



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Distortions to Agricultural Incentives in Zimbabwe

Daniel Ndlela and Peter Robinson

Zimconsult, Harare
dndlela@mweb.co.zw
robinson.peter.b@gmail.com

Agricultural Distortions Working Paper 39, 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 Zimbabwe

Daniel Ndlela and Peter Robinson

Zimbabwe's agricultural history can be traced over a long period dating from the 13th to the 15th century, the period known as that of the Great Zimbabwe under the Mhunumutapa Empire. During the pre-colonial period, people relied on barter trade based goods and services offered by the trading communities, and production patterns based on comparative advantage.

From the time of the first European settlers in the late nineteenth century, acquisition and control over land has been the central factor underpinning the growth, maturation and decline of agriculture in Zimbabwe. The period from 1890 to the present can be divided into seven sub-periods defined by major political and/or economic developments (Appendix Table 1 and, for the apportionment of land, Appendix Table 2).

The country was initially ruled by the British South Africa Company, under a Charter from Britain (1890-1923), and subsequently by a white minority which was granted 'self-government' of what was at that time called Southern Rhodesia (1923-1953). These two variants of settler regime deliberately created a dualistic system of agriculture, in which the European farmers were given exclusive rights to the best farmland, together with various forms of support and assistance, while the majority African producers were confined to areas much less suitable for agriculture and were subject to discriminatory policy measures designed to subordinate African agriculture. The areas in which Africans were required to remain were initially known as Native Reserves, but were subsequently referred to as Tribal Trust Lands (during the 1960s and 1970s) and Communal Lands (after independence).

In these areas, traditional communal land tenure prevails.¹ As early as the 1930s, a small provision was made for African farmers to acquire land on a freehold basis, but this was never more than 8 percent of the total land area. During the twentieth century, the designation of public

¹ From the first two decades of the colonial administration (1890-1910) when native reserves (now communal lands) were set aside for exclusive use by Africans, these directly came under the administration of central government, albeit remaining 'traditional' in a limited sense of traditional leaders retaining rights to allocate arable plots among local households, while grazing is open for those households. Methods of cultivation are often traditional and continuous with farming methods used before the arrival of the settlers. See, Riddell (1978, pp 6-11).

land changed, altering those proportions, but the fundamental structure of ownership between small-scale communal farmers and large-scale commercial farmers remained much more static, and it is this which determined production patterns in the agricultural sector.

During the period 1953-1963, the country was part of the Federation of Northern and Southern Rhodesia and Nyasaland (now Zambia, Zimbabwe and Malawi). With the Federal Government situated in Salisbury (now Harare), the Southern Rhodesian Government had a dominating influence over the Federation. When Zambia and Malawi achieved independence, the Federation dissolved. The Rhodesian government tried to avoid pressures for majority rule by a Universal Deceleration of Independence (UDI) from the nominal colonial ruler, Britain, in November 1965. The international response to this illegal action was the imposition of trade and investment sanctions. This created a 'closed economy' environment which stimulated a period of intense import substitution. The agricultural sector grew rapidly, diversifying away from the main export crop, tobacco, which was particularly hard-hit by the sanctions.

During the UDI period, the nationalist forces intensified their struggle into a liberation war which eventually sapped the resources of the UDI regime. The main focus of the struggle was the restoration of land to the majority of the population. Yet after independence was achieved, land reform proceeded slowly. Various resettlement 'models' were tried out in the early 1980s, but thereafter there was little acquisition of land, even after the land-protective terms of the Lancaster House Constitution expired in 1990. Pressure from various quarters for resolution of the land question resulted in the convening of a major international land conference in 1998. The proposals made at that time, which seemed to have the support of a wide cross-section of stakeholders, were rejected by President Mugabe.

Had the 1998 proposals been followed, an orderly land reform program would have been implemented with relatively little disruption to agricultural production. In the event, however, when the government lost a constitutional referendum in February 2000, a precipitous 'fast track' land reform program (FTLRP) was implemented in a manner which has effectively decimated the agricultural sector. At the same time, perverse macroeconomic policies were imposed, leading to inflation at unprecedented levels (around 1,200 p.a. per annum by mid-2006). The combined effect of adverse structural change and pro-inflationary macro policies has been eight consecutive years of declining GDP, with the cumulative decline being about one third of national output, this being driven by an even steeper decline in the agricultural sector.

The allocation of land under the FTLRP was such that by 2002, the large-scale commercial sector had shrunk from 39 percent of the land area to 8 percent. Model A1 resettlement is small-scale farms, while Model A2 resettlement is larger-scale farms, often formed by sub-division of the excessively large commercial farms that existed before. Since 2002, in fact right up to mid-2006, white-owned commercial farms continue to be appropriated. The re-allocation of the farms has been made in a discriminatory way in a highly politicised environment. This has not only resulted in much of the land being occupied by people not oriented or able to use it productively, but has also failed to lay to rest the perception of injustice in land access. Thus, despite the high costs of destruction of the agricultural base and much of the institutional structure that supported a highly productive agricultural sector, the 'land question' in Zimbabwe still remains to be settled.

It is against this background that the agricultural distortion measures calculated in this study for the period 1955-2004 are to be assessed. The ratios that have been calculated attempt to measure the divergence between the price actually paid to the producer and the price the farmer should have received in a distortion-free environment, as measured by the trade parity equivalent prices (adjusted for non-policy price wedges). With the exception of wheat prior to 1973, and to a lesser extent maize and cotton for some years in the early part of the study period, plus a very few other single year values elsewhere in the time series, the Nominal Rates of Assistance (NRA) for all the crops studied are found to have large negative values. Three strands of explanation for the implied high taxation of agriculture are given: (i) agricultural policies that have driven down producer prices, offset at various times to some extent by direct subsidies to agriculture; (ii) market imperfections, particularly monopsonistic buying practices, which deprive farmers of the returns they should be receiving, and (iii) macroeconomic mismanagement, notably a persistently overvalued exchange rate.

The highest rates of growth in the agricultural sector as whole were in the late 1960s and early 1970s. However, after independence the support given to the previously neglected small-scale farmers, coupled with subsidy policies which encouraged the marketing of maize and re-purchase of maize meal, resulted in significant improvement in performance, with the communal sector becoming the dominant supplier of both maize and cotton. A particular focus of attention is whether the liberalization of agricultural markets, which occurred as part of a broad structural adjustment program in the 1990s, had a positive effect on the agricultural sector. It turns out that

the calculated NRAs and the growth of agricultural GDP are hardly different to the pre-liberalization period, although account should be taken of the fact that the averages for the 1990s include the adverse effects of the once-in-a-century drought which occurred in the 1991/92 agricultural season.

Prior to 1990 the taxation of agriculture can be largely attributed to government policy. It is important to note that after liberalization non-policy explanations have to be sought for the persistence of low prices for producers. Gross market imperfections would appear to be important in this regard. These are imperfections in both product markets (monopsonistic buying of agricultural outputs) and factor markets (e.g., inability of farmers to borrow so as to be able to store crops to take advantage of higher prices later in the season).

In response to the steep decline in agricultural output following the FTLRP, the government (mainly through quasi-fiscal payments by the Reserve Bank of Zimbabwe, RBZ) has provided huge levels of subsidies to farmers (equivalent, in 2004, to 19 percent of GDP). However, distortions in the overall economy mean that items such as subsidized fuel and credit are likely to have been used for highly profitable arbitrage purposes rather than for agricultural production.²

The crisis in the agricultural sector and the economy as a whole is politically induced, and until such time as there is a political realignment, it will not be possible for the comprehensive economic and social program that is so desperately needed to be implemented.

Agricultural policy in the colonial period

Zimbabwe's modern economy was built upon the land alienation policies that followed the country's colonization by white settlers organized by the British South Africa (BSA) Company in 1890. Though the primary motive of the colonization by the BSA Company was the pursuit of rich gold deposits, failure to realize this original dream turned the Company towards the exploitation of land and related agricultural resources. Already by the early twentieth century,

² The RBZ governor bemoaned this fact while increasing the levels of support to agriculture in the Monetary Policy Statement of October 2005.

agriculture was being vigorously organized to provide food for commercial settlements, namely mines and urban centers. By the beginning of 1900, three types of land categories were in existence, reserves set aside for the exclusive use by Africans; land alienated to mines and farms, sometimes occupied, sometimes in the hands of absentee land owners or companies; and unalienated land which the BSA Company (the settler colonial administration) regarded as its own until the Privy Council decision of 1918 conferred it to the Crown.

In the early years of the twentieth century, there was no clear policy on the agricultural sector of the Rhodesian colony. But from 1908-1914 a so-called 'white agricultural policy' launched an attack on the African reserves with the intention of recovering the best land and making it available for European settlement (Palmer 1977, p. 80). The hallmark of the BSA Company rule was the enactment of discriminatory laws which set aside the reserves for the exclusive use and habitation by Africans, even though this was against the law which had stated that the rest of the land areas in the colony were open for purchase by members of all races.³

In 1908, the Department of Agriculture was reorganized to give technical support to white farmers. A Land Bank was set up in 1912 with a share capital of £250,000 to make credit facilities available to white farmers only (Palmer 1977, p. 89). Bank loans up to £2,000 for the purchase of farms, livestock, and other agricultural equipment were made available to white farmers, and no loans were made available to black farmers until 1945 when the Land Bank initiated a scheme of advancing loans to farmers in the African Purchase Areas. The African Purchase Areas (APAs) was a very small proportion of farm land in the country, occupying only 8 percent of the total land area in 1961. Because of the alleged lack of collateral security among African peasant farmers, the African reserve farmers were not considered for the Land Bank loans.

The advent in Southern Rhodesia and self rule by the white settlers in 1923 ushered in further land alienations, culminating in the enactment of the Land Apportionment Act of 1930. The Southern Rhodesia Order in Council of 1898, Article 83, which stated that 'a Native may acquire, hold, encumber and dispose of land on the same conditions as a person who is not a Native had been removed at the recommendation of the 1925 Land Commission. Another result of the Commission was the establishment of the Native Purchase Areas - later called Small Scale

³ The BSA Company refused to sell land to leading Ndebele households who needed it. The Company also refused to sell land to the Fingo Community (migrants from South Africa who had been invited by Rhodes to settle in Rhodesia). See Loney (1975, p. 54).

Commercial (SSC) farming areas. These were demarcated and sold to selected African farmers. In both the large-scale and small-scale commercial farming areas, land was individually owned and title deeds registered.

The actions taken following the 1925 Land Commission prepared the stage for the Land Apportionment Act of 1930, and consequently also laid the foundations for the permanent division of the country into African and European areas. The Land Apportionment Act was the first legal sanction by Parliament to confirm the BSA Company practice and provide for the areas reserved for whites and blacks. The Land Apportionment Act not only legally sanctioned land alienation policies and the creation of African reserves, but was used to prevent the African peasant farmer from becoming a competitor to the white settler farmers or plantation owners. It was also used to impoverish the African peasantry to such an extent that the majority of the adults would be compelled to work for white farmers in mines or farms (Ndlela 1981, p. 72).

African peasant agricultural production thus was severely curtailed. During the 1920s a given African labor effort in the produce market gave a lower return than twenty years earlier. Whereas at the beginning of the century African produce sales accounted for 70 percent of their total cash earnings, by 1932 the figure had fallen to 20 percent (Arrighi 1970, p. 216). A stagnant peasant agriculture within the framework of dualism in the economy had emerged as a result of the black peasant farmers being increasingly evicted from the more-fertile lands and from the areas within easy reach of markets. When the Land Apportionment Act of 1930 was superseded by the Land Tenure Act of 1969, all the main provisions of the former were confirmed. The discriminatory and dualistic political and economic framework developed during the previous periods, especially with regards to land policy, was further entrenched under the Native Land Husbandry Act of 1951.

The development of a specific policy on agricultural prices was triggered by a deep slump in Rhodesian cattle and maize prices that occurred in 1921-23. This slump had far more devastating effects than previous economic depressions. In 1920, the African grain sales to 'white' traders were estimated at 19,800 tonnes⁴ at 10s per bag. In 1921 the average price had fallen to approximately 5s per bag, at which prices sales of grain became uneconomic in many districts. As a result, and notwithstanding the bumper harvest that year, only 43,000 bags (4,300 tonnes) were purchased from African peasant farmers, a drop of 78 percent in sales.

⁴ This is equivalent to 198,000 bags and each bag weighed 200 lb.

A similar reduction was reported in sales of African cattle. From an estimate of at least 20,000 head of cattle sold in 1919 at prices in the order of £7 to £8, by 1921 the demand for African cattle had declined and practically ceased to exist. The trend of decline over time was spectacular. At the beginning of the century, 70 percent of Africans' total earnings came from produce sales, but by 1932 it had fallen to 20 percent. This change was not just a cyclical phenomenon but rather a 'deep-seated' structural change based on the development of policy and institutional changes that had taken place in the country. The African peasant farmers had moved en masse to the more-remote reserves, cut-off from the rail line, other transport systems and credit facilities. Thus, as peasant production for marketed surplus was further curtailed, the forced evictions of Africans into the reserves were aggravated by falling prices in the produce market (Arrighi 1970, p. 216).

With the enactment of the Maize Control Amendment Act of 1940, a new price system was instituted whereby the government guaranteed a fixed price to the producers based on the estimated costs of production plus some profit (Yudelma 1964, p. 273). In 1943, the government guaranteed a price of 13s 6d and a bonus of 2s for all maize delivered to the government maize marketing agency, the Maize Control Board, provided that maize was grown under certain conditions of sound farming practices. These conditions were that the area under maize cultivation should be protected from soil erosion, and that in the first season, one-third of the area (and one-half of the following season) under cultivation should be planted with green manure crop. These conditions obviously discriminated against the African farmers, since the digging of contour ridges for the protection of soil erosion only started in earnest after 1951, under the Native Land Husbandry Act.

As is evident from the situation just described in respect of maize, agricultural pricing policies came to be closely tied to the institutions set up to regulate agricultural activity. In the 1920s the white farmers called for the establishment of statutory marketing agencies in order to stabilize and guarantee agricultural producer prices and help find domestic and foreign markets for their produce. The slump in the prices in the wake of the great depression of the early 1930s made the case for statutory marketing institutions even more necessary. Thus the sudden decline in the price of maize at the beginning of 1931 became the main reason for the setting up of the Maize Marketing Board, established by the Maize Control Act of 1931. It became compulsory

for all maize marketed in the urban areas (except for sales between Africans in the same administrative area) to be sold to the Board.

Maize marketing had thus become a controlled product and the government had established a monopoly over the marketing of maize into the urban areas. The Maize Marketing Board functioned until 1950 when it was replaced by the Grain Marketing Board (GMB), created under the Grain Marketing Act (No. 31). Since its formation, the GMB had controlled the purchase and sale of various products including sorghum (from 1950), groundnuts (from 1951), soybeans (from 1969), wheat (from 1970) and coffee (from 1971).⁵ Following the opening up of the economy in the 1990s, most of the controls were scrapped, – but then they were re-introduced from the year 2001.

Agricultural distortions prior to 1955

As shown above, dualism in the Zimbabwean economy was manifest first and foremost in the land market as a result of successive policy interventions of colonial governments, starting from the beginning of settler colonial rule by the BSA Company. Thereafter, dualism was entrenched through actions in other factor markets (labor and capital) and in product markets, mainly via discrimination in the marketing arrangements of agricultural produce. These relationships interacted to create economic impoverishment of the African agricultural producers and the African labor force. The following interlocking forces contributed to that outcome: land alienation policies and discrimination in the provision of infrastructure and services; population pressure in the African rural areas and soil erosion; low productivity; and migrant labor discrimination and low wages (Ndlela 1981, pp. 58-59).

Zimbabwe's land tenure was split into various distinct farming systems, operated under different land tenure rules, each having its own characteristic farming system. From the colonial period, legislation restricted produce transactions within each category as well as labor and product movements between categories.

⁵ Some other products were initially controlled and later removed from the controls list: beans in 1959, bulrush millet in 1962 and finger millet (rapoko) in 1965.

Dualism also emerged from the biases in factor and product markets, and through the institutional and political mechanisms created by the colonial governments to undermine the participation of the African peasant farmers in marketing agricultural production. The conduct of the marketing institutions that emerged after the depression of the early 1930s was important in this regard, as was the dualistic structure of the transport services in relation to the marketing of agricultural produce. Only 30 percent of the land assigned to Africans, as against 75 percent of that alienated to Europeans, was within 25 miles of the railway line and therefore within reach of markets for agricultural goods in the towns and mines.

From the early years of colonial administration, the policy was to locate the European farms within a radius of 25 miles of the railway line so that white farmers had easy access to the country's transport system. Peasant farmers, by contrast, were cut off from markets. When railway costs were added, grain crops could not bear the costs of more than 15 miles of ox-wagon transport (Arrighi 1970). Thus the general movement of Africans into the more-remote reserves not only reduced the inland resources both in terms of size and quality, but also progressively reduced their ability to compete in grain markets. In order to access export markets from a land-locked situation, Zimbabwe's railways and roads were created with the aim of assisting transit routes to the sea-ports. Virtually all the exports of bulk products (mainly minerals and agricultural products) either go through the Mozambique ports of Beira and Maputo or the South African port of Durban.⁶

In the wake of the drastic fall of export prices of maize in 1931, the government introduced a dual price system, one for the local market (or local pool) and the other for the export pool. Through this quota system, the amount of output allocated to the local pool was that deemed sufficient to meet local demand. The price paid for the local pool was 30 to 50 percent above world prices (Ndlela 1981, p. 164), with the local pool thereby constituting a support price scheme for producers. The remaining surplus was sold to the export pool at whatever prices could be realized in the world market. That is, the quota system served to reduce the marketing of produce of the African majority farmers, a tendency that was further reinforced under the marketing levies applied to African products during the 1950s.

There was discrimination in prices between different price categories of farmers, namely small-scale white farmers, the large-scale white farmers and the African peasant farmers. The

⁶ Beef, however, is exported through Cape Town.

small-scale white farmers were allocated 80 percent of all their deliveries to the high-priced local market, compared with just 20 percent for both the large-scale white farmers and the African peasant producers. Both communal and African Purchase Area (APA) farmers (small-scale black commercial farmers) were lumped together for their deliveries to the high-priced internal market. In other words, though the African peasant farmers were invariably small-scale producers, they were largely excluded from the price incentives enjoyed by the small-scale white farmers. If there had not been a discriminatory price policy, the African peasant farmers would have received higher prices for 80 percent of their deliveries to the higher-priced internal market.

The implications of the maize quota system on farm productivity are obvious, as this was the most important crop produced by both black and white farmers up to the 1950s (after which tobacco became the country's leading crop). In addition, with the clear separation of land settlement between Africans and farmers of European origin, it was possible to direct capital expenditure in roads, dams, communication systems, and other infrastructure to widen the differential in overall productivity between the two racial groups.

Measuring the extent of price distortions, 1955 to 2004

This section provides estimates of the changing extent of distortions to incentives faced by farmers in Zimbabwe, using the standard methodology of the project that is described below.

Methodology and data issues

The main focus of the present study's methodology (Anderson et al. 2008) is on government-imposed distortions that create a gap between domestic prices of farm products and what they would be under free markets. 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 nonagricultural 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 received (or paid) 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 such non-policy price wedges as transport costs, marketing margins, quality differences, etc. Where actual import and export prices are available, these are used in preference to the alternative of constructing a synthetic border price from international commodity reference prices, adjusted for transport and related costs.

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 or sanctioned secondary market (when there were retention schemes for exporters) or the illegal (black) secondary market for foreign currency. Zimbabwe's agricultural commodity institutional arrangements have been such that almost all import and export transactions involving the main crops have taken place at the official exchange rate throughout the five decades covered by this study.⁷

The longest series of border prices is obtained from the trade volume and value data from FAOSTAT. Dividing value by volume produces aberrant unit values in years when volumes were small, but those were filled by using either national trade data (where that is available) or the international commodity reference price approach – bearing in mind that much of Zimbabwe's agricultural trade is within the southern African region rather than to/from international ports.

The producer price and production data for maize, sorghum, wheat, groundnuts cotton and tobacco are available over the entire time period (1955-2004), mainly from the official Central Statistical Office (CSO) and from individual researchers, notably Muir (1981a) and

⁷ Over the 50 year period under study (1955-2004), the average proportion of foreign exchange sold on the parallel market was 0.122. This figure only rose disproportionately to 65 percent in 2002-03 and 75 percent in 2004-05. During the five decades, official transactions of main agricultural commodities took place at official exchange rates. The trading was the preserve of the GMB (for course grains including maize) and CMB/Cottco (for cotton seed and lint).

Masters (1994). Producer price and data are only available from 1960 (sunflower) and 1968 (soybeans), as these are relatively new crops. As many primary and secondary data sources as possible have been consulted to build up the data series needed for the calculations, and it should be noted that there are sometimes quite divergent figures available for any particular commodity and year.

Interpretation of the NRA and CTE results presented below needs also to take account of a number of other issues that arise from the way the calculations have been made. First, the wholesale level was chosen as the point in the value chain where the ratios are calculated. From 1955 to 1990 it is assumed that the wholesale level was constituted by the state marketing boards, namely the GMB for maize and other grains covered in this study (wheat, groundnuts, soybeans, sorghum, sunflower) and the Cotton Marketing Board (CMB) for cotton. Tobacco's point of sale is calculated as the price prevailing at the tobacco auctions in Harare. As explained below, even after the brief period of market liberalization in the 1990s, the GMB continued to provide the reference wholesale level prices. 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 away from the depots. This remained true even after independence when the government did try to improve the position of small farmers in remote areas by extending the network of marketing board rural depots beyond the line of rail and introducing pan-territorial pricing.

Second, attempts were made during the 1990-94 period to deregulate domestic markets for major crops, but less progress was made in the liberalization and de-monopolization of imports and exports by the marketing boards. Though the GMB was completely deregulated by April 1994, it continued to maintain its monopoly on international trade. Then in 2000 the government reintroduced domestic controls, including the compulsory purchase of grain and tight control over transport of maize and other crops. Thus except for the period 1994-2000, the GMB has consistently exercised a statutory monopoly and monopsony over both domestic and international marketing of maize and other major grains.

Third, even during the 1994-2000 period the GMB continued to set minimum guaranteed prices for farmers and it is this minimum price which has been used in the NRA calculations. Farmers who were able to market their products on the free market would have received higher prices and hence have been subject to higher (less negative) NRAs than have been calculated.

Fourth, in the case of seed cotton, those farmers who had received inputs from the Cotton Marketing Board, (CMB, later Cottco), were required to sell their crop through official channels, with a ‘stop order’ system ensuring that any loan due from the input credit scheme was repaid. Initially following liberalization, some farmers tried to market their crop to freelance agents and ginners, and without having to repay their input loans those farmers received higher prices than those used in the NRA calculations. Subsequently, since the inputs were typically subsidized and the interest rates were below the prevailing bank rates, most farmers preferred to market through the main cotton companies and thereby have access to inputs for the following season.

And fifth, for the CTE calculations, the GMB selling price to the millers has been used as the applicable wholesale price. Such prices are only available for maize, sorghum, wheat and soybeans. The way in which subsidies have been given is via the marketing boards: the difference between the GMB/CMB purchase price from the farmer and selling price to the processors, less the GMB/CMB operating cost margin. This difference indicates whether there is a subsidy to producers (positive difference) or to consumers (negative difference).⁸

Overall NRA pattern

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 1.⁹ Year-by-year data are given in Appendix Table 8. Except for sunflower, which is assumed to be a nontradable and whose NRA is estimated to be zero, the NRAs are generally large negative. There were, however, brief periods of positive assistance for some commodities in the late 1950s for maize, early 1960s for cotton and from 1955-1974 for wheat. The overall pattern is one of negative assistance to agriculture after the 1950s. During the 1960s the NRA for covered products averaged -42 percent, then it worsened in the 1970s, 1980s and the first half of the 1990s to an average of -47 percent (peaking at around -54 percent in the latter 1970s). The negative NRA dropped back slightly to -40 percent in the latter 1990s, before relapsing into very severe taxation

⁸ The largest recorded subsidy before hyperinflation set in was in early 2006, when maize was being purchased by the GMB from farmers for \$31,200 per tonne and sold to millers for just \$6,500 per tonne. With a potential profit of \$24,700 per tonne, this provided a huge incentive for the maize to be ‘round tripped’.

⁹ The production shares of the crops covered by this study are shown in Appendix Figure 1, together with their tradability status (exportable, import-competing or non-tradable product). Figure 2 gives household consumption shares of the food crops covered.

of agriculture (NRA of around -70 percent) in the 2000-04 period. That is, farmers are taxed most heavily in the most recent five-year period of the fast-track land reform.

This pattern is the result of the interplay of a number of different influences. The direct influences arise from agricultural sector policies, and the nature and characteristics of agricultural markets, which are discussed in detail below. In explaining the changes in NRAs, it is not just the articulated policies that matter but also their implementation as reflected in the institutional structures, regulations and financial flows to the agricultural sector (subsidies, public sector investments, etc.).

The other main strand of explanation for the NRA pattern lies in the indirect effects of the macroeconomic and trade policies pursued by the government. Various aspects of these are mentioned below, but it is relevant at the outset to stress that the main macroeconomic influence is via exchange rate overvaluation. Using parallel market premium, the Zimbabwean dollar appears overvalued during most of the period under review with heavy spikes immediately after UDI in 1965, and in 1976, 1983, 2001 and 2003 (Appendix Figure 3). In the spreadsheet, the peaks for 1965 and 1976 have been discounted on the basis that the black market premia were much more to do with extreme capital account activity than rates applicable to current account transactions. The NRA values for years such as 1965, 1976 and 1983 are more negative than surrounding years. This is because of a mirror image upward swing in the exchange rate premium.¹⁰

NRAs by commodity

The NRA for *maize* was -46 percent during 1975-79 (the height of the liberation war), -36 percent in 1985-89, -49 percent in 1990-94 and then further worsened to -63 percent in 2000-04 (the height of the FTLRP, the severity of taxation on agriculture notwithstanding unprecedented subsidies to the sector amounting to 19 percent of GDP in 2004). The other traded *cereal crops* (sorghum and wheat) have very large negative NRAs too, particularly in the 1990-2004 period. Amongst the traded oilseeds, the NRA for *groundnuts* is severely and consistently negative at around -75 percent during the UDI period (1965-79) and again peaking at -81 percent in 2000-

¹⁰ The exchange rate influence is evident in Appendix Figure 3. When calculated at the official exchange rate, the NRAs are less negative for most time periods and, for the 2000-2004 period, turn from negative to positive. See the bottom rows of Table 2.

04, with soybeans also always negative but peaking at -68 percent in 2000-04. The NRAs for the export cash crops, *cotton* and *tobacco*, have tended to be negative, though less so than food crops, with cotton at -57 percent, -36 percent and -64 percent in the 1990-94, 1995-99 and 2000-04 periods, respectively. The *tobacco* NRAs have remained negative throughout the period under study, and in certain years are even more negative than cotton's (-39 percent in 1965-69 and -66 percent in 2000-04).

NRA for tradables and for agriculture as a whole

Import-competing products enjoyed higher/less negative NRAs than exportable farm products prior to the 1990s, but their average NRA was positive only prior to the mid-1970s. Over the past two decades their NRA has been even more negative than for exportables, which is unusual. Normally, because import parity prices are higher than export ones, it is expected that the NRAs for import-competing products would be less positive or more negative than the NRAs for exportables. In Zimbabwe's case the import-competing farm sub-sector is relatively small, and those foodgrains are essential for political stability, hence the provision of scarce foreign exchange at a low price to bring in what are effectively subsidized cereal imports

The weighted average NRA for the commodities covered in Table 1 (which account for between 55 and 70 percent of agricultural output over the 50-year period) is reproduced in row 1 of Table 2. To that we add our guesstimate of the NRA for the residual non-covered products. The elements of agriculture that grew most rapidly under the liberalized conditions of the 1990s – horticulture and export-oriented floriculture – did so in a relatively neutral policy environment. Most fruit and vegetables traditionally are for domestic consumption and are not traded internationally. We therefore assume the average NRA for all non-covered products is zero, and assume they are nontradables which is true for most of the period studied. Then the weighted average NRA for all agriculture, and for the tradable component can be estimated. These are shown in Figure 2 and Table 2. Also shown there are the NRAs for non-agricultural tradables, based on import tariff protection rates and assumptions about the shares of import-competing production in the total value of non-agricultural tradables production. That NRA is positive, averaging between 20 and 50 percent, and so is a further dampener on agricultural incentives, as

indicated by the relative rate of assistance (RRA) which is even more negative than the NRA for agriculture.¹¹

Had the exchange rate not been distorted, the agricultural NRAs and RRA would have been considerably less negative (bottom rows of Table 2), suggesting that exchange rate distortions have made a non-trivial contribution for the anti-agricultural and anti-trade bias.

Policies behind the distortions

To trace the evolution of distortionary policies in Zimbabwe, it is helpful to divide the period since 1955 into sub-periods, with the breaks after 1979, 1990 and 1999.

1955 to 1979

The Federation of Rhodesia and Nyasaland retained the status quo of the dualistic economy through land alienation and continued discrimination in labor and factor markets. By 1961 the proportion of land occupied by the African reserves (22 percent of the total land area) was the same as it had been in 1911. Forcible removal of Africans from elsewhere into these areas had started during the BSA period and by the 1960s the reserves formed a vast land patch of farms with irregular plots, a high degree of land degradation through soil erosion, sparse grazing and depleted trees.

Following the Unilateral Declaration of Independence (UDI) in 1965, the Rhodesian regime was forced to contend with international sanctions. UDI resulted in the intensification of the liberation war led by the African nationalists, which focused on the alienation of land from indigenous peoples. The discriminatory policies of UDI regime culminated in the government enacting the Land Tenure Act of 1969, which replaced the Land Apportionment Act of 1930. This resulted in each racial group being allocated equal overall amounts (about 46 percent) of the

¹¹ From 2004, large direct subsidies to agricultural inputs have been provided. Ostensibly these subsidies are in recognition of the need to restore agricultural production following the chaotic land reform program. However, distortions elsewhere in the economy are such that many farmers divert the subsidies into direct profits (e.g., by selling subsidized fuel on the parallel market) or into other channels (e.g., investing low-interest loans in financial markets). As a result, agriculture is not being revived by those direct subsidies.

land, but since the Africans were 96 percent of the population, this worked out to be only 3 hectares for each black person, compared to 60 hectares per a white person.

Agricultural production increased significantly during and after the Federal period with Zimbabwe (then Southern Rhodesia) exporting maize from 1953 to 1962. The export parity maize price was consistently lower than the producer prices which were guaranteed for the domestic market (Muir 1981b, p. 9). The gross returns on exports were only between \$2 and \$6 per tonne higher than the average price paid to producers. Hence the positive NRAs for maize from 1955 to 1960.

When international trade sanctions were imposed on the white Rhodesian minority regime after UDI in 1965, strict administrative controls of imports were imposed. Agricultural output increased strongly in the first decade of this period (by 13 percent pa in 1965-69 and 22 percent pa in 1970-74), while the real value of European agricultural output increased by 45 percent between 1965 and 1979 (Nziramasanga 1980, p. 39). Livestock production grew faster than crop production, with most of the increases after 1969 consisting of increases in the size of European herds. The real value of African agricultural output, however, did not change significantly over this period, increasing by just 12 percent up to 1972 and thereafter declining to less than the 1967 level (*ibid.*). This may be explained by greater rainfall variation in the more arid areas occupied by the Africans, combined with a lack of weather compensating inputs.

Maize yields and area planted increased markedly after 1966. From 1955-64, the dominant policy was to stimulate production through offering higher producer prices. The country's flue-cured tobacco exports accounted for 22 percent of total world exports during 1954-64 but fell during the UDI period (1965-79) and represented only approximately 11 percent of total world exports by 1979.

Another significant influence on agricultural output was the marketing policies of the marketing boards. By the 1960s controlled products included maize, sorghum, groundnuts, soybeans, cotton and tobacco.¹² The non-controlled products were usually regulated by the producers' associations which had the power to levy fees on growers, set minimum quality standards and regulate prices. The most notable of these were the Rhodesian Oilseeds Producers' Association, the Rhodesian Deciduous Fruit Growers' Association, and the Rhodesian Tea

¹² Virginia flue-cured tobacco, which was grown almost exclusively by European farmers in the 1965-79 period, was a "controlled crop". Its marketing was regulated by an Act of Parliament and controlled by the Tobacco Marketing Board, which in turn was under the umbrella of the Agricultural Marketing Authority.

Growers' Association. An umbrella body for the farmers, the Rhodesian National Farmers' Union (RNFU)¹³ worked with the producer associations to improve the producer prices of products, especially those products produced by white farmers.

In 1967, government set up the Agricultural Marketing Authority (AMA) in 1967 to administer the statutory marketing boards, some of which had been in existence prior to its formation. The four organizations under the AMA were the Grain Marketing Board (GMB), the Cold Storage Commission (CSC – now the Cold Storage Company), responsible for livestock and meat products, the Dairy Marketing Board (DMB, now completely liberalized as Dairibord Zimbabwe Limited or DZL)) for milk and milk products, and the Cotton Marketing Board (CMB, now Cottco) for the marketing of seed cotton, cotton lint, and other cotton-derived products. The AMA conducted marketing research for different products, studied the marketing channels and advised the government on marketing policies.

As monopolistic marketing agencies, the marketing boards and producers' associations had the legal authority to levy fees from growers each year (a form of tax), to set producer prices, and to control imports. In the case of tobacco, the Minister of Agriculture had the power to set the minimum auction floor price of the product as well as the production quota. In general, it has been claimed that all the crops in which Africans did not have a share of the market experienced rising prices, an indication of the success of the white-controlled producer associations and the RNFU.¹⁴ However, the large negative NRAs for all commodities during the UDI period (other than for wheat up to 1973) show that these institutions failed to raise producer prices above import or export parity levels.

In addition to the fundamental injustice of discriminatory land policies, there were many other measures which prejudiced African producers. For example, levies charged on sales by black farmers were used as a segregated marketing tool between whites and blacks in the produce market. The levy charged could be as high as 15 percent of the selling price. The money raised through these levies was paid to the Ministry of Internal Affairs' African Development Fund for use in the general development of the communal areas (African areas). Quite like the

¹³ Since independence in 1980 the Rhodesia National Farmers' Union (RNFU) became the Commercial Farmers' Union (CFU) and continues to represent the commercial farmers, while the majority of small and indigenous farmers are represented by the Zimbabwe Farmers' Union (ZFU).

¹⁴ For example, the Tobacco Association which carried out tobacco surveys to document production costs, and had a say in the minimum price, assisted the Minister in setting minimum prices. Thus tobacco remained a profitable crop despite the economic sanctions.

allocation of maize quotas described above, the levy, was a form of discriminatory tax, which tended to reduce the receipts from the sale of African peasant produce, further strengthening dualism in the produce market.

European farmers could sell their agricultural output directly to the Marketing Boards so that they did not need to pay the marketing levy. Their grain was graded and delivered in bags to the depots established along the railway line. The maize was purchased using the prescribed producer prices, with an advance amount paid out at the beginning of the harvest period. The advance was usually less than the prescribed price and the Board paid out an adjustment at the end of the season, based on the outcome of market conditions. The bulk of the African farmers were ineligible to market their produce through the Marketing Boards due to lack of economies of scale and various discriminatory practices, and therefore sold their produce through approved buyers (agents) who in turn delivered it to the Marketing Boards.

The calculated NRAs, which are based on European farmers' prices and apply to producers close to the rail line, therefore understated the negative incentives facing communal farmers. Another factor worsening their position was the lack of credit facilities available to African peasant farmers, especially prior to 1945 when a small section of black commercial (African Purchase Area) farmers were given some credit for land improvements. But the majority of the African peasant farmers who benefited did not receive loans from the African Loan Fund until the 1960s, and even they represented only a small proportion of the African farmers.

1980 to 1990

The first post-independence decade in Zimbabwe was characterized by a controlled economy and, in the sphere of land, by some piloting of land reform models. In 1982 the Resettlement Areas (RAs) were introduced, consisting of land originally purchased from large-scale commercial (LSC) areas by the Mugabe's post independent government for resettlement of selected black farmers. Tenure in the RAs remained broadly similar to that of the communal areas, with open access grazing areas and individually held cropping areas. However, by 1985 the resettlement program had ran out of steam, and concern started over neglect of land reform.

To stimulate agricultural production in the communal areas, extension services were greatly expanded in the early 1980s and marketing services extended into remote areas. Thus while prior to 1980 the GMB and CMB operations were mostly commercial and geared to marketing grain products mainly from the LSC farmers, during the 1980s the GMB and CMB expanded their marketing operations to communal areas in response to government social and strategic goals. The GMB had both commercial and non-commercial roles. Its commercial roles related to the purchase, storage, and subsequent sale of agricultural produce to meet profitable market opportunities. Its non-commercial activities related to price support/stabilization activities, reserve food stock holdings, and provision of uneconomic depots as marketing channels for small holder farmers and consumers in rural areas.

The distortions behind almost all agricultural crops in the 1980s, where all NRAs were well below zero, arose from government's desire to maintain the multiple objectives of national food self-sufficiency, food security, low-priced food for consumers and access to marketing channels for all farmers wherever they were located. This led to a set of policies combining higher domestic producer prices than in neighboring countries (but still well below border prices), subsidized consumer prices, accumulation and maintenance of strategic stocks, and an expansion of the depot network.

Subsidies were generally administered at two levels. One was via the trading accounts of the agricultural parastatals, mainly for the GMB, the CMB, the CSC and the DMB; the other was as direct payments to millers and processors. As shown in Appendix Table 3, the bulk of the subsidies during in the 1983/84 period went to maize distribution and in 1984/85 a substantial amount went to export subsidies (Chelliah 1986, p. 266). Subsidies to processed consumer goods, which peaked in 1982/83, were almost predominantly for maize meal.

Since colonial days the government has been committed to a cheap food policy for urban dwellers and the non-farm workforce, so keeping food producer prices low has been an important fiscal need. So even though subsidies have been provided to both "producers" and "consumers", they have tended to benefit mainly the latter group in urban areas who represent a relatively small share of the population, and at the expense of the majority of the poor who are in rural areas and dependent directly or indirectly on agriculture for their livelihood (Ndlela, Kanyenze and Munemo 1999).

1991 to 1999

Under the Economic Structural Adjustment Program (ESAP), which was launched in 1990, there was a general liberalization of the previously tightly controlled economy. Price and interest rate controls were unwound, trade was liberalized and there was commercialization and privatization of some of the public enterprises. The agricultural parastatals included in this list were Dairiboard Zimbabwe Limited (DZL) and the Cotton Company of Zimbabwe Limited (Cottco). The liberalization of the cotton sector had a positive impact on the level of production and widened the geographical distribution of production. Training and extension also benefited from the changed environment, and input credit increased. A well-organized and efficient private seed company has taken over the production of cotton planting seed.¹⁵

Maize, which had been a controlled product from 1931, was decontrolled in 1994, allowing farmers to sell to whoever they chose. However, GMB (which was not privatized like other parastatals) retained its monopoly over import and export – and in 2001 the government reasserted control by promulgating Statutory Instrument 235A, which enabled the government to monopolize the marketing of maize and wheat by criminalizing any non-GMB sales of these products by farmers, even sales to their starving neighbors.

The break in policies from strict controls of the 1980s to the liberalized regime of the 1990s is not reflected in a change from the continued high levels of negative NRAs to agriculture of the previous decades. This is largely explained by the pace and structure of the domestic liberalization in the marketing of grains, which left the GMB with its continued monopoly of international trade. For most of the period, the GMB continued to exercise a statutory monopoly and monopsony over both domestic and international marketing of maize and other major food crops. The GMB had the mandate to buy these crops from farmers through a system of gazetted “producer prices” and sell the raw products to millers and other food processors who, after processing, sell the finished products directly to the public and to retailers.

The brief period of maize marketing liberalization (1994-2000) saw a significant change in the structure of maize and maize meal markets. The previously single channel marketing

¹⁵ Cottco (Cotton Company of Zimbabwe) Group has interests in two seed houses, holding a 100 percent interest in Quton Seed Company which produces cotton planting seed and holding a 40.5 percent share in Seed Co Limited, (listed separately on Zimbabwe Stock Exchange). It produces and markets maize seed and other broad acre crop seeds.

system became a dual market, consisting of both ‘private’ and ‘official’ segments. The private sector consisted of farmers, traders and hammer mills. These operated legally in Zone B (non-commercial or communal farming areas) from the 1992/1993 marketing season and illegally in Zone A (commercial areas and industrial mills) up to the start of the 1994/1995 marketing season. The private segment of the market flourished in a partially deregulated environment and captured an increasing share of maize and maize meal markets at the expense of the official market, while the ‘official’ maize market, as represented by industrial millers and the GMB, witnessed an erosion of the market share.

The political mandate of the GMB was to honor the fixed producer price for all farmers during the entire marketing season (so-called pan-territorial and pan-seasonal pricing). The main problem with the maize movements under full liberalization and the pan-territorial pricing policy was that private traders would encroach on the Board’s least-cost markets for maize procurement, while compelling the latter to procure maize from remote locations at greater cost. Another major distortion with the operation of the pan-seasonal pricing policy was that the government could choose a fixed producer price without certain knowledge about the next crop’s size, which would vary according to weather conditions relative to producer incentives and farmer’s choices over deliveries to the GMB or retentions for other purposes.¹⁶

The reform measures effectively reduced the GMB to a residual buyer or seller of maize (and other crops), depending on the relationship between the pre-set producer price and the price that emerged in the private sector. The GMB found itself in an invidious position of purchasing large maize surpluses even in normal years and able to sell domestically only under exceptional circumstances such as drought. In a year of good harvest such as in the 1993/94 marketing season, the GMB losses were estimated at Z\$1.4 billion or roughly 4.6 percent of GDP, which was normally absorbed by the Treasury at taxpayers’ expense.¹⁷

Given the financial ramification of the maize price policy, it is important to assess the impact on other objectives of this policy stance. The objectives of higher producer prices and maize marketing reforms included ensuring the viability of maize production by farmers,

¹⁶ The GMB had no way of knowing whether farmers would deliver maize to its own depots or to the private market after deregulation. If the producer price is not consistent with the private sector’s valuation of maize, the GMB cannot compete effectively in a deregulated environment. By definition, the pre-season’s announced producer price could not be adjusted ex-post to reflect market conditions. It is more than likely that the announced price would be at variance with the private sector’s valuation of maize.

¹⁷ The GMB loss includes all handling, storage, transport, administrative and financial losses of maize marketing.

transferring income toward smallholders (small commercial, communal and resettlement farmers), increasing food security, increasing private sector participation and increasing production so as to recover from previous droughts. In the immediate post 1993/94 maize marketing season, the two last objectives were achieved: production recovered from the previous drought, and the private sector participation in maize and maize meal marketing became firmly established.

The GMB has over the years, since its establishment in 1931, exercised tight control over marketing, domestic prices and the provision of inputs. (Appendix Table 4 shows the changing structure from regulation to deregulation and then re-regulation from 1990 to 2006.) The objective of ensuring increased viability of maize farmers while transferring incomes towards smallholder growers was not achieved, as the bulk of the benefits accrued not to small farmers but to large-scale commercial (LSC) farmers (Jayne 1993). In the 1990s, an average of 74 percent of the GMB's purchases originated from only 5 percent of all farms in Zimbabwe. In the 1993/94 marketing season, the major beneficiaries of high support prices consisted of the 1,360 LSC farmers and 4,470 small-scale commercial farmers.

The distribution of maize purchases by the GMB was highly skewed within each sub-sector, with about 15 percent of the farms (206) benefiting from 75 percent of GMB purchases from the LSC farmers, and only 4 percent of the farms (4,470) benefiting from 36 percent of the GMB purchases from the smallholder sector (Collier and Foroutan 1996). The LSC and SSC farmers as groups are likely to have realized the full producer price as a result of their proximity to the market and/or GMB depots. In general the strong lobby of the LSC farming sector ensured that controlled prices served their interests. Even so, except for the years 1995 and 2000, the calculated NRAs that apply to farmers located close to GMB depots remained strongly negative.

The remaining communal smallholder farmers that delivered maize, primarily in small lots, and shared only 26 percent of the revenues of the GMB purchases (Chipika 1994). Smallholder farmers benefit less than LSC farmers from an increase in the official producer price of maize due to a combination of a lower maize price elasticity of supply, fewer substitution possibilities, higher transaction costs, and the current distribution of land.

Selling prices and consumer prices of unprocessed, semi-processed and highly processed grain products were largely controlled by the government following negotiations with the

wholesale buyers of grain; and the Ministry of Industry and International Trade becomes the custodian of consumer price interests.

The liberalization of the domestic maize market in 1993 made the “straight-run” maize meal¹⁸ more attractive to consumers, than the more processed variety of “roller” maize meal. Whereas 70 percent of urban households consumed roller meal in March 1993, the level fell to 23 percent by December 1993, with a commensurate rise in consumption of “straight-run” maize meal. However, this supply response could not be sustained. Most small-scale millers were forced to close down owing to high input costs associated with inadequate supplies of maize (Ndlela, Kanyenze and Munemo 1999, p. 41).¹⁹

The government has not adequately address the supply constraints facing maize producers (especially the small holder communal farmers) through access to infrastructure, technologies and applied research. Nor has there been a maize input scheme under the GMB, such as that provided for cotton. The government also failed to allow producer prices to fluctuate between export and import parity depending on supply, to provide incentives for farmers to produce more or less maize. And agricultural market liberalization coincided with reduction of resources for continued farmer training, improved extension services, crop management research and the use of more suitable varieties.

The negative NRAs were to some extent offset by subsidies to inputs, although in Zimbabwe there have never been generalised input subsidies. In particular, fertilizers have not been subsidized, but concern about the concentration of Zimbabwe’s fertilizer industry led the government to control fertilizer prices. It has, however, been recognized by the authorities that price controls on fertilizer encouraged fertilizer use in areas where it was not suitable (WTO 1995, p. 55).

As part of drought relief programs, in-kind subsidies of both seed and fertilizer were periodically made to farmers, especially smallholders. Other input subsidies include the Cotton Inputs Scheme which was started in 1992 with the assistance of the World Bank, and administered by the CMB. Under the scheme, cotton inputs are supplied on credit to cotton growers, most of whom are smallholders, and the loan is repaid when the cotton is marketed.

¹⁸ This is referred to as “mugaiwa” in Zambia, and while not officially referred to by that name in Zimbabwe, mugaiwa is also the normal name of the ‘straight-run’ maize meal in Zimbabwe’s vernacular languages.

¹⁹.After the re-introduction of controls of the maize marketing by the GMB and the demise of the small-scale hammer millers after 2000, Zimbabwean consumers are now back to consuming the ‘roller meal’ brand of maize meal.

After the cotton industry liberalization in 1995, the Cotton Company of Zimbabwe (Cottco) continued with the inputs scheme, although other industry players initially did not want to be involved in input credit recovery. In this case, Cottco became the only company providing an input credit scheme and it had to fight against the poaching of input-recipient farmers by small traders who offered higher prices for seed cotton (which were affordable because they were not providing input credits). These traders bought seed cotton without grading, so quality suffered. This threatened to erode the high premium enjoyed by Zimbabwe cotton in the international market (Goreux 2003, p. 16). Even though this problem has not been solved (because the government is prevaricating over enacting appropriate legislation) larger and more-established cotton ginning companies are now participating in the input credit scheme.

The provision of inputs by the cotton ginning companies, and their monopsonistic position in purchasing seed cotton at the end of the season, goes a long way to explaining why large negative NRAs persist for cotton after liberalization (Goreux 2003, Section 2.6). What is more difficult to explain is why there are high rates of negative assistance for all of the other crops where liberalization has occurred and where there are many more players and so much more competition than in the cotton market. One plausible explanation is that the monopsonistic buying that is evident in the cotton sector is also present in the purchase of cereal and oilseed crops, where the buyers operate in specific localities in which competition is relatively limited.

Furthermore, buyers 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 in relation to border prices. This would apply in particular to small-scale farmers who typically try to raise cash as soon as they have harvested a marketable product, and do not have access to borrowing to allow them to store their crops to take advantage of higher prices later in the season.

This study is oriented to measuring policy-induced distortions and it is thus important to note that the market imperfections that lead to seemingly inefficient trading situations are not the result of policy choices that could readily be reformed by a change in policy by the government. Prior to liberalization, large negative NRAs can be attributed to policy decision to hold down producer prices, but what about after market liberalization? Part of the explanation may well be a result of using average prices for each calendar year without weighting monthly prices by the volumes actually traded. But the rest may be attributable to the market imperfection discussed

above. For Zimbabwe in the period 1995-99, the data suggest that this “market imperfection margin” may have been as large as 36 percent across all crops ranging from a low of 24 percent for maize to a high of 74 percent for sorghum.

2000 to 2004

From 2000 the dramatic deterioration in productivity in the agricultural sector was the result of the fast-track land reform program, coupled with the effects of macroeconomic mismanagement (including shortages of imported inputs such as fuel, seed and fertilizer) and the disruption of research and extension services, input supplies and marketing systems. While the need for land reform was long overdue, the manner in which it was done was clearly never intended to solve the land question. The beneficiaries are clearly confirmed by the government’s own constituted land audits (Government of Zimbabwe 2003). The ruling party stalwarts, who own multiple farms, have been left alone while millions of hectares lie fallow and farmers in all tenure systems have had to go without inputs year after year.²⁰ The FTLRP involved wanton destruction of agricultural infrastructure, which subsequent massive subsidies have failed to address. The collapse of the agricultural sector, which had strong forward and backward linkages with other productive activities and commercial services, was a major contributor to the precipitous decline in performance of the entire economy.

The fundamental agricultural policy change in the new millennium was the reversal of the 1994 decontrol of the maize market, allowing farmers to sell to whomever they wanted, though the GMB retained the monopoly over import and export. By Statutory Instrument 235A of 2001, the government re-controlled maize and wheat and criminalized any selling of maize by farmers even to their neighbors, let alone to independent market players. In an accelerating inflationary environment, the prices offered to farmers failed to take account of rapidly rising prices elsewhere in the economy. It is not therefore surprising that by 2003, the NRAs of the major crops had fallen to all-time lows of the order of -90 percent. Maize producer prices were relatively higher than other crops, though, with the maize NRA in 2003 at ‘only’ -44 percent.

²⁰ President Mugabe is on record as having said “It’s clear we ...have serious bottlenecks in the system of procuring and supplying inputs to our people now on the land... The farmer prepares for the season diligently, only to be failed by the various arms of government. Closing remarks at his 2005 Party Congress at Esigodini, as reported by Sunday Mail of 11 December 2005.

Prospects for reform

In present day Zimbabwe, to say that the current policies of the incumbent government fall short of what is needed to address the deteriorating economic situation would be a gross understatement. Even the fiscal and monetary policies announced in mid-2006 are anti-growth and pro-inflation, heralding further economic and social decline. Measures such as strong fiscal adjustment, full liberalization of the exchange rate regime, and strengthening reforms for the agricultural sector are a distant prospect.

The crisis in the agricultural sector and the economy as a whole is politically induced, and until such time as there is a political realignment which allows a bold change in policy direction, the economic outlook will remain bleak, with particularly detrimental effects on the poorest segments of the population. It is only political changes that will allow the basic conditions for economic recovery to be restored. These include the re-establishment of the rule of law, including respect for private property rights, and the formulation and implementation of a comprehensive program to address the crisis in a systematic and internally consistent manner.

Political change is also a pre-requisite for addressing the land question in an equitable and balanced fashion. This in turn remains vital for the resolution of Zimbabwe's deep socio-economic crisis. Once there is a regime change, the challenge will be for the authorities to implement a comprehensive package of macroeconomic policies and structural reforms to lay the basis for sustained growth, low inflation, and external viability. Overarching policies for the restoration of the agricultural sector will be needed, aiming at restoring and enhancing the productivity of the sector as a whole, integrating different modes of production so as to overcome dualism, and reducing the historically entrenched distortions to agricultural incentives.

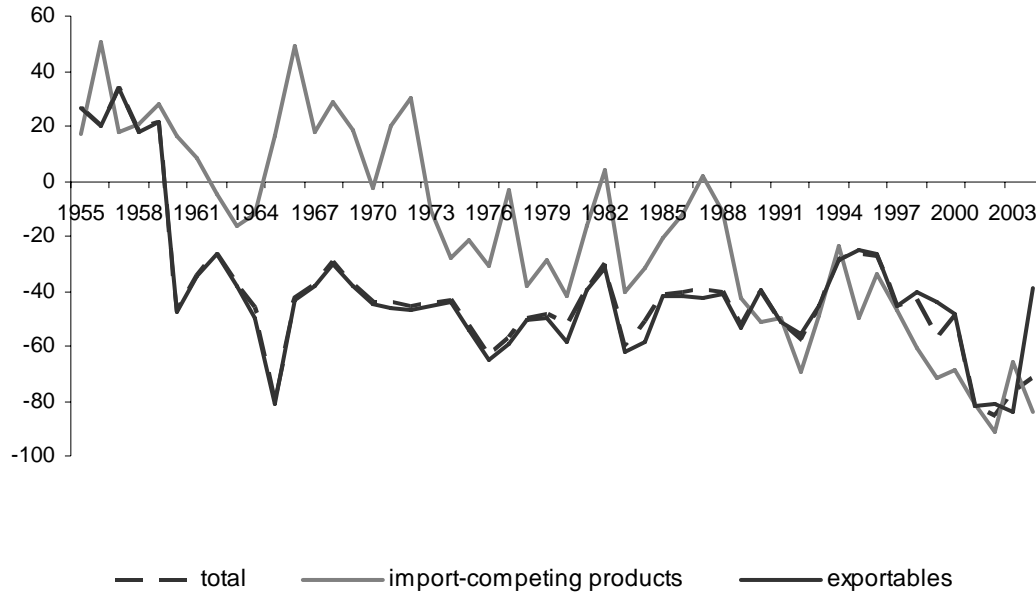
References

- 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.
- Arrighi, G. (1970), “Labor Supplies in a Historical Perspective: A Study of the Proletarianization of the African Peasantry in Rhodesia”, *Journal of Development Studies* 6(3).
- Central Statistical Office (2005), *Agriculture Year Book*, Harare: Government Publications.
- Chelliah, R.J. (1986), *Report of the Commission of Inquiry into Taxation*, Harare: Government of Zimbabwe, April.
- Chipika, J.T. (1994), “Structure of the Peasantry Household Decision Making and Supply Response: The Case of Maize and Cotton in the Peasant Agricultural Sector in Zimbabwe 1965-1989”, unpublished PhD. thesis, Economics Department, University of Zimbabwe.
- Collier, P. and F. Foroutan (1996), *Zimbabwe – Consolidating the Trade Liberalization*, report prepared for the Government of Zimbabwe with the assistance from the United Nations Development Program/World Bank, Washington DC.
- Goreux, L. (2003), “Reforming the Cotton Sector in Sub-Saharan Africa”, Second Edition, Africa Region Working Paper 62, World Bank, Washington DC.
- Government of Zimbabwe (2003), *Report of The Presidential Land Review Committee Under the Chairmanship of Dr. Charles M.B. Utete*, Volume I, Main Report and Volume II, Special Studies.
- Loney, M. (1975), *White Racism and Imperial Response*, Hammondsouth: Penguin African Library.
- Masters, W. A., (1994a), *Government and Agriculture in Zimbabwe*, Westport CT: Praeger Publishers.
- Masters, W. A., (1994b), “The Scope and Sequence of Maize Market Reform in Zimbabwe”, *Food Research Institute Studies* 22(3).
- Muir, K. (1981a), “Crop Production Statistics: 1940-1979”, Working Paper 4/81, Department of Land Management, University of Zimbabwe, Harare, May.

- Muir, K. (1981b), "Crop Production in Zimbabwe's Commercial Agricultural Sector: 1940-1979", Working Paper 6/81, Department of Land Management, University of Zimbabwe, Harare, July.
- Ndlela, D.B. (1980), "The Rhodesian Economy in a Historical Perspective, Part I" in *Zimbabwe Towards the New Order, An Economic and Social Survey*, Volume II, United Nations, UNCTAD/MFD/19, UNDP PAF/78/010.
- Ndlela, D.B. (1981), "Dualism in the Rhodesian Colonial Economy", *Lund Economic Series 22*.
- Ndlela, D.B., G. Kanyenze and J. Munemo (1999), "A Review of Pricing Policy in a Liberalized Environment in Zimbabwe: The Case of Basic Commodities", Prepared for the National Economic Consultative Forum Taskforce on Prices and Incomes, January.
- Nziramasanga, M. (1980), "Agricultural Sector in Zimbabwe: Prospects for Change and Development", in *Zimbabwe Towards the New Order, An Economic and Social Survey*, Working Papers, Volume 1, United Nations, UNCTAD/MFD/19, UNDP PAF/78/010.
- Palmer, R. (1977), *Land and Land Discrimination in Rhodesia*, London: Heinemann.
- Riddell, R.C. (1978), "The Land Problem in Rhodesia: Alternatives for the Future", Gweru, Rhodesia: Mambo Press and London: Catholic Institute of International Relations.
- Reserve Bank of Zimbabwe (2005), "Monetary Policy Statement", Issued by Gideon Gono, Governor of Reserve Bank of Zimbabwe, October.
- World Bank (2001), *Global Economic Prospects and the Developing Countries*, Washington DC: World Bank.
- World Bank (2005), "Agricultural, Rural and Social Development", AFTS1 Country Department 3, Zimbabwe, Africa Region, Report No. 32699-ZW, - World Bank, Washington DC.
- World Trade Organization (1995), *Trade Policy Review: Zimbabwe 1995*, Geneva: World Trade Organization, February.
- Yudelman, M. (1964), *Africans on the Land: Economic Problems of African Agricultural Development in Southern, Central and East Africa, with special Reference to Southern Rhodesia*, Cambridge MA: Harvard University Press.

Figure 1: Nominal rates of assistance to exportables, import-competing and all^a agricultural products, Zimbabwe, 1955 to 2004

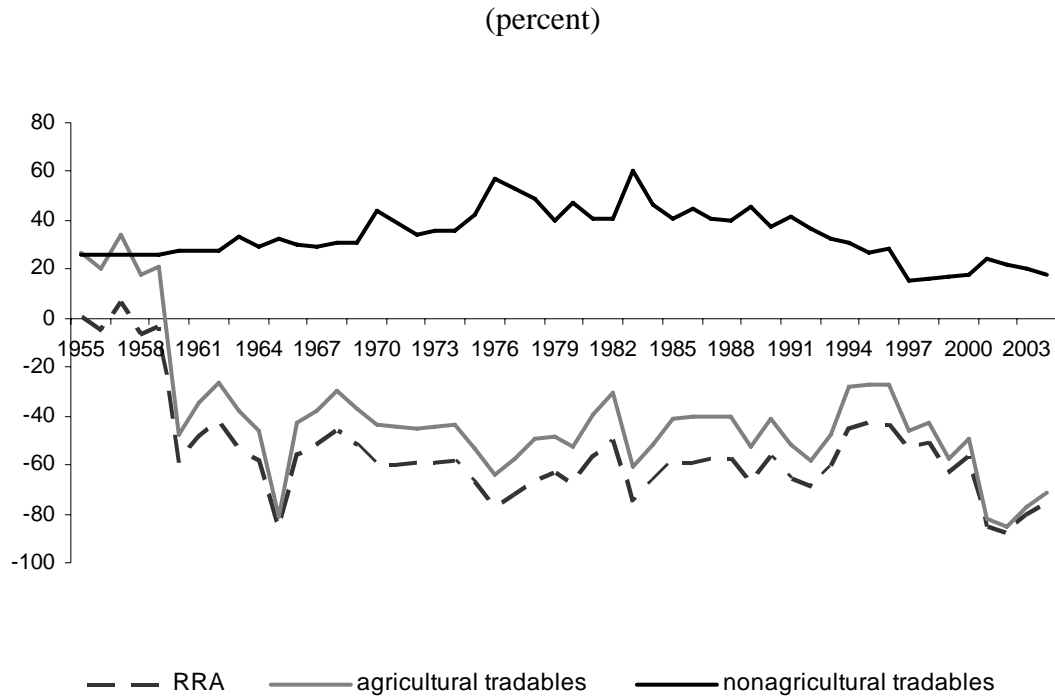
(percent)



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, Zimbabwe, 1955 to 2004



Source: Authors' spreadsheet

a. 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 nonagricultural sectors, respectively.

Table 1: Nominal rates of assistance to covered farm products, Zimbabwe, 1955 to 2004
(percent)

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Exportables^{a, b}	23.9	-39.4	-46.3	-45.4	-55.8	-50.0	-44.2	-44.3	-36.4	-66.7
Groundnut	-38.5	-50.1	-79.3	-74.8	-73.2	-68.7	-41.9	-49.5	-46.0	-80.9
Cotton ^c	-86.9	84.1	-27.5	-43.6	-56.6	-52.5	-47.8	-57.4	-36.3	-63.5
Tobacco	n.a.	-42.7	-39.1	-45.7	-53.0	-45.7	-45.9	-37.2	-35.0	-66.0
Import-competing products^{a, b}	26.8	-1.6	26.2	1.9	-24.6	-25.2	-17.0	-48.5	-52.5	-78.2
Wheat	26.8	33.7	56.6	15.0	-23.7	-11.7	-8.6	-47.3	-43.8	-76.6
Nontradables	0.0	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	0.0
Mixed trade status^b										
Maize	39.0	-5.1	-21.9	-22.3	-45.6	-30.8	-36.0	-49.0	-32.9	-62.9
Sorghum	n.a.	-9.8	-16.5	-57.1	-38.6	-30.9	-36.8	-63.6	-74.3	-77.1
Soybean	n.a.	n.a.	-14.1	-28.5	-42.0	-42.2	-33.6	-48.5	-54.3	-68.4
Total of covered products^a	23.9	-38.5	-45.5	-44.2	-54.4	-46.7	-42.7	-44.8	-39.9	-72.9
Dispersion of covered products ^d	78.4	73.1	56.2	36.9	27.7	28.1	24.4	25.2	27.3	33.9
% coverage (at undistorted prices)	71	71	66	59	52	52	56	55	53	53

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 on their trade status in each year.

c. Cotton average for 1975-79 excludes 1977.

d. 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, Zimbabwe, 1955 to 2004
(percent)

	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Covered products	23.9	-38.5	-45.5	-44.2	-54.4	-46.7	-42.7	-44.8	-39.9	-72.9
Non-covered products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All agricultural products	16.9	-27.2	-30.8	-26.0	-28.6	-24.0	-24.1	-24.9	-21.2	-38.7
Trade bias index ^a	-0.01	-0.37	-0.58	-0.44	-0.40	-0.33	-0.31	0.13	0.42	0.83
<i>Assistance to just tradables:</i>										
All agricultural tradables	23.9	-38.5	-45.6	-44.2	-54.5	-46.7	-42.9	-45.2	-40.0	-72.9
All nonagricultural tradables	26.0	29.1	30.8	37.8	48.1	46.9	42.2	35.9	20.9	20.2
Relative rate of assistance, RRA^b	-1.7	-52.3	-58.3	-59.5	-69.1	-63.4	-59.8	-59.5	-50.6	-77.3
MEMO , ignoring exchange rate distortions:										
NRA, all agric. products	37.3	-32.9	-24.5	-27.7	-31.3	-23.9	-21.4	-31.6	-30.8	-46.2
Trade bias index ^a	0.10	-0.31	-0.40	-0.21	0.13	0.36	0.13	0.59	0.71	
RRA (relative rate of assistance) ^b	9.4	-47.8	-41.3	-44.6	-48.4	-42.3	-40.5	-50.8	-47.0	-63.1

Source: Authors' spreadsheet

a. 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.

b. 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 nonagricultural sectors, respectively.

Appendix: Key quantity and price data, assumptions and sources

Quantity data for agricultural products and lightly processed foods

Production volume data are primarily from CSO, Ministry of Lands & Agriculture publications, in early years the CSO Quarterly Digest of Statistics and Ministry of Agriculture annual Agricultural Statistics Bulletin. The main source of data was the CSO and the marketing boards. From 1954 to 1979 some data were collected from Muir (1981a). In recent years, data were collected from the CSO and supplied in both hardcopy publications and 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 (mainly Cottco Annual Reports and the Zimbabwe Tobacco Association, 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 generally assumed to be production plus imports less exports (no stock change data are available). In the case of maize, an estimate of cattle feed requirements (together with small industrial use) was made, with adjustments for drought years. Domestic consumption of tobacco is assumed to be 5 percent of production.

Wholesale product prices

The main sources again are CSO and GMB publications and electronic data. Some primary product prices have also been available from the main processing companies such as the CMB/Cottco Annual Reports.

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 black market premia in Easterly (2006). The proportion of export revenues realized on the parallel market is assumed to be 10 percent in most years, 5 percent from 1955-1964, and 25 percent from 1965-1979 which was the period of rationing of foreign exchange because of international sanctions on Rhodesia. Multiple exchange rates operated mainly from 2000, the principal 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

Electronic data generously provided by Will Masters, relating to his 1994 book on Zimbabwe, 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 Zimbabwe 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 Chelliah (1986), Masters (1994a) and various World Bank publications on Zimbabwe. 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

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>

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.

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

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).

Muir, K. (1981a), "Crop Production Statistics: 1940-1979", Working Paper 4/81, Department of Land Management, University of Zimbabwe, May.

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

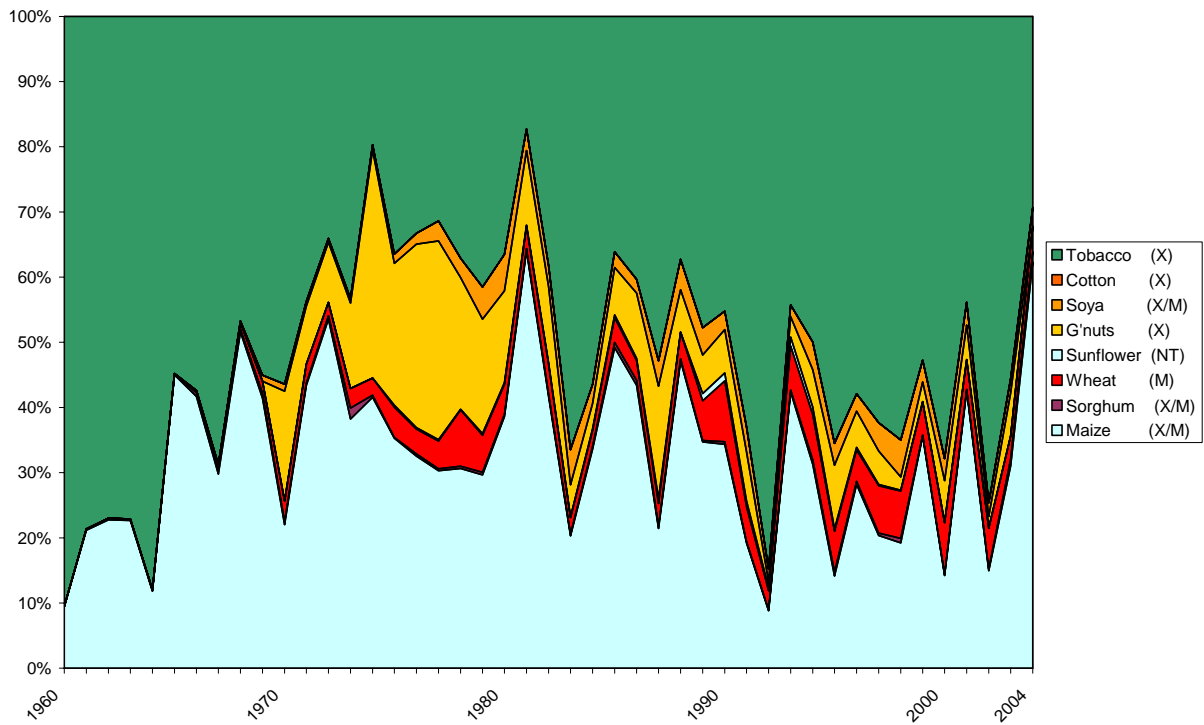
Acronyms

APA	African Purchase Areas
AMA	Agricultural Marketing Authority
BSA	British South Africa Company
CMB	Cotton Marketing Board
COTTCO	Cotton Company of Zimbabwe
CSO	Central Statistics Office
DMB	Dairy Marketing Board
DZL	Dairibord Zimbabwe Limited
ESAP	Economic Structural Adjustment Program
FAOSTAT	Food and Agricultural Organisation Statistical Database

FTLRP	Fast-track Land Reform Program
GMB	Grain Marketing Board
LSC	Large Scale Commercial farmers
RNFU	Rhodesia National Farmers' Union
SSC	Small Scale Commercial farmers
UDI	Unilateral Declaration of Independence

Appendix Figure 1: Product shares of agricultural output, covered products, Zimbabwe, 1960 to 2004

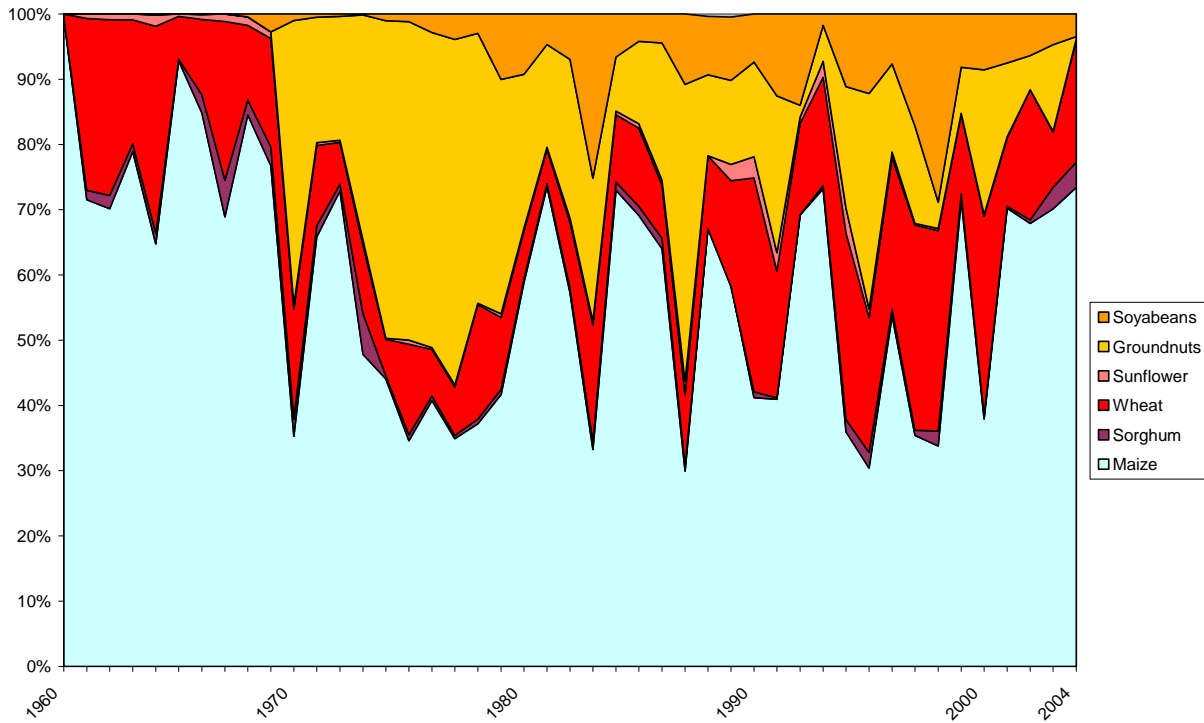
(percent, at undistorted prices)



Source: Authors' spreadsheet

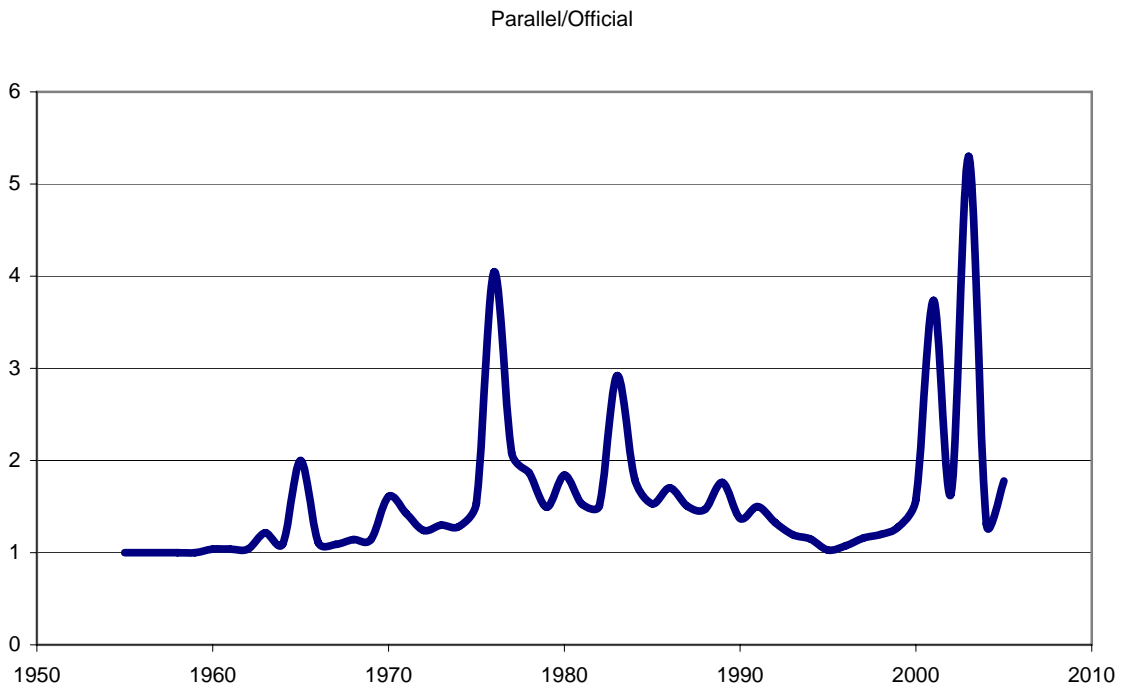
Appendix Figure 2: Household consumption shares, covered food products, Zimbabwe, 1960 to 2004

(percent, at undistorted prices)



Source: Authors' spreadsheet

Appendix Figure 3: Black market premium, Zimbabwe, 1955 to 2004



Source: Authors' spreadsheet

Appendix Table 1: Key periods in Zimbabwean history

Dates	Political & Economic Framework	Land Policy	Agricultural & Food Policy
13th-15th Century	Mhunumutapa Great Zimbabwe		Food production to sustain the Mhunumutapa empire. Cotton cloth also produced. Trading.
1890-1923	British South Africa Company ruling under a Charter from Britain	Reserves set aside for Africans, white settlers occupying the best agricultural land	Policy intended to promote European agriculture, provide cheap wage goods & limit reserves to reproduction of labour
1923-1953	Southern Rhodesia self-government under white minority	Land Apportionment Act 1930 entrenched highly inequitable land distribution	Dualism of agriculture entrenched through distortions in factor & produce markets & operation of marketing boards.
1953-1963	Federation of N&S Rhodesia and Nyasaland		Growing maize and tobacco exports
1965-1979	Unilateral Declaration of Independence Rhodesian regime under int'l sanctions	Liberation war focus was on the alienation of land from the indigenous peoples	Strong government support to white large-scale commercial farmer.
1980-1989	Independent Zimbabwe Controlled economy	Piloting of land reform models. Planned reforms ran out of steam in 1985	Spread of marketing facilities and extension services into remote areas. Prices based on cost of production
1990-1999	Structural adjustment Liberalisation of the economy	Growing concern over neglect of land reform. Int conference plan (1998) rejected by President	Commercialisation and some privatisation of agricultural parastatals. Prod prices more closely linked to world prices.
2000-2004	Precipitous structural change Pro-inflation macro-economic policies	Fast-track land reform associated with collapse of agricultural production	Land reform beneficiaries not necessarily farmers. Collapse of input supply. Massive subsidies

Sources: Ndlela (1980), Palmer (1977), Nziramasanga (1980), Riddell (1978)

Appendix Table 2: Land Apportionment in Zimbabwe, 1911 to 2002
(percent of total land area)

1911	Native Reserves	22.4
	European land	20.0
	Land held by BSA Company ^a	57.6
1925	Native Reserves	22.4
	European land	32.6
	Crown Land - unassigned	45.0
1931	Native Reserves	22.4
	Native Purchase Area	7.7
	European Area	50.8
	Forest and Unassigned land	19.1
1961	Native Reserves	22.4
	Special Native Area	11.0
	Native Purchase Area	8.0
	European Area	44.6
	National Land	14.0
1969	African Area	46.4
	European Area	46.6
	National Area	7.0
1980	Communal lands	41.4
	Small-scale Commercial	3.5
	Large-scale Commercial	39.1
	National parks, urban and state land	15.9
2002	Communal lands	41.4
	Resettlement prior to fast track	7.6
	Model A1 Resettlement	13.6
	Small-scale Commercial	3.5
	Model A2 Resettlement	14.1
	Large-scale Commercial	8.1
	National parks, urban and state land	11.6

Sources: Ndlela (1981), Central Statistical Office (2005).

^a A Privy Council decision of 1918 passed the BSA Company land into the Crown land area. This gave de facto ownership and control to the 1923 Southern Rhodesia government

Appendix Table 3: Agricultural producer and consumer subsidies, Zimbabwe, 1980 to 1985
(Z\$ million)

Item	1980	1981	1982	1983	1984	1985
Prod. and distribution	15.4	19.8	7.1	25.3	71.1	75.9
Consumer subsidies:						
Maize meal	1.9	20.2	46.4	49.2	28.0	14.4
Beef	29.9	11.3	25.7	33.2	36.5	41.6
Dairy	0.4	5.7	10.4	18.5	24.9	31.7
Totals	47.6	56.9	89.5	126.2	160.5	163.6

Source: Chelliah (1986, Table 3.11).

Appendix Table 4: Maize marketing regulation, deregulation and re-regulation, Zimbabwe, 1990 to 2006

Marketing Seasons – Period	Producer price (PP) of white maize
1990/1991 marketing season	Z\$225 /MT
· Maize movements allowed in contiguous areas	
1991/1992 marketing season	Z\$270 /MT
· Maize movements allowed in non-contiguous areas	
· March 1992 announcement of PP for 1992/93	
· Evidence of short rainfall – signs of drought	
1992/1993 marketing season (Drought – below average deliveries)	Z\$550/MT
§ Maize movements allowed in Zone B (non commercial farming areas or communal areas) but not in Zone A (defined as commercial farming areas and industrial mills)	
· July 1992: announcement of PP for 1993/94	
· March-July 1992: Commercial imports reach 500 kMT	
· July–Oct 1992: Commercial imports reach 1,300 kMT	
· Oct 92-Aug 93: Food aid reach 700K/MT	
· Oct 93: Revised upwards- food import targets	
1993/1994 Marketing season (Bumper harvest – above average deliveries with total production of 2.2M/MTs)	Z\$900/MT
· Maize movements allowed in all Zone B and not in Zone B (defined as factory gate of industrial mills)	
· GMB purchased 1.4M/MTs at the official price	
· GMB imported 120 kMTs at an average price of Z\$1038/MT	
· GMB's official selling price – Z\$1070/MT , sold 315 kMTs	
· Increased the SGR with 300K/MTs and left with unintended stock of 905 K/MTs and exported 360K/MTs at a substantial loss of Z\$698/MT with balance stored at even greater costs.	
· Announcement of PP for 1994/95	
April 1994 – March 1995 – Deregulation	Z\$900/MT
· Domestic marketing (maize movements) – fully liberalized	
· Government involvement in setting prices	
· GMB share of maize marketing – 75%	
· Sole exporter / importer & dominant buyer / seller	
1996/1997 Marketing season (continuation of liberalized marketing)	Z\$1,200/MT
§ Large-scale millers bought maize directly from farmers at PP and ex-GMB price of Z\$1,420	
§ Min of Agric issued import/export licences on the basis of the country's food requirement	
2000/2001 Marketing season – Regulation	Z\$8,500/MT
§ Reintroduction of GMB monopoly & price controls	
§ Maize movements not allowed between rural /commercial farming areas and urban areas	
§ All maize to be delivered to GMB depots	
§ Police impound maize transported outside farming areas	
2001 Marketing Seasons to 2006	2001/02 –Z\$8,500 2002/03 – Z\$28,000 2003/04 – Z\$300,000 2004/05 – Z\$750,000
§ Continued enforcement of GMB monopoly and price controls	2005/06- Z\$31,000,000

1) Producer prices = PP

2) The 2005/06 PP was revised upwards from the planned Z\$2,248,024 to Z\$31,000,000 because of the inflation pressures. This is against the import parity price of US\$.

Appendix Table 5: Prices for primary products, Zimbabwe, 1955 to 2005

(a) Maize, sorghum and wheat

	MAIZE			SORGHUM				WHEAT		
	Domestic price per MT	Border price per MT	$\frac{DP-BP}{BP}$	Domestic price per MT	Border price per MT	per	$\frac{DP-BP}{BP}$	Domestic price per MT	Border price per MT	$\frac{DP-BP}{BP}$
1955	46	31	0.47	39				64	55	0.17
1956	44	33	0.34	41				84	56	0.51
1957	46	30	0.51	37				66	56	0.18
1958	39	30	0.28	38				66	55	0.21
1959	40	29	0.35	41				66	52	0.28
1960	35	28	0.24	41	37	0.11		66	54	0.23
1961	26	32	-0.20	42	41	0.01		66	46	0.42
1962	30	31	-0.05	38	44	-0.13		66	48	0.38
1963	32	36	-0.12	38	51	-0.25		66	50	0.32
1964	36	41	-0.12	37	48	-0.23		66	49	0.34
1965	34	84	-0.60	40	49	-0.18		66	46	0.42
1966	29	36	-0.20	34	24	0.44		66	42	0.57
1967	29	34	-0.13	31	38	-0.17		74	42	0.78
1968	33	35	-0.06	31	54	-0.43		74	47	0.58
1969	31	35	-0.10	34	65	-0.49		69	47	0.47
1970	33	24	0.40	35	94	-0.63		72	68	0.06
1971	30	39	-0.23	40	105	-0.62		72	56	0.29
1972	26	45	-0.42	44	71	-0.38		71	49	0.47
1973	36	61	-0.40	44	102	-0.56		63	54	0.16
1974	40	74	-0.46	38	113	-0.66		77	100	-0.23
1975	37	72	-0.49	41	102	-0.60		109	137	-0.20
1976	44	110	-0.60	51	130	-0.61		120	168	-0.28
1977	52	89	-0.42	69	96	-0.28		121	123	-0.02
1978	53	78	-0.32	70	92	-0.25		108	177	-0.39
1979	61	110	-0.45	76	94	-0.19		115	162	-0.29
1980	85	152	-0.44	90	121	-0.25		135	180	-0.25
1981	120	199	-0.40	105	113	-0.07		134	161	-0.17
1982	120	154	-0.22	115	152	-0.24		164	158	0.04
1983	152	177	-0.14	115	268	-0.57		189	186	0.02
1984	179	270	-0.34	120	203	-0.41		218	279	-0.22
1985	178	248	-0.28	140	215	-0.35		248	313	-0.21
1986	179	290	-0.38	180	191	-0.06		283	283	0.00
1987	193	241	-0.20	180	307	-0.41		298	232	0.28
1988	213	388	-0.45	180	412	-0.56		327	368	-0.11
1989	215	419	-0.49	195	362	-0.46		362	601	-0.40
1990	225	433	-0.48	215	513	-0.58		397	814	-0.51
1991	270	497	-0.46	225	670	-0.66		456	911	-0.50
1992	550	1,176	-0.53	250	669	-0.63		516	1,350	-0.62
1993	900	1,409	-0.36	350	810	-0.57		987	1,987	-0.50
1994	900	1,008	-0.11	520	2,016	-0.74		1,429	1,865	-0.23

1995	1,050	1,030	0.02	520	2,618	-0.80	1,440	3,215	-0.55
1996	1,200	1,571	-0.24	550	1,798	-0.69	1,925	2,578	-0.25
1997	1,200	1,645	-0.27	920	2,056	-0.55	2,375	3,704	-0.36
1998	2,400	2,930	-0.18	700	5,400	-0.87	2,375	5,384	-0.56
1999	4,200	9,339	-0.55	1,000	4,934	-0.80	4,000	7,479	-0.47
2000	5,500	4,904	0.12	3,000	5,485	-0.45	5,500	17,691	-0.69
2001	8,500	50,196	-0.83	4,000	16,006	-0.75	6,500	34,932	-0.81
2002	28,000	124,848	-0.78	5,500	66,072	-0.92	25,000	134,410	-0.81
2003	300,000	537,771	-0.44	28,000	574,343	-0.95	65,000	623,440	-0.90
2004	750,000	1,922,341	-0.61	300,000	1,383,248	-0.78	774,000	2,027,036	-0.62
2005	2,248,024	2,676,262	-0.16	750,000			1,749,218		

(b) Sunflower, soyabean and tobacco

	SUNFLOWER			SOYABEAN			TOBACCO		
	Domestic price per MT	Non-tradable	$\frac{DP-BP}{BP}$	Domestic price per MT	Non-tradable	$\frac{DP-BP}{BP}$	Domestic price per MT	Border price per MT	$\frac{DP-BP}{BP}$
1955							743		
1956							575		
1957							684		
1958							645		
1959							590		
1960	62		0				590	1,339	-0.56
1961	56		0				584	958	-0.39
1962	49		0				601	896	-0.33
1963	53		0				707	1,160	-0.39
1964	55		0				431	811	-0.47
1965	56		0				571	851	-0.33
1966	60		0				442	565	-0.22
1967	60		0				503	876	-0.43
1968	60		0	82	81	0.00	504	921	-0.45
1969	60		0	86	121	-0.29	451	960	-0.53
1970	60		0	86	151	-0.43	459	1,202	-0.62
1971	63		0	88	145	-0.40	480	1,134	-0.58
1972	64		0	77	130	-0.41	492	980	-0.50
1973	68		0	114	128	-0.11	589	948	-0.38
1974	101		0	124	134	-0.07	767	971	-0.21
1975	103		0	103	159	-0.35	690	1,532	-0.55
1976	103		0	103	212	-0.52	734	1,894	-0.61
1977	103		0	130	313	-0.59	819	1,771	-0.54
1978	105		0	140	176	-0.20	1,007	1,853	-0.46
1979	127		0	145	259	-0.44	855	1,691	-0.49
1980	145		0	160	348	-0.54	811	1,848	-0.56
1981	155		0	168	402	-0.58	1,783	2,188	-0.19
1982	185		0	179	238	-0.25	1,677	2,872	-0.42
1983	242		0	210	533	-0.61	1,964	5,657	-0.65
1984	271		0	273	315	-0.13	2,428	4,597	-0.47

1985	304	0	301	397	-0.24	2,677	4,764	-0.44
1986	323	0	336	481	-0.30	3,152	5,912	-0.47
1987	371	0	357	457	-0.22	2,379	5,526	-0.57
1988	409	0	404	739	-0.45	4,257	6,263	-0.32
1989	433	0	441	827	-0.47	4,453	8,922	-0.50
1990	480	0	457	623	-0.27	6,490	8,686	-0.25
1991	561	0	509	1,467	-0.65	11,570	16,742	-0.31
1992	945	0	588	1,479	-0.60	8,100	17,302	-0.53
1993	1,398	0	998	1,610	-0.38	8,030	14,456	-0.44
1994	1,398	0	1,260	2,635	-0.52	13,000	19,154	-0.32
1995	1,450	0	1,520	2,278	-0.33	18,040	23,699	-0.24
1996	1,501	0	1,600	3,156	-0.49	29,020	37,246	-0.22
1997	1,350	0	2,000	5,645	-0.65	26,600	45,671	-0.42
1998	1,430	0	2,900	8,867	-0.67	34,740	61,941	-0.44
1999	2,200	0	5,000	11,681	-0.57	66,240	116,851	-0.43
2000	4,000	0	6,500	14,011	-0.54	81,340	199,076	-0.59
2001	6,620	0	8,500	44,443	-0.81	174,640	487,045	-0.64
2002	7,000	0	17,000	122,665	-0.86	359,800	1,795,831	-0.80
2003	40,000	0	70,000	956,883	-0.93	1,840,000	10,881,644	-0.83
2004	350,000	0	1,000,000	1,405,843	-0.29	8,619,780	15,310,949	-0.44
2005	500,000	0	2,000,000	8,366,672	-0.76	22,710,260	89,630,988	-0.75

Source: Authors' spreadsheet

Appendix Table 6: Prices for lightly processed foods, Zimbabwe, 1955 to 2005

	GROUNDNUTS shelled			COTTON lint, seed & cake		
	Domestic price per MT	Border price per MT	$\frac{DP-BP}{BP}$	Domestic price per MT	Border price per MT	$\frac{DP-BP}{BP}$
1955	86	155	-0.45	178	682	-0.74
1956	92	170	-0.46	183	617	-0.70
1957	102	166	-0.39	185	616	-0.70
1958	97	135	-0.29	185	588	-0.68
1959	97	148	-0.35	185	532	-0.65
1960	110	164	-0.33	352	564	-0.38
1961	110	162	-0.32	277	145	0.91
1962	110	142	-0.22	303	98	2.09
1963	107	591	-0.82	314	204	0.54
1964	99	536	-0.81	303	252	0.20
1965	105	808	-0.87	293	372	-0.21
1966	110	564	-0.80	319	405	-0.21
1967	116	531	-0.78	324	412	-0.21
1968	135	509	-0.74	303	396	-0.23
1969	135	602	-0.78	319	414	-0.23
1970	135	767	-0.82	335	585	-0.43
1971	135	742	-0.82	335	569	-0.41
1972	159	495	-0.68	357	574	-0.38
1973	189	670	-0.72	516	889	-0.42
1974	259	867	-0.70	559	628	-0.11
1975	220	860	-0.74	463	701	-0.34
1976	254	1,207	-0.79	671	1,396	-0.52
1977	295	1,367	-0.78	665	1,438	-0.54
1978	278	1,018	-0.73	649	1,251	-0.48
1979	360	939	-0.62	731	1,195	-0.39
1980	390	1,448	-0.73	880	1,555	-0.43
1981	420	1,212	-0.65	939	1,453	-0.35
1982	450	1,003	-0.55	1,209	1,403	-0.14
1983	450	1,776	-0.75	1,209	3,126	-0.61
1984	500	2,035	-0.75	1,338	3,045	-0.56
1985	750	1,111	-0.32	1,573	3,063	-0.49
1986	750	1,763	-0.57	1,760	2,344	-0.25
1987	900	1,529	-0.41	1,878	2,517	-0.25
1988	1,000	1,356	-0.26	1,995	3,277	-0.39
1989	1,000	2,083	-0.52	2,072	4,430	-0.53
1990	1,000	1,996	-0.50	2,694	4,880	-0.45
1991	1,250	4,523	-0.72	3,286	8,242	-0.60
1992	1,500	1,431	0.05	4,225	10,902	-0.61
1993	1,800	5,894	-0.69	5,868	9,412	-0.38
1994	2,400	6,131	-0.61	8,215	11,075	-0.26
1995	2,400	6,019	-0.60	10,563	15,012	-0.30
1996	4,600	7,222	-0.36	13,849	19,653	-0.30
1997	5,000	5,439	-0.08	14,318	21,231	-0.33

1998	5,000	11,467	-0.56	21,829	37,870	-0.42
1999	7,000	22,540	-0.69	34,269	60,655	-0.44
2000	10,000	40,895	-0.76	42,250	75,023	-0.44
2001	15,000	80,537	-0.81	61,028	307,088	-0.80
2002	45,000	181,972	-0.75	84,500	720,743	-0.88
2003	96,000	2,005,960	-0.95	638,806	3,735,016	-0.83
2004	850,000	3,720,348	-0.77	6,175,124	7,966,302	-0.22
2005	1,800,000					

Source: Authors' spreadsheet

Appendix Table 7: Foreign exchange rates, Zimbabwe, 1955 to 2005

(Z\$ per US\$)

	Official rate	Commodity specific rate (n/a)	Secondary or parallel market rate	Retention rate (a)	Discount to secondary market rate	Estimated equilibrium exchange rate using this study's methodology (b)
1955	0.71		0.71	0.05		0.71
1956	0.71		0.71	0.05		0.71
1957	0.71		0.71	0.05		0.71
1958	0.71		0.71	0.05		0.71
1959	0.71		0.71	0.05		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		1.43	0.05	-0.41	0.78
1966	0.71		0.79	0.05		0.76
1967	0.71		0.78	0.05		0.75
1968	0.71		0.82	0.05		0.77
1969	0.71		0.82	0.05		0.77
1970	0.71		1.15	0.05		0.94
1971	0.71		1.02	0.05		0.87
1972	0.66		0.82	0.05		0.74
1973	0.59		0.76	0.05		0.68
1974	0.58		0.75	0.05		0.67
1975	0.57		0.88	0.05		0.73
1976	0.63		2.53	0.05	-0.41	1.08
1977	0.63		1.31	0.05		0.99
1978	0.68		1.26	0.05		0.99
1979	0.68		1.01	0.10		0.86
1980	0.64		1.18	0.10		0.94
1981	0.69		1.05	0.10		0.89
1982	0.76		1.15	0.10		0.97
1983	1.01		2.96	0.10		2.08
1984	1.26		2.26	0.10		1.81
1985	1.61		2.47	0.10		2.08
1986	1.67		2.84	0.10		2.31
1987	1.66		2.50	0.10		2.12
1988	1.81		2.66	0.10		2.27
1989	2.12		3.73	0.10		3.01
1990	2.45		3.36	0.10		2.95
1991	3.62		5.43	0.05		4.57
1992	5.10		6.76	0.05		5.97
1993	6.48		7.74	0.05		7.15
1994	8.15		9.36	0.05		8.78
1995	8.67		8.91	0.05		8.80

1996	10.00	10.75	0.05	10.39
1997	12.11	14.03	0.05	13.12
1998	23.68	28.35	0.10	26.25
1999	38.30	48.98	0.25	44.98
2000	44.42	70.00	0.40	62.33
2001	55.05	205.75	0.50	168.08
2002	55.00	769.00	0.65	644.05
2003	697.42	3,696.00	0.65	3,171.25
2004	824.00	6,550.00	0.75	5,834.25
2005	5,041.00	34,090.00	0.75	30,458.88

^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 8: Annual distortion estimates, Zimbabwe, 1955 to 2004

(a) Nominal rates of assistance to covered products (percent)

	Cotton	Groundnut	Maize	Sorghum	Soybean	Sunflower	Tobacco	Wheat	All covered
1955	-92	-45	47	na	na	na	na	17	27
1956	-88	-46	34	na	na	na	na	51	20
1957	-87	-39	51	na	na	na	na	18	34
1958	-86	-29	28	na	na	na	na	21	18
1959	-81	-35	35	na	na	na	na	28	21
1960	-47	-33	24	11	na	0.0	-56	23	-48
1961	113	-32	-20	1	na	0	-39	42	-35
1962	261	-22	-5	-13	na	0	-33	38	-26
1963	68	-82	-12	-25	na	0	-39	32	-38
1964	25	-81	-12	-23	na	0	-47	34	-46
1965	-27	-87	-60	-18	na	0	-33	42	-49
1966	-26	-80	-20	44	na	0	-22	57	-27
1967	-27	-78	-13	-17	na	0	-43	78	-37
1968	-29	-74	-6	-43	0	0	-45	58	-29
1969	-29	-78	-10	-49	-29	0	-53	47	-37
1970	-53	-82	40	-63	-43	0	-62	6	-44
1971	-51	-82	-23	-62	-40	0	-58	29	-44
1972	-47	-68	-42	-38	-41	0	-50	47	-45
1973	-52	-72	-40	-56	-11	0	-38	16	-44
1974	-14	-70	-46	-66	-7	0	-21	-23	-44
1975	-42	-74	-49	-60	-35	0	-55	-20	-53
1976	-65	-79	-60	-61	-52	0	-61	-28	-64
1977	-67	-78	-42	-28	-59	0	-54	-2	-57
1978	-60	-73	-32	-25	-20	0	-46	-39	-50
1979	-48	-62	-45	-19	-44	0	-49	-29	-48
1980	-54	-73	-44	-25	-54	0	-56	-25	-52
1981	-44	-65	-40	-7	-58	0	-19	-17	-39
1982	-17	-55	-22	-24	-25	0	-42	4	-30
1983	-77	-75	-14	-57	-61	0	-65	2	-61
1984	-70	-75	-34	-41	-13	0	-47	-22	-51
1985	-61	-32	-28	-35	-24	0	-44	-21	-41
1986	-31	-57	-38	-6	-30	0	-47	0	-40
1987	-32	-41	-20	-41	-22	0	-57	28	-40
1988	-49	-26	-45	-56	-45	0	-32	-11	-40
1989	-67	-52	-49	-46	-47	0	-50	-40	-52
1990	-56	-50	-48	-58	-27	0	-25	-51	-40
1991	-75	-72	-62	-66	-65	0	-31	-50	-51
1992	-77	5	-72	-63	-60	0	-53	-62	-58
1993	-47	-69	-49	-57	-38	0	-44	-50	-47
1994	-32	-61	-14	-74	-52	0	-32	-23	-28
1995	-30	-60	3	-80	-33	0	-24	-55	-27
1996	-30	-36	-32	-69	-49	0	-22	-25	-27
1997	-33	-8	-37	-55	-65	0	-42	-36	-38
1998	-42	-56	-24	-87	-67	0	-44	-56	-43
1999	-44	-69	-74	-80	-57	0	-43	-47	-57
2000	-44	-76	17	-45	-54	0	-59	-69	-49
2001	-80	-81	-91	-75	-81	0	-64	-81	-82

2002	-88	-75	-93	-92	-86	0	-80	-81	-85
2003	-83	-95	-62	-95	-93	0	-83	-90	-77
2004	-22	-77	-85	-78	-29	0	-44	-62	-72

Appendix Table 8 (continued): Annual distortion estimates, Zimbabwe, 1955 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 nonagricultural 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							
1955	0	27	0	19	27	17	27	26	1
1956	0	20	0	14	20	51	20	26	-5
1957	0	34	0	24	34	18	34	26	6
1958	0	18	0	12	18	21	18	26	-7
1959	0	21	0	15	21	28	21	26	-4
1960	0	-48	0	-34	-48	17	-48	27	-59
1961	0	-35	0	-24	-35	8	-35	27	-49
1962	0	-26	0	-19	-26	-4	-26	27	-42
1963	0	-38	0	-27	-38	-16	-38	34	-53
1964	0	-46	0	-32	-50	-12	-46	30	-58
1965	0	-49	0	-39	-49	16	-81	32	-86
1966	0	-27	0	-22	-28	49	-42	30	-56
1967	0	-37	0	-26	-38	18	-38	29	-52
1968	0	-29	0	-16	-30	29	-30	31	-46
1969	0	-37	0	-25	-38	19	-37	31	-52
1970	0	-44	0	-24	-45	-2	-44	44	-61
1971	0	-44	0	-28	-46	20	-44	39	-60
1972	0	-45	0	-28	-47	30	-45	34	-59
1973	0	-44	0	-23	-46	-10	-44	36	-59
1974	0	-44	0	-28	-44	-28	-44	35	-58
1975	0	-53	0	-29	-54	-21	-53	42	-67
1976	0	-64	0	-37	-65	-31	-64	57	-77
1977	0	-57	0	-28	-59	-3	-57	53	-72
1978	0	-50	0	-26	-50	-38	-50	49	-66
1979	0	-48	0	-23	-50	-29	-49	40	-63
1980	0	-52	0	-27	-58	-42	-52	47	-68
1981	0	-39	0	-25	-40	-16	-39	41	-57
1982	0	-30	0	-16	-32	4	-30	41	-50
1983	0	-61	0	-27	-62	-40	-61	60	-75
1984	0	-51	0	-25	-58	-32	-51	46	-67
1985	0	-41	0	-25	-42	-21	-41	41	-58
1986	0	-40	0	-24	-42	-12	-40	44	-59
1987	0	-40	0	-19	-43	2	-40	40	-57
1988	0	-40	0	-23	-41	-11	-40	40	-57
1989	0	-52	0	-29	-54	-43	-53	46	-68
1990	0	-40	0	-23	-40	-51	-41	37	-57
1991	0	-51	0	-31	-51	-50	-51	41	-66
1992	0	-58	0	-31	-56	-69	-58	37	-69
1993	0	-47	0	-25	-46	-49	-47	33	-60
1994	0	-28	0	-15	-29	-23	-28	31	-45
1995	0	-27	0	-14	-25	-50	-27	27	-42
1996	0	-27	0	-14	-27	-34	-27	29	-44
1997	0	-38	0	-22	-38	-47	-46	16	-53
1998	0	-43	0	-23	-41	-61	-43	16	-51
1999	0	-57	0	-30	-44	-72	-57	17	-64
2000	0	-49	0	-26	-48	-69	-49	17	-57
2001	0	-82	0	-43	-82	-81	-82	24	-85
2002	0	-85	0	-45	-81	-92	-85	22	-88
2003	0	-77	0	-41	-84	-66	-77	20	-81
2004	0	-72	0	-38	-39	-84	-72	17	-76

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 nonagricultural sectors, respectively.

Appendix Table 8 (continued): Annual distortion estimates, Zimbabwe, 1955 to 2004
(c) Value shares of primary production of covered^a and non-covered products, (percent)

	Cotton	Groundnut	Maize	Sorghum	Soybean	Sunflower	Tobacco	Wheat	Non-covered
1955	1	15	55	na	na	na	na	0	29
1956	0	12	58	na	na	na	na	0	29
1957	0	13	57	na	na	na	na	0	29
1958	1	12	58	na	na	na	na	0	29
1959	1	13	57	na	na	na	na	0	29
1960	0	2	6	0	na	0	62	0	29
1961	0	2	14	0	na	0	54	0	29
1962	0	2	16	0	na	0	53	0	29
1963	0	7	14	0	na	0	49	0	29
1964	0	7	8	0	na	0	56	0	29
1965	1	9	32	0	na	0	38	0	20
1966	3	9	28	0	na	0	38	0	21
1967	4	7	17	1	na	0	40	0	31
1968	5	5	22	0	0	0	20	0	47
1969	14	8	20	0	0	0	26	1	32
1970	13	7	9	0	0	0	23	1	45
1971	12	5	22	0	0	0	22	1	37
1972	12	3	27	0	0	0	17	1	39
1973	15	4	14	1	0	0	16	1	49
1974	8	19	24	0	0	0	11	2	35
1975	8	10	17	0	1	0	17	2	45
1976	9	13	16	0	1	0	17	2	42
1977	11	11	12	0	1	0	13	2	51
1978	11	10	12	0	1	0	15	3	48
1979	8	6	12	0	2	0	17	2	52
1980	9	6	17	0	2	0	16	2	48
1981	8	6	36	0	2	0	10	2	37
1982	7	5	19	0	1	0	18	2	48
1983	14	1	6	0	2	0	20	1	56
1984	16	1	11	0	1	0	19	1	51
1985	17	2	23	0	1	0	17	2	38
1986	8	5	22	0	1	0	21	2	41
1987	9	5	9	0	2	0	21	1	53
1988	13	2	22	0	2	0	17	2	42
1989	12	2	15	0	2	0	21	3	44
1990	10	3	16	0	1	1	21	4	44
1991	15	3	12	0	2	0	27	2	38
1992	6	0	7	0	1	0	38	1	47
1993	6	1	23	0	1	1	19	3	47
1994	4	2	16	0	2	1	25	3	47
1995	12	4	6	0	1	0	27	3	47
1996	9	2	14	0	1	0	25	2	47
1997	9	2	11	0	2	0	29	3	43
1998	11	1	9	0	2	0	27	3	47
1999	7	1	23	0	1	0	19	2	47
2000	7	3	6	0	2	0	32	4	47
2001	8	2	26	0	1	0	14	1	47
2002	5	1	17	0	1	0	27	2	47
2003	9	2	18	0	1	0	22	1	47
2004	6	2	37	0	1	0	6	1	47

Source: Authors' spreadsheet

a. At farmgate undistorted prices