,140	-0.82	5,411	30,702	-0.82
1991	5,556	16,134	-0.66	5,278	18,418	-0.71	7,600	48,155	-0.84
1992	13,333	28,256	-0.53	11,269	29,614	-0.62	14,419	54,415	-0.74
1993	55,556	69,134	-0.20	55,556	84,022	-0.34	28,889	132,513	-0.78
1994	89,444	168,274	-0.47	105,556	130,711	-0.19	168,222	143,525	0.17
1995	165,926	198,989	-0.17	166,667	180,687	-0.08	227,654	228,073	0.00
1996	197,118	412,836	-0.52	177,778	451,395	-0.61	422,222	264,572	0.60

1997	204,167	298,002	-0.31	162,963	354,990	-0.54	369,192	397,413	-0.07
1998	360,185	530,802	-0.32	166,667	627,586	-0.73	424,074	383,411	0.11
1999	636,944	699,171	-0.09	250,000	604,569	-0.59	514,794	536,087	-0.04
2000	351,111	740,823	-0.53	298,876	821,294	-0.64	699,857	637,802	0.10
2001	396,144	627,895	-0.37	375,647	1,136,776	-0.67			
2002	885,188	971,185	-0.09	558,036	636,493	-0.12			
2003	765,440	796,417	-0.04	580,580	550,627	0.05	1,354,085	1,129,909	0.20
2004	700,779	1,317,055	-0.47	769,011	685,134	0.12	1,519,340	904,233	0.68
2005	952,558	881,669	0.08	1,387,262	1,723,263	-0.19	1,475,334	1,347,891	0.09

(b) Millet, sunflower and soyabean

	<u>MILLET</u>			<u>SUNFLOWER</u>			<u>SOYABEANS</u>		
	Domestic price per MT	Non-tradable	<u>DP-BP</u>	Domestic price per MT	Non-tradable	<u>DP-BP</u>	Domestic price per MT	Border price per MT	<u>DP-BP</u>
1966	39		0						
1967	35		0	49		0	41	157	-0.74
1968	56		0	49		0	36	173	-0.79
1969	52		0	49		0	36	174	-0.80
1970	52		0	49		0	36	179	-0.80
1971	52		0	168		0	93	235	-0.60
1972	52		0	120		0	93	299	-0.69
1973	56		0	133		0	93	518	-0.82
1974	67		0	179		0	147	424	-0.65
1975	67		0	168		0	147	458	-0.68
1976	67		0	200		0	189	169	0.12
1977	67		0	200		0	189	681	-0.72
1978	67		0	270		0	239	703	-0.66
1979	67		0	274		0	278	291	-0.04
1980	67		0	328		0	356	590	-0.40
1981	67		0	352		0	403	556	-0.28
1982	67		0	415		0	469	519	-0.10
1983	322		0	430		0	503	743	-0.32
1984	328		0	430		0	583	1,379	-0.58
1985	423		0	558		0	677	1,237	-0.45
1986	625		0	839		0	1,246	1,239	0.01
1987	1,022		0	1,400		0	1,644	19,719	-0.92
1988	1,778		0	1,800		0	2,417	23,259	-0.90
1989	2,199		0	3,240		0	3,111	13,779	-0.77
1990	4,833		0	6,428		0	6,413	44,613	-0.86
1991	7,778		0	10,072		0	8,905	25,693	-0.65
1992	16,925		0	18,823		0	25,794	47,192	-0.45
1993	175,556		0	80,000		0	88,889	282,916	-0.69
1994	177,778		0	137,000		0	222,222	243,276	-0.09
1995	180,000		0	210,000		0	280,556	458,242	-0.39
1996	200,000		0	240,000		0	331,204	434,027	-0.24
1997	222,204		0	227,500		0	380,556	457,453	-0.17
1998	276,389		0	341,111		0	403,611	547,779	-0.26
1999	337,037		0	440,000		0	413,148	814,636	-0.49

2000	376,579	0	512,000	0	683,436	556,708	0.23
2001	396,970	0	549,964	0	500,000	891,861	-0.44
2002	586,364	0	641,952	0	638,889	899,806	-0.29
2003	586,296	0	803,611	0	1,466,188	1,144,935	0.28
2004					1,687,729	3,864,351	-0.56
2005			962,769	0	1,278,829	1,229,937	0.04

(c) Tobacco

	<u>TOBACCO - burley</u>			<u>TOBACCO - virginia</u>		
	Domestic price per MT	Border price per MT	<u>DP-BP</u> BP	Domestic price per MT	Border price per MT	<u>DP-BP</u> BP
1955	489	516	-0.05	625	630	-0.01
1956	408	465	-0.12	570	567	0.01
1957	680	567	0.20	700	692	0.01
1958	414	544	-0.24	643	665	-0.03
1959	403	563	-0.28	611	687	-0.11
1960	606	556	0.09	617	679	-0.09
1961	441	672	-0.34	608	677	-0.10
1962	589	600	-0.02	644	750	-0.14
1963	505	656	-0.23	758	820	-0.07
1964	392	433	-0.09	514	539	-0.05
1965	320	472	-0.32	602	586	0.03
1966	313	573	-0.45	650	721	-0.10
1967	276	791	-0.65	940	1,004	-0.06
1968	441	856	-0.48	650	1,086	-0.40
1969	507	959	-0.47	750	1,218	-0.38
1970	560	732	-0.24	810	926	-0.13
1971	560	853	-0.34	810	1,077	-0.25
1972	570	949	-0.40	880	1,198	-0.27
1973	620	1,252	-0.50	880	1,579	-0.44
1974	860	1,373	-0.37	960	1,732	-0.45
1975	970	1,435	-0.32	840	1,809	-0.54
1976	1,010	1,751	-0.42	970	2,218	-0.56
1977	1,060	3,040	-0.65	1,100	3,862	-0.72
1978	1,100	3,474	-0.68	1,450	4,394	-0.67
1979	1,110	1,919	-0.42	1,510	2,421	-0.38
1980	1,250	1,272	-0.02	1,570	1,592	-0.01
1981	1,260	2,510	-0.50	1,650	3,083	-0.46
1982	1,560	2,577	-0.39	2,400	3,111	-0.23
1983	1,650	2,519	-0.34	2,700	3,050	-0.11
1984	1,800	4,784	-0.62	2,800	5,873	-0.52
1985	2,300	7,081	-0.68	3,450	8,676	-0.60
1986	3,500	23,264	-0.85	5,120	28,660	-0.82
1987	5,100	45,511	-0.89	6,250	56,217	-0.89
1988	9,000	59,484	-0.85	14,000	72,216	-0.81
1989	12,000	45,624	-0.74	14,400	54,698	-0.74
1990	48,000	190,115	-0.75	60,000	224,979	-0.73
1991	86,000	118,848	-0.28	87,450	135,623	-0.36
1992	145,000	548,390	-0.74	166,320	617,251	-0.73

1993	867,100	576,546	0.50	747,040	666,696	0.12
1994	857,660	790,348	0.09	1,089,650	945,312	0.15
1995	1,321,170	1,565,429	-0.16	1,789,670	1,869,930	-0.04
1996	2,284,480	1,948,940	0.17	3,556,520	2,235,678	0.59
1997	1,932,560	2,839,198	-0.32	3,069,360	3,220,093	-0.05
1998	2,102,100	4,610,420	-0.54	2,809,170	5,181,111	-0.46
1999	3,156,000	4,842,829	-0.35	3,813,500	5,460,128	-0.30
2000	2,341,560	4,333,125	-0.46	4,600,960	5,007,876	-0.08
2001	2,344,550	4,627,204	-0.49	4,328,400	5,375,601	-0.19
2002	3,222,600	8,805,226	-0.63	6,523,800	9,984,418	-0.35
2003	4,614,390	16,153,770	-0.71	8,016,920	18,024,663	-0.56
2004	4,419,000	11,188,493	-0.61	8,935,000	12,494,657	-0.28

Source: Authors' spreadsheet

Appendix Table 2: Prices for lightly processed foods, Zambia, 1961 to 2005
(a) Maize meal and milled rice

	<u>MAIZE MEAL</u>			<u>RICE milled</u>		
	Domestic price per MT	Border price per MT	<u>DP-BP</u> BP	Domestic price per MT	Border price per MT	<u>DP-BP</u> BP
1961	62	146	-0.58			
1962	54	146	-0.63			
1963	49	159	-0.70			
1964	64	175	-0.64			
1965	64	249	-0.74			
1966	58	205	-0.72	164	163	0.01
1967	54	207	-0.74	190	222	-0.15
1968	50	133	-0.62	190	250	-0.24
1969	55	196	-0.72	190	238	-0.20
1970	61	236	-0.74	190	451	-0.58
1971	69	176	-0.61	190	521	-0.64
1972	75	299	-0.75	232	571	-0.59
1973	75	236	-0.68	232	505	-0.54
1974	75	241	-0.69	316	449	-0.30
1975	87	378	-0.77	316	355	-0.11
1976	109	478	-0.77	379	500	-0.24
1977	109	632	-0.83	379	484	-0.22
1978	118	577	-0.80	379	473	-0.20
1979	156	501	-0.69	421	394	0.07
1980	203	546	-0.63	474	425	0.12
1981	234	552	-0.58	474	460	0.03
1982	277	507	-0.45	738	482	0.53
1983	317	784	-0.60	1,054	718	0.47
1984	425	1,577	-0.73	1,054	782	0.35
1985	491	2,144	-0.77	1,054	1,129	-0.07
1986	954	3,412	-0.72	1,464	2,176	-0.33
1987	1,352	11,530	-0.88	2,186	9,806	-0.78
1988	1,387	18,720	-0.93	2,924	15,138	-0.81
1989	1,873	11,274	-0.83	4,441	9,829	-0.55
1990	4,928	40,674	-0.88	9,732	32,106	-0.70
1991	8,669	18,066	-0.52	15,422	41,116	-0.62
1992	20,806	30,046	-0.31	34,293	98,758	-0.65
1993	94,875	82,988	0.14	210,714	127,014	0.66
1994	159,673	131,050	0.22	289,732	302,460	-0.04
1995	255,166	215,804	0.18	948,214	550,712	0.72
1996	341,590	500,407	-0.32	1,106,250	805,543	0.37
1997	333,283	372,697	-0.11	532,639	696,203	-0.23
1998	552,861	416,950	0.33	653,214	750,606	-0.13
1999	582,159	543,528	0.07	659,458	886,289	-0.26
2000	549,154	734,990	-0.25	555,874	1,078,677	-0.48
2001	714,969	1,147,463	-0.38	961,937	1,180,854	-0.19
2002	1,225,286	1,060,044	0.16	927,671	1,348,020	-0.31
2003	1,140,939	958,637	0.19	1,227,042	1,192,970	0.03
2004	916,667	3,321,087	-0.72			

2005 1,140,741 2,732,863 -0.58

(b) Shelled groundnuts and cotton lint

	<u>GROUNDNUTS shelled</u>			<u>COTTON lint, seed & cake</u>		
	Domestic price per MT	Border price per MT	<u>DP- BP</u> BP	Domestic price per MT	Border price per MT	<u>DP-BP</u> BP
1965	120	244	-0.51	329	451	-0.27
1966	128	216	-0.41	329	537	-0.39
1967	124	159	-0.22	352	443	-0.20
1968	128	205	-0.38	352	572	-0.38
1969	128	286	-0.55	352	527	-0.33
1970	128	221	-0.42	399	496	-0.20
1971	128	287	-0.56	399	487	-0.18
1972	128	390	-0.67	399	728	-0.45
1973	158	437	-0.64	399	1,058	-0.62
1974	213	665	-0.68	587	947	-0.38
1975	213	879	-0.76	704	1,057	-0.33
1976	313	701	-0.55	939	1,715	-0.45
1977	313	1,320	-0.76	939	2,062	-0.54
1978	358	1,364	-0.74	1,080	1,801	-0.40
1979	400	1,054	-0.62	1,080	1,369	-0.21
1980	438	2,119	-0.79	1,080	1,793	-0.40
1981	576	1,299	-0.56	1,080	1,209	-0.11
1982	600	1,433	-0.58	1,103	1,663	-0.34
1983	688	2,071	-0.67	1,221	2,162	-0.44
1984	894	3,175	-0.72	1,361	3,475	-0.61
1985	1,146	3,702	-0.69	1,573	4,064	-0.61
1986	1,644	5,289	-0.69	1,972	6,006	-0.67
1987	2,025	23,433	-0.91	3,756	39,721	-0.91
1988	3,625	19,012	-0.81	7,042	55,231	-0.87
1989	4,210	21,590	-0.81	8,450	35,937	-0.76
1990	8,530	108,443	-0.92	22,768	98,473	-0.77
1991	13,836	130,375	-0.89	36,452	119,619	-0.70
1992	35,025	137,237	-0.74	201,861	179,015	0.13
1993	125,000	508,054	-0.75	281,667	652,937	-0.57
1994	342,500	753,537	-0.55	938,889	808,082	0.16
1995	375,000	982,682	-0.62	1,135,837	1,153,450	-0.02
1996	387,500	1,563,773	-0.75	1,332,549	1,407,396	-0.05
1997	562,963	1,491,376	-0.62	1,295,875	1,594,206	-0.19
1998	496,296	4,144,116	-0.88	1,267,500	2,264,180	-0.44
1999	883,133	2,726,146	-0.68	1,008,938	3,138,793	-0.68
2000	642,111	2,974,104	-0.78	1,533,387	3,237,261	-0.53
2001	754,728	3,674,285	-0.79	1,971,667	4,044,801	-0.51
2002	914,727	3,168,849	-0.71	2,018,611	5,597,281	-0.64
2003	1,299,104	2,489,537	-0.48	2,863,611	4,601,282	-0.38

Source: Authors' spreadsheet

Appendix Table 3: Foreign exchange rates, Zambia, 1955 to 2005
(Kwacha per US\$)

	Official rate	Commodity specific rate (n/a)	Secondary or parallel market rate	Reten- tion rate (a)	Discount to secondar y market rate	Estimated equilibrium exchange rate using this study's methodolog y (b)
1955	0.71		0.71	0.00		0.71
1956	0.71		0.71	0.00		0.71
1957	0.71		0.71	0.00		0.71
1958	0.71		0.71	0.00		0.71
1959	0.71		0.71	0.00		0.71
1960	0.71		0.74	0.05		0.73
1961	0.71		0.74	0.05		0.73
1962	0.71		0.74	0.05		0.73
1963	0.71		0.87	0.05		0.80
1964	0.71		0.78	0.05		0.75
1965	0.71		0.78	0.05		0.75
1966	0.71		0.75	0.05		0.74
1967	0.71		0.82	0.05		0.77
1968	0.71		1.05	0.05		0.89
1969	0.71		1.11	0.05		0.92
1970	0.71		0.94	0.05		0.83
1971	0.71		1.27	0.10		1.02
1972	0.71		1.54	0.10		1.17
1973	0.65		1.24	0.10		0.98
1974	0.64		0.99	0.10		0.84
1975	0.64		1.54	0.10		1.14
1976	0.70		1.73	0.10		1.27
1977	0.79		2.37	0.10		1.66
1978	0.80		1.95	0.10		1.43
1979	0.79		1.32	0.10		1.08
1980	0.79		1.33	0.10		1.09
1981	0.87		1.21	0.10		1.05
1982	0.93		1.35	0.10		1.16
1983	1.26		1.59	0.10		1.44
1984	1.81		3.55	0.25		2.90
1985	3.14		5.32	0.50		4.78
1986	7.79		10.39	0.50		9.74
1987	9.52		47.60	0.50		38.08
1988	8.27		57.86	0.50		45.46
1989	13.81		31.90	0.50		27.38
1990	30.29		121.61	0.50		98.78
1991	64.64		134.23	0.50		116.83
1992	172.21		204.10	0.25		192.14
1993	452.76		553.29	0.10		508.05
1994	669.37		822.40	0.10		753.54

1995	864.12	935.60	0.10	903.43
1996	1,208	1,286.30	0.10	1,251.02
1997	1,315	1,564.92	0.10	1,452.23
1998	1,8628	2,327.59	0.10	2,118.10
1999	2,388	2,388.02	0.10	2,388.02
2000	3,111	3,110.84	0.10	3,110.84
2001	3,611	3,610.94	0.10	3,610.94
2002	4,399	4,398.60	0.10	4,398.60
2003	4,733	4,733.27	0.10	4,733.27
2004	4,797	4,797.13	0.10	4,797.13
2005	4,616	4,616.07	0.10	4,616.07

^a The proportion of foreign currency actually sold by all exporters at the parallel market rate.

^b See Anderson et al. (2008) on the exchange rate methodology used in this study.

Source: Authors' spreadsheet

Appendix Table 4: Chronology of policy milestones, Zambia

	Political	Macro-economic	Trade Policy	Agricultural Policy	Food policy
1955	Federal Government based in Southern Rhodesia				
1963	End of Federation				
1964	Independence (24 Oct), start of First Republic				
1965	Rhod sanctions-Zambia's road & rail links affected				
1969	Nationalisation of copper mines				
1971					From 1971-88, substantial maize meal subsidies
1973	Second Republic (Aug) - one party state				
1974			Copper prices start to fall from mid-1974		
1977	Dissidents in UNIP oppose economic management	Presidential speech on economic crisis (Oct)			
1978		Austerity budget			
1980	Failed coup attempt (Oct)				
1981	Detention of labour leaders - strikes	Real interest rates negative 1981-1993 (peak of -137% in 1992)			
1984		Economic restructuring announced (Aug)			
1985		Forex auction and import liberalisation			
1986	Economic team changed (April)			Liberalisation of inter-district grain trade	Maize meal riots on Copperbelt (Dec); subsidies removed & reintroduced

	Political	Macro-economic	Trade Policy	Agricultural Policy	Food policy
1987	Labour unrest (Jan); Mayday speech announcing break with BWI	BWI programmes suspended; New Economic Recovery Programme (May)			
1989	WB/IMF agreement on PFP	Devaluation and removal of price controls		NAMBOARD abolished, maize marketing function transferred to Cooperative Federation	Tripling of maize price, coupon system for targeting subsidy (operational until 1992); other consumer prices decontrolled
1990	Maize meal riots & coup attempt (June); formation of MMD (Aug)	Dual exchange rate system			Maize meal subsidy removed; food riots
1991	Election 25 Oct; start of Third Republic	BWI programmes suspended	Removal of most export controls & ban on maize exports	Substantial reduction in fertiliser subsidy (Dec)	Subsidy re-introduced before the election
1992	Chiluba govt. Privatisation Law (July); key ministers resign (Aug); first phase of PS redundancy (Sept)	Devaluation (30%) (Jan); PFP agreed (Feb); debt rescheduling (Aug); interest rates liberalised; forex bureaus (Oct); exchange rates unified (Dec)	Non trade exporters allowed 100% retention & import preferences except for PTA revoked (Jan); OGIL expanded (Oct); increased COMESA preference	Major drought - substantial maize imports needed. Fertiliser market opened to full competition & pan- territorial pricing eliminated - pricing to reflect differential transport costs (June).	Roller meal subsidy removed (June); deregulation of informal, small-scale milling.
1993	Zero Option Plan to overthrow Chiluba discovered (Feb); state of emergency for a period; reform ministers sacked (April)	Cash budget, tax reduction & weekly tender (Jan)	General reduction in tariffs and excises & shift to HS (Jan); elimination of import & export licences (June)	Markets for maize & fertiliser opened to full competition (July)	Official producer and selling prices abolished.
1994	Chiluba speech criticising economic and agric policies (July)	Exchange controls removed (Jan)	In-bond & duty drawback schemes (Jan)	Agricultural Credit Management Programme	

	Political	Macro-economic	Trade Policy	Agricultural Policy	Food policy
1995	Bank crisis; Land Act (July)	VAT (July)	Removal of 20% uplift factor applied to import values	Privatisation of the milling industry. Launch of World Bank Agricultural Sector Investment Programme	No floor price for maize. Hammermills help reduce the price of food
1996	MMD win elections boycotted by UNIP			Customs duty exemptions eliminated, tariffs reduced by 15% on most goods (Jan)	Food Reserve Agency operational
1997	Failed coup (Oct); Kaunda detained & soe declared	Donors withdraw balance of payments support			
1998	Finance Minister fired				
2000	ZCCM sale to Anglo American				
2001	Election November				
2002	Mwanawasa govt Anglo American withdrawal	Poverty Reduction Strategy Paper presented to donors		GM food aid refused; FRA as subsidised buyer from small-scale sector	
2003				Maize & fertiliser subsidies increased	
2005		HIPC Completion Point attained (April)			

Sources: Based on Jansen (1991), Rakner et al. (1999) and McCulloch et al. (2001), with cross-checking and additions from many other sources listed in this paper.

Appendix Table 5: Sample agricultural market exchange price schedule

U.S.\$1.00 = ZK3,420.00 @ 23/12/05

SAFEX Futures Prices for October in U.S.\$ (ex Randfontein, RSA) as at 23/12/05

<u>(EST)</u>	<u>UNIT</u>	<u>BIDS</u>	<u>OFFERS</u>	<u>MTM</u>	<u>IMPORT PARITY</u>
					<u>DDP OR DDU,</u>
<u>LUSAKA,</u>					
Soya bean (DDP)	US\$/MT	\$252.23	\$263.26	\$255.38	\$469.66
Sunflower (DDP)	US\$/MT	\$342.08	\$349.96	\$349.96	\$581.17
Wheat (DDP)	US\$/MT	\$220.70	\$221.17	\$220.70	\$428.77
White Maize (DDU)	US\$/MT	\$178.92	\$180.50	\$179.71	\$335.83
Yellow Maize (DDU)	US\$/MT	\$143.30	\$145.03	\$143.45	\$298.66

Exchange rate from Xe.com U.S.\$1.00 : SAR6.34 @ 23/12/05

Import parity Prices Include:

Duty @ 15% on Soya, Sunflower & Wheat & 0% duty on White & Yellow Maize.

Bagging & Handling ex silo @ U.S.\$13.00 per metric tonne

Wheat price excludes VAT @ 17.5%

Insurance @ 1%

Clearing costs @ 1.5%

Freight rate estimated @ U.S.\$130.00/mt Randfontein to Lusaka

DDP: Incoterm "Delivered Duty Paid"

DDU: Incoterm "Delivered Duty Unpaid"

Source: CHC Commodities, Lusaka

Appendix Table 6: Rail Transport Rates, Zambia, 1992

Commodity	From	To	Freight/ton
Maize	Lusaka	Livingstone	Kw 2286
Cotton	Lusaka	Livingstone	Kw 2340
Tobacco*	Lusaka	Livingstone	Kw 2240
Maize	Lusaka	Victoria Falls	US\$ 53
Cotton	Lusaka	Victoria Falls	US\$ 54
Tobacco*	Lusaka	Victoria Falls	US\$ 54
Maize	Lusaka	New Kapiri	US\$ 22
Cotton	Lusaka	New Kapiri	US\$ 33.80
Tobacco*	Lusaka	New Kapiri	US\$ 33.80

Appendix Table 7: Annual distortion estimates, Zambia, 1961 to 2004

(a) Nominal rates of assistance to covered products

(percent)

	Cotton	Groundnut	Maize	Millet	Rice	Sorghum	Soybean	Sunflower	Tobacco V	Tobacco B	Wheat	All covered
1961	na	na	-22	na	na	na	na	na	-10	-34	na	-21
1962	na	na	-32	na	na	na	na	na	-14	-2	na	-29
1963	na	na	-44	na	na	na	na	na	-7	-23	na	-38
1964	na	na	-9	na	na	na	na	na	-5	-9	na	-9
1965	-27	-51	-2	na	na	na	na	na	3	-32	na	-11
1966	-39	-41	-20	0	na	-12	na	na	-10	-45	-73	-22
1967	-20	-22	-27	0	na	13	na	0	-6	-65	-76	-22
1968	-38	-38	-42	0	-24	-30	na	0	-40	-48	-76	-38
1969	-33	-55	-77	0	-20	-32	na	0	-38	-47	-82	-69
1970	-20	-42	-24	0	-58	-22	na	0	-13	-24	-63	-25
1971	-18	-56	-55	0	-64	-21	na	0	-25	-34	-71	-50
1972	-45	-67	-42	0	-59	-44	na	0	-27	-40	-68	-43
1973	-62	-64	-40	0	-54	-50	-82	0	-44	-50	-54	-45
1974	-38	-68	-46	0	-30	-36	-65	0	-45	-37	-44	-47
1975	-33	-76	-64	0	-11	-48	-68	0	-54	-32	-34	-63
1976	-45	-55	-32	0	-24	-62	12	0	-56	-42	-30	-39
1977	-54	-76	-76	0	-22	-73	-72	0	-72	-65	-50	-74
1978	-40	-74	-68	0	-20	-72	-66	0	-67	-68	-26	-66
1979	-21	-62	-47	0	7	-66	-4	0	-38	-42	-1	-45
1980	-40	-79	-51	0	12	-72	-40	0	-1	-2	-6	-49
1981	-11	-56	-10	0	3	-55	-28	0	-46	-50	22	-13
1982	-34	-58	-4	0	53	-52	-10	0	-23	-39	39	-8
1983	-44	-67	-12	0	47	-43	-32	0	-11	-34	29	-15
1984	-61	-72	-40	0	35	-64	-58	0	-52	-62	-22	-42
1985	-61	-69	-53	0	-7	-64	-45	0	-60	-68	-60	-52
1986	-67	-69	-52	0	-33	-60	1	0	-82	-85	-42	-54
1987	-91	-91	-79	0	-78	-80	-92	0	-89	-89	-87	-82
1988	-87	-81	-85	0	-81	-89	-90	0	-81	-85	-87	-85
1989	-76	-81	-68	0	-55	-76	-77	0	-74	-74	-71	-69
1990	-77	-92	-77	0	-70	-82	-86	0	-73	-75	-82	-79
1991	-70	-89	-66	0	-62	-71	-65	0	-36	-28	-84	-69
1992	13	-74	-53	0	-65	-62	-45	0	-73	-74	-74	-51
1993	-57	-75	-20	0	66	-34	-69	0	12	50	-78	-31
1994	16	-55	-47	0	-4	-19	-9	0	15	9	17	-37
1995	-2	-40	-17	0	72	-8	-39	0	-4	-16	0	-15
1996	-5	-75	-52	0	37	-61	-24	0	59	17	60	-46
1997	-19	-62	-31	0	-23	-54	-17	0	-5	-32	-7	-31
1998	-44	-88	-32	0	-13	-73	-26	0	-46	-54	11	-47
1999	-68	-68	-9	0	-26	-59	-49	0	-30	-35	-4	-29
2000	-53	-78	-53	0	-48	-64	23	0	-8	-46	10	-50
2001	-51	-79	-37	0	-19	-67	-44	0	-19	-49	12	-41
2002	-64	-71	-9	0	-31	-12	-29	0	-35	-63	7	-27
2003	-38	-48	-4	0	3	5	28	0	-56	-71	20	-19
2004	na	na	-47	0	na	12	-56	na	-28	-61	68	-41

Appendix Table 7 (continued): Annual distortion estimates, Zambia, 1961 to 2004
 (b) Nominal and relative rates of assistance to all^a agricultural products, to exportable^b and import-competing^b agricultural industries, and relative^c to non-agricultural industries (percent)

	Total ag NRA				Ag tradables NRA			Non-ag tradables	
	Covered products		Non-covered products	All products (incl NPS)	Export-ables	Import-competing	All	NRA	RRA
	Inputs	Outputs							
1961	0	-21	-3	na	-21	0	-20	15	-30
1962	0	-29	-4	na	-29	0	-27	15	-36
1963	0	-38	-6	na	-38	0	-35	19	-46
1964	0	-9	-4	na	-5	-9	-9	16	-22
1965	0	-11	-2	-7	-11	0	-12	16	-25
1966	0	-22	-7	-17	-24	-13	-22	15	-33
1967	0	-22	0	-9	-25	11	-21	18	-32
1968	0	-38	-17	-26	-41	-30	-39	25	-51
1969	0	-69	-51	-54	-49	-76	-71	26	-77
1970	0	-25	-13	17	-33	-24	-27	22	-40
1971	0	-50	-30	-29	-44	-54	-52	28	-63
1972	0	-43	-26	-20	-58	-42	-47	33	-60
1973	0	-45	-28	-25	-48	-51	-48	30	-60
1974	0	-47	-22	-22	-50	-38	-48	25	-58
1975	0	-63	-30	-39	-65	-46	-62	35	-72
1976	0	-39	-29	-25	-39	-53	-42	36	-57
1977	0	-74	-48	-59	-75	-67	-73	39	-81
1978	0	-66	-42	-47	-67	-63	-66	35	-75
1979	0	-45	-25	-17	-44	-46	-46	27	-57
1980	0	-49	-29	-18	-53	-50	-51	27	-61
1981	0	-13	-9	13	-39	-11	-15	22	-31
1982	0	-8	-7	18	-40	-4	-10	24	-27
1983	0	-15	-11	4	-46	-11	-18	20	-31
1984	0	-42	-26	-31	-61	-39	-45	27	-57
1985	0	-52	-33	-44	-61	-53	-55	21	-63
1986	0	-54	-36	-47	-70	-52	-56	18	-62
1987	0	-82	-69	-73	-91	-80	-83	29	-87
1988	0	-85	-70	-74	-85	-85	-85	30	-89
1989	0	-69	-50	-56	-78	-69	-71	24	-76
1990	0	-79	-62	-66	-85	-78	-80	28	-84
1991	0	-69	-48	-50	-74	-68	-70	23	-76
1992	0	-51	-32	-2	-46	-57	-54	18	-61
1993	0	-31	-19	-14	-59	-24	-34	19	-44
1994	0	-37	-20	-22	-25	-42	-39	19	-49
1995	0	-15	-10	-6	-22	-15	-17	17	-29
1996	0	-46	-27	-37	-36	-49	-46	17	-54
1997	0	-31	-20	-27	-37	-30	-32	12	-40
1998	0	-47	-44	-45	-73	-31	-54	13	-59
1999	0	-29	-31	-29	-63	-10	-34	8	-39
2000	0	-50	-25	-41	-54	-15	-48	8	-52
2001	0	-41	-22	-31	-47	-18	-41	8	-45
2002	0	-27	-30	-25	-62	-8	-32	8	-37
2003	0	-19	-19	-17	-48	-1	-22	5	-26
2004	0	-41	-20	-29	-46	-10	-39	5	-42

a. NRAs including assistance to nontradables and non-product specific assistance.

b. NRAs including products specific input subsidies.

c. The Relative Rate of Assistance (RRA) is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Appendix Table 7 (continued): Annual distortion estimates, Zambia, 1970 to 2004

(c) Value shares of primary production of covered^a and non-covered products, (percent)

	Cotton	Groundnut	Maize	Millet	Rice	Sorghum	Soybean	Sunflower	Tobacco	V Tobacco	B	Wheat	Non-covered
1961	na	na	68	na	na	na	na	na	na	9	1	na	22
1962	na	na	66	na	na	na	na	na	na	11	1	na	22
1963	na	na	64	na	na	na	na	na	na	12	1	na	23
1964	na	na	64	na	na	na	na	na	na	12	2	na	23
1965	1	15	55	na	na	na	na	na	na	10	1	na	19
1966	2	12	48	4	na	3	na	na	na	7	0	0	24
1967	0	10	52	4	na	3	na	0	7	7	0	0	23
1968	1	11	44	5	0	4	na	0	8	8	0	0	26
1969	1	6	49	2	0	2	na	0	3	3	0	0	38
1970	2	16	40	5	0	4	na	0	6	6	0	0	26
1971	1	9	50	2	0	2	na	0	3	3	0	0	31
1972	1	13	46	5	0	2	na	0	3	3	0	0	30
1973	1	18	38	3	0	2	0	0	5	5	0	0	31
1974	0	10	50	2	0	1	0	1	5	5	0	0	29
1975	0	9	52	1	0	2	0	0	3	3	0	0	32
1976	1	16	44	1	0	1	0	1	4	4	0	0	32
1977	1	7	49	1	0	1	0	0	2	2	0	0	39
1978	1	5	51	0	0	1	0	0	3	3	0	0	37
1979	3	5	53	1	0	1	0	1	4	4	0	0	31
1980	3	4	56	0	0	1	0	2	1	1	0	0	33
1981	3	3	57	0	0	1	1	3	3	3	1	1	28
1982	4	3	51	0	0	1	1	6	2	2	1	1	28
1983	4	4	50	1	1	1	1	6	2	2	0	1	29
1984	8	3	46	1	0	1	2	3	2	2	0	1	33
1985	3	2	50	1	0	1	1	2	1	1	0	1	36
1986	3	2	49	0	0	2	1	1	4	4	0	1	37
1987	2	5	31	0	0	1	2	0	1	1	0	2	55
1988	4	1	33	0	0	1	1	0	1	1	0	2	56
1989	5	4	41	0	0	1	2	0	1	1	0	2	44
1990	3	6	31	0	0	1	2	0	1	1	1	3	51
1991	5	6	34	0	1	1	1	0	1	1	1	6	44
1992	5	6	35	2	1	1	1	1	2	2	1	8	37
1993	5	7	41	2	0	1	3	1	1	1	1	3	34
1994	3	6	46	3	1	1	2	1	1	1	0	2	34
1995	4	6	47	3	1	2	3	1	1	1	1	3	27
1996	3	4	52	1	0	1	2	1	0	0	0	1	33
1997	7	8	40	2	1	2	2	1	2	2	1	4	31
1998	5	17	27	1	0	1	1	2	2	2	2	2	39
1999	11	8	35	1	0	1	1	0	2	2	1	3	35
2000	5	8	43	1	0	1	1	1	2	2	1	3	34
2001	7	11	33	1	0	2	2	1	2	2	2	5	34
2002	7	9	35	1	0	0	1	0	2	2	3	4	37
2003	4	6	34	1	0	0	2	0	6	6	7	5	34
2004	na	na	44	1	na	0	6	na	5	5	6	3	35

Source: Authors' spreadsheet

a. At farmgate undistorted prices