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Distortions to Agricultural Incentives in Sudan

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Distortions to Agricultural Incentives in Sudan

Hamid Faki and Abdelmoneim Taha

Agriculture is the most important sector in Sudan's economy. It accounts for close to 40 percent of national GDP, provides a livelihood for over 80 percent of the population and employs about 70 percent of the active labor force. This is thus by no means the first study of price and trade policies in Sudan.¹ But it is the most comprehensive in terms of its commodity and temporal coverage: it examines the evolution of policies since 1955 and provides new estimates of distortions to agricultural incentives affecting 12 of Sudan's agricultural products that together account for around three-quarters of agricultural output value. Since independence in 1956, those policies have provided government hegemony over production, marketing and trade of agricultural products through a series of public-sector-led development plans, production and marketing parastatals, plus close control of foreign exchange transactions that, until recent years, had led to currency overvaluation. Many attempts were made to reduce overvaluation, particularly during the 1980s with interventions from the World Bank and the IMF, but it persisted right through to the late 1990s. Trade flows were for a long time subjected to quantitative controls and licensing, and the tariff structure has continued to tax trade until recently. This includes agricultural import tariffs, which in recent years averaged about 30 percent.²

A salient feature of Sudanese agriculture is the wide fluctuations in its contribution to economic growth. While being generally export orientated via cash crops, which have been an intrinsic characteristic of the agricultural sector, there have been periodic shifts to food crops for import substitution or to meet food demands in Arab countries, especially during the 1970s and the early 1990s. Most of the investments have been directed to the irrigated sector, with notable neglect of the economically more important traditional sector. Policies since independence include land acquisition, production controls, and land and crop taxes (especially indirect ones) that have provided the bulk of government budget revenue.

¹ Studies of macro policy issues affecting Sudanese agriculture include Hag Elamin and El Mak (1997), Abdelgadir and Elbadawi (2002) and Amal Mubarak (2006). Analyses of the comparative advantage of some farm products and related policy issues include Hassan and Faki (1993), Hassan, Faki and Byerlee (2000) and Faki, Gumaa and Ismail (1995).

² Sudan's initial offer during its WTO accession negotiations on agricultural tariffs averaged 45 percent.

In this chapter we begin with a summary of the country's economic growth and structural changes since independence. We then provide empirical estimates of the changing extent of distortions to agricultural incentives over the past fifty years. The reasons behind the government's policy choices are then analyzed, before the chapter concludes with a discussion of prospects for further policy reform.

Growth and structural changes since 1955

With a total land area of about 2.4 million square kms, Sudan is the largest country in Africa. Its population of around 36 million is growing at about 2.6 percent per year. Even by the most conservative estimates, more than 50 percent of the population is living on less than \$1 per day. Poverty in Sudan is mainly a rural phenomenon, and the level of poverty is closely linked to the strength of agricultural productivity. The economy is predominantly agricultural. Agriculture accommodates three major farming systems: irrigated, rain-fed semi-mechanized, and rain-fed traditional agriculture, accounting respectively for around 30 percent, 10 percent and 60 percent of agricultural production. Crop production accounts for 53 percent of agricultural output, livestock for 38 percent, and forestry and fisheries (not considered in this study) for 9 percent. About 60 percent of all crop production is from the irrigated sector, 7 percent comes from mechanized dryland farming, and the remaining 33 percent from the traditional rain-fed sector.

Ever since the food shortages in the 1980s, the government has given attention to the production of food crops, resulting in large expansions in sorghum and wheat area and output, often at the expense of the main cash crop, cotton, the production of which has declined by more than 40 percent since the mid-1980s. Livestock production is most prevalent in the traditional rain-fed farming systems, but is increasing in irrigated areas.

Although endowed with rich natural resources, Sudan remains underdeveloped, primarily as a result of protracted civil strife and poor economic management. During the three decades from 1960 to 1990, the Sudanese economy witnessed low and sometimes negative rates of growth and deteriorating real per capita income. The poor economic performance was reflected in other economic indicators such as deficits in government accounts, accelerating rates of inflation, deterioration in national savings and in the value of the national currency, and frequent food shortages.

Economic development in Sudan has largely been influenced by the country's colonial history (D'Silva and El Badawi 1988). Agriculture has always been the main sector shaping development patterns and growth. Since the inception of the first agricultural development efforts, the tendency has been for the government to practice paternal attitudes over the whole economy, especially the production sectors through excessive regulations (FAO 1997). A major feature of Sudan's agricultural development has been the focus of expansion in irrigated agriculture and mechanized rain-fed farming, a situation that started early in the colonial era and continued after independence. The vast traditional rain-fed sector, which accommodates the majority of the population and contributes significantly to foreign-exchange earnings, has been neglected (D'Silva and Elbadawi 1988). For example, of the share of total public expenditure going to agriculture in 2004 which was only 0.9 percent of GDP, the traditional crop and livestock sectors received a mere 25 percent of that allocation (Abdalla et al. undated).

The contribution of agriculture to the country's GDP has ranged from 29 percent to 46 percent during the last half century (Appendix Figure 1), averaging 38 percent and surpassing in many years that of the services sector (which itself is highly dependent on agricultural activities). The share of industry was relatively low, but has increased during the current decade. Agricultural output growth has been variable, and negative in many years. Since agriculture is the main source of economic growth in the country, overall GDP growth had been variable and low, with an annual growth rate of -0.3 percent for the whole period.

Agriculture also has been the major source of foreign exchange before the discovery of oil, contributing close to 100 percent of total value of merchandize exports until oil exports began in 1999. Since then its share of exports has averaged around 25 percent (Figure 1(a)). Meanwhile, agricultural imports have been steadily increasing in value relative to exports. In the 1960s, farm imports averaged about 20 percent more than farm exports, but that gap has grown steadily each decade and in the current decade has averaged more than 100 percent (Figure 2).

Traditionally the export structure has been characterized by the dominance of five commodities, namely cotton lint, sesame, groundnuts, live animals and gum Arabic. In the period since 1961 they have contributed between 50 and 90 percent (on average, 77 percent) of all agricultural exports (Figure 1(b)). Cotton dominated those exports – although with substantial annual fluctuations – until the early 1990s, when live animals and sesame became more important. Gum Arabic, which was a strong competitor to both sesame and groundnuts prior to 1994, has since slumped in production and hence exports. Groundnut exports started

to deteriorate in the early 1980s, in part because of increases in processing for domestic consumption of its oil. Except for some processing of oil seeds and cotton, agricultural raw material processing has been weak, hampered by poor transport and other infrastructure and shortages of essential inputs such as electricity and fuel in the country as whole (Ministry of Finance 2006).

Policy evolution and the economy

In this section, the history of growth and economic policies in the Sudanese economy is summarized. The periods are delineated by changes in political systems or specific economic policies and programs. While this is not the place to discuss macroeconomic policies in detail, but it should be kept in mind that they are crucial, and in particular that the exchange rate has been a major factor in directing the pace and path of change in Sudan's economy.

The colonial period

During the period 1899-1956 Sudan was under British colonial administration, when the foundation of the modern economy of Sudan was laid (Abdelgadir and Elbadawi 2002). The center piece of this foundation was long-staple cotton under irrigation. British colonial rule early in the twentieth Century involved agricultural land acquisition and utilization that has largely remained. An enacted rule in 1903 enabled the government to acquire land by expropriating all rights, which was followed by the Land Acquisition Ordinance of 1930 that authorized the Governor General to acquire land for public purposes against payment of compensation (Tothill 1948). Freeland holding had, however, remained in some riverain lands, mostly along the Nile in the northern part of the country where land is scarce and agricultural production activities were based on irrigation by the water wheel 'sagia' from the Nile.

Such land acquisition allowed the charging of land rent and land tax for private investment in pump enterprises along the main Nile north of Khartoum and in the Khartoum area. It also allowed the allotment of annual tenancies on a yearly lease basis, depending on land location. And it enabled the establishment of livelihood agricultural schemes along the White Nile in consequence of floods resulting from the construction of Jebel Awlia Dam at the southern outskirts of Khartoum. In northern Sudan, in response to problems of land

fractionation built-up on account of Islamic inheritance rules, government policy was directed to the development of government pump schemes behind 'sagia' land strips. This involved attracting free-land holders to sell land to the government so that in turn it could be re-allotted on a government tenancy basis to mitigate bottlenecks of food supply to the people there. During and immediately after the First World War, the government opened seven schemes in the north, basically to feed British regiments then stationed in Egypt. These schemes continue to function today, albeit with different and varying objectives and management over time.

The most outstanding agricultural government undertakings are reflected by the Gezira irrigation scheme that currently extends over a little less than one million ha of irrigated land. Early steps towards establishment of the scheme took place in 1911, with the overriding objective to produce cotton for British industry on a tenancy basis. Tenants were first provided with water at fixed charges on cotton land; then the system of production relations changed to a profit-sharing arrangement between the government, the Sudan Plantation Syndicate that was then in charge of the business, and the Gezira tenants, with respective shares of 35 percent, 25 percent and 40 percent. Those shares have undergone many changes before and after independence, but the basic structure has largely remained. Crops other than cotton, which were exempted from irrigation-water charges, are currently subject to such payment. The Gezira served as a model for the establishment of many other government irrigation schemes, bringing the area under irrigation to some two million ha. Finances for and input supply for irrigated agricultural production have been predominantly sourced by the government, which practiced close control over the areas and the types of crops to be grown. Among the crops grown under irrigation (the most important being cotton, wheat, groundnuts and sorghum), cotton remained a government monopoly with respect to its ginning and export, while wheat delivery and distribution has been under government control for extended periods of time.

Agriculture formed the main source of government revenue through direct and indirect land and crop taxation and other avenues. Important types of direct taxes were land tax, dates tax and a tax levied on rain-fed crops known as 'ushur'. Land taxes comprised a tax on the potential value of land and one on the gross value of crops produced at a range of fixed percentage rates. Dates taxes were levied on date palms, exclusively in northern Sudan. 'Ushur' were levied on the produce of rain-fed areas at 10 percent ad valorem that is consistent with the Islamic 'Zakat' tax. However, the administration aimed at keeping direct taxes at low levels. Over a seven-year period in the 1940s, land, dates and 'ushur' taxes contributed only 1.4 percent to Sudan's total budgetary revenue (Tothill 1948).

Indirect taxation included two main items: royalties on gum Arabic and other natural products, and custom charges. Royalties were levied per unit weight upon export in the case of exportables such as gum Arabic, and ad valorem for tobacco. Customs, on the other hand, were charged on all Sudan's exported produce at a rate of 1 percent. Land and crops also contributed to various types of government revenue such as inland railway freight on cotton and other crops and government monopoly on the import and sale of sugar. The contribution of land and crop taxes accounted for about 40 percent of government budget revenue (Tothill 1948).

The 1956–1970 period

At independence in 1956 the production structure of the Sudanese economy was dominated by agriculture, which contributed about 61 percent of GDP (Abdelgadir and Elbadawi 2002). The industrial sector was rudimentary, with a share of just 1.1 percent of GDP, while the services sector accounted for the remaining 38 percent of GDP. At that time, the structure of the economy was clearly dualistic in nature, with a vast traditional sector and a small modern sector – a situation that continued today.

Following independence in 1956, Sudan started to adopt a series of development plans. The Ten-Year Plan of Economic and Social Development, 1961/62 – 1970/71, placed considerable emphasis on the development of agriculture, with allocation of about 27 percent of the total public investment. This was driven by a campaign for food and nutritional security to combat hunger and malnutrition through a program of import substitution (wheat, sugar) and improvement of livestock and horticultural products. The modern irrigated sub-sector got the lion's share of the projects in the plan. The Roseires dam, 620 km south of Khartoum, was the key project in the plan to enhance the water supply for diversification and intensification of irrigated cropping. The main objectives of the agricultural component of the plan were intensification, crop diversification and expansion in irrigated agriculture, and expansion of sugar production by 25 percent. The economy in general was stable compared to that of the 1970s and beyond, but imports started to expand in quantity and value, resulting in trade deficits. This was what drove the agricultural intensification and diversification program of import substitution and export expansion.

The 1970s and 1980s

In the early 1970s, the Sudanese government and the governments of some Gulf States saw Sudan as a potential food basket for the Arab World. With support of Gulf States and the West, Sudan's agricultural strategy shifted emphasis from production of non-food crops (mainly cotton) towards food production and its export, using Arab funds and western technology to produce wheat, sugar, livestock and textiles for export, and to promote import substitution in sugar and wheat. This was planned within the framework of the Five-Year Plan of 1970/71 – 1974/75, which later was extended to 1976/77. Key objectives of the plan were to adopt a socialist's development path to achieve, among other things, an 8 percent average annual GDP growth, raise agricultural production by 61 percent, increase livestock production by 75 percent, increase industrial production by 57 percent, and satisfy national demands for food.

Implementation did not follow the plan, however, as investment was diverted from agriculture to the transport and communications sectors and the majority of the projects were not completed. The plan failed to achieve its objectives, and overall GDP growth was only 4 percent. This not only resulted in failure to achieve planned targets of food import substitution, it also caused real exports to decline by 13 percent between 1970 and 1977, due to discrimination against export crops (particularly cotton). In 1974, the sharp increase in the price of fuel and capital goods increased the value of imports by more than 100 percent, leading to mounting deficits in the current account of the balance of payment.

During the late 1970s Sudan's economy began to experience severe interdependent structural problems that inhibited economic growth. The internal sector has long suffered from excess aggregate demand resulting in inflationary pressures in the economy. The situation was further aggravated by the devastating effects of the civil war in the south and frequent incidence of drought. The external sector experienced a continuous deficit in the balance of payment and external debts mounted. The underlying reason was the socialist approach then adopted, which led to confiscation and nationalization of industrial and agricultural firms as well as banks, and a diminished role in economic activities for the private sector. A dominant feature of this period was government control over the economy, particularly in setting prices for production, exports, imports and consumption goods in addition to control and restriction of import and export quantities. Further, the public sector was expanded, and it is often criticized for its inefficiency and poor performance.

To address these issues, the government launched a series of development plans and programs, the most important of which was the Economic Recovery Program (ECRP 1978-1985), which had better chances of implementation. The major targets of the ECRP were the

adoption of a more realistic exchange rate, reduced quantitative restrictions, and removal of export taxes. The main economy-wide policy action taken was the devaluation of the Sudanese pound, followed by attempts to adopt tighter demand-management policies. The potential effects of these policies were, however, undermined by rising inflationary pressures. During the period 1978/79-1984/85 the official exchange rate was devalued, on average by 14.5 percent per annum, whereas the domestic inflation over the same period grew annually by 27 percent (Hag Elamin and El Mak 1997).

A number of sector-specific policies were implemented in agriculture, the most important being the introduction of the individual account system of production relations in the Gezira scheme in 1981,³ general rehabilitation of the major public agricultural schemes, reduction of agricultural export taxes, and the dismantling of the Oilseeds Company's monopoly on oilseeds exports.

Despite government efforts to introduce changes in the areas of exchange rate, pricing policies, export taxes, production relations and public investment, a host of other policy variables were left untouched (Hag Elamin and Elmak 1997). The irrigated sector continued to be controlled by the Agricultural Public Corporations (APCs). The government continued to decide on crop rotations, varieties to be grown and input quantities, and to control farm-gate prices of cotton, wheat and gum Arabic. The APCs also continued to recover land and water charges for all crops from cotton proceeds simply because of their control on cotton marketing, a factor that artificially made cotton relatively less profitable. Marketing of principal export commodities such as cotton, gum Arabic and oilseeds was monopolized by the government through public marketing parastatals, which failed to achieve their major objective of producer-price stabilization and meanwhile dampened incentives for producers by paying them low prices compared with international levels.

Formal credit to agriculture was confined principally to the Agricultural Bank of Sudan (ABS), while rural financial markets in Sudan were dominated by informal lenders. The ABS credit was channeled mainly to a limited number of large-scale farmers who could provide collateral. The ABS was unable to recover enough of its loans. It also experienced problems of high administrative costs, interest rates fixed at negative real values, capital erosion, poor coordination and inadequate supplies of loanable funds. The other source of

³ Prior to 1981, the cotton accounts system entailed placing cotton proceeds in a joint account from which the cotton production costs are deducted and the balance divided between the three partners: the government, the scheme administration, and the farmers. Due to the belief that such a system does not provide adequate incentives for farmers to produce, an individual account system was set up whereby individual accounts were provided for each farmer to accommodate his/her costs and revenue (Suliman Sid Ahmed 2002).

formal credit to agriculture was the Bank of Sudan. It provided loans to the APCs, which were in most cases regarded by farmer unions as a subsidy from government. This resulted in accumulation of debts against APCs, a factor that contributed significantly to their inefficiency. The commercial banks' credit to agriculture was negligible, however: they concentrated on financing industry and foreign trade.

The economy in general and agriculture in particular was crippled by a series of cumbersome bureaucratic procedures such as import licensing, registration of exporters, reporting of stocks and restrictions of crop movements, all of which greatly discouraging production and exports. Moreover, domestic policies were unstable, an example being the abolishing and then reinstating of government monopolies in oilseeds. That discouraged production and exports. Further, a host of exogenous negative shocks coincided with the implementation of the adjustment policies in 1978-1985. The most notable were the civil war, the spread of droughts and famines, and the influx of refugees from neighboring countries.

The performance of the economy was poor during the ECRP: GDP growth declined from an annual rate of 8 percent during 1970-1977 to 2.2 percent for the period 1978-1985, the government budget deficit tripled, the rate of inflation rose to an annual average rate of over 27 percent, and the balance of payment continued to deteriorate (Hag Elamin and El Mak 1997).

The 1986-89 period

The ECRP came to an end in April 1985 via a political change in government through civil uprising, mainly driven by poor economic conditions for the majority of the population. In 1987, the newly elected government jointly with the World Bank and the IMF prepared an action program. Within the program, the exchange rate was unified and devalued by 44 percent, and a compensatory rate was introduced within the Islamic banking system, with effective lending rates being pegged at three percentage points above the annualized quarterly rate of inflation. To encourage production, the pre-season announcement of prices was expanded to include commodities other than cotton and wheat. But there were substantial increases in the consumer prices for fuel (25 percent), sugar (66 percent), cement (33 percent), and other basic commodities previously subjected to indirect subsidies (via the multiple exchange rate system) or direct subsidy (through the central government's budget and pricing policies).

These policy measures led to trade union strikes and street demonstrations, which forced the government to declare the action program inoperative. Partial adjustments prior to 1989 were associated with increased inflation, under-utilization of capacity, stagnation in economic growth, and a heavy dependence on food aid and external foreign assistance. The next formulation of economic programs accompanied the change in the political regime in 1989.

National Economic Salvation Program (NESP) policies, 1990-93

In response to the woes of the late 1980s, the government embarked on a medium-term three-year (1990-1993) National Economic Salvation Program (NESP) that aimed to reallocate available resources in favor of the production sectors, particularly agriculture. Objectives included achieving food self-sufficiency, improving food security and social equity, liberalization and deregulation, removal of administrative and legal barriers to agricultural exports, private-sector enhancement, and financial and social stability (Hag Elamin and El Mak 2001). Vulnerable segments of the society would be targeted for social welfare programs to alleviate adverse effects of adjustment. Economy-wide policies and agricultural sector-specific policies were adopted to achieve these objectives. The former were directed to reform foreign exchange, trade, fiscal and monetary policies. Those latter agricultural objectives were:

- Removing subsidies on goods and services provided by the APCs, mainly fertilizers, insecticides, land and water,⁴ and significant subsidy reduction on food products;
- Lifting price controls and regulations on agricultural commodities, except for the determination of the wheat minimum procurement price;
- Abolishing the monopoly of public marketing parastatals, namely, the Oil Seeds Company, the Livestock Marketing Corporation and the Cotton Company;
- Freezing the role of the Ministry of Commerce in product price setting and setting up ministerial committees to oversee a set of flexible signal prices;
- Reducing export taxes to 5 percent for all exports except cotton and gum Arabic, for which export taxes were reduced to 10 percent;

⁴ It might be argued that such subsidies were a result of the over-valued exchange rate, the progressive amendments of which have led to the rise in their prices. There were no explicit subsidies on inputs.

- Shifting APCs financing to a consortium of commercial banks and retaining credit ceilings for agriculture at higher shares of 50 percent;⁵
- Rigorously revising the 1990 Investment Encouragement Act to include more concessions and privileges to attract national and foreign investment; and
- Reforming government administrative structures to cope with liberalization policies and to enhance the role of the private sector.

The nominal exchange rate was devalued from the official rate of SD0.4.5 per US\$ in 1991 to SD9 in February 1992 and 140 in May 1993 (Abdelgadir and Elbadawi 2002). Recognizing the adverse effects of foreign exchange liberalization on prices of imported inputs, a preferential exchange rate was adopted (between the official and market exchange rates) for the import of essential inputs.

Reform policies from 1993

Up to 1992 the Sudanese economy was still characterized by state controls. Under the 1992 liberalization policy, previous controls that negatively affected the private-sector role were abandoned. The most significant of those is the yielding of export earning to the Central Bank at overvalued official rates while domestic prices and access to foreign exchange were subject to black market conditions. The reform policy after 1992 seemed to be more consistent and rapid, and reflected the continuation of relaxation of restrictions on foreign exchange, credit and product prices, high rate of privatization of state-owned enterprises, attraction of foreign direct investment, wide abolition of subsidies, reduction of direct agriculture taxation, and introduction of a value added tax to replace production taxes.

Following the reforms of 1992, there was significant improvement in the GDP growth rate, from 1.2 percent during the 1980s to 12.7 percent in 1992/93 and 4.7 percent in 1996. This was assisted by favorable natural conditions that improved agricultural production. However, high growth was accompanied by high rates of inflation, deterioration in the value of the local currency and rising costs of production, leading to a significant increase in money growth rate and high government borrowing from the banking system. Such a situation had offset the benefits from potential positive production. Under pressure of increased expenditure and lack of external assistance, features of former economic crises started to recur. According to Sheikh Musa (2001), the deterioration in the economy in 1996 could be

⁵ Banking services were also expanded via the establishment of new specialized banks and an expansion of the services of existing ones. A major change in agricultural finance was the adoption of Islamic forms of lending (Murabaha and Salam).

attributed to the structural problems mentioned before, in addition to poor implementation of financial and monetary policies. With this in mind, reform policies were not comprehensive enough to cause internal and external balance. Efforts were made to ease structural problems but insufficient account was taken of interrelationships between the main components of the economy which drive its growth.

In 1997, the Government engaged in a more comprehensive economic and structural reform program monitored by the International Monetary Fund. The objectives of this program were the removal of exchange rate distortions along with the formulation of financial and monetary policies to remove negative performance of the current account and the increased rate of inflation (cost push), the normalization of relations with regional and international financial organizations as steps to improve the flow of external financial resources needed to rehabilitate the basic infrastructures of the production sectors, and the abolition of the speculative marginal activities in foreign exchange, automobile, crop markets and other strategic commodities. The program was implemented in three stages: a short term (second half of 1996) fiscal shock program to remove the distortions in the financial and monetary sectors and ease the pressure on aggregate demand and demand on foreign exchange, a one-year (1997) program of financial and monetary reform with a component of social support to mitigate the negative effect of liberalization, and a subsequent one-year (1998) program aiming at increasing aggregate supply to narrow the gap to aggregate demand, in addition to expansion in social programs.

By the end of 1996, the economy started to respond positively to the reform program, and by the end of 1998 the targeted economic indicators were showing positive results. This is reflected by the end of 1988 in terms of real economic growth averaging 6 percent, a reduction in the rate of inflation from 166 percent to 17 percent, a lowering of the current account deficit from 8 percent to 4 percent of the GDP, a reduction in the budget deficit from 3.1 percent to 0.5 percent of GDP, a lower growth rate of money from 65 percent to 19 percent, reduced annual growth of reserves from 79 percent to 29 percent, and increased export volumes.

Building on the positive results of the 1996-1998 reform programs, and to maintain and consolidate the economic gains achieved, a medium term (1999–2002) program was designed and implemented with the support of the IMF. The main features and agenda of the program were comprehensiveness in targeting all aspects of economic liberalization, capacity strengthening of human resources and infrastructure, development in social services, and normalization of external relations to attract foreign support. Considerable gains were

realized in terms of overall economic stability through recapturing the balance between aggregate demand and supply, lowering the rate of inflation, converting the foreign exchange rate system into a more realistic one free-market rate by 1998, and raising the growth averaging to over 6 percent and reaching 8 percent in 2000.⁶

It can be argued that, after more than a decade of liberalization, Sudan has still not managed to put in place adequate practical policy measures and institution-building mechanisms to promote domestic outward looking and proactive private sector strategies. The government has not followed through the steps taken within the 1992 liberalization policy, and has not provided a sustainable macroeconomic environment that would have stimulated a positive response from domestic enterprises. For instance, it has not moved on to privatize non-core activities and to free up markets (particularly for key export commodities such as cotton and gum Arabic) so as to enable the private sector to procure all its needed inputs at competitive world market prices.

Estimates of the changing extent of distortions

With the above policy history as background, the main focus of the rest of this study is to estimate the extent to which prices facing farmers were distorted over the past 50 years and generated an anti-agricultural bias and, within the sector, an anti-trade bias. The methodology adopted is the standard one for this project (Anderson et al. 2008), which seeks to measure the government-imposed distortions that create a gap between domestic prices 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

⁶ An analytical overview of the main macroeconomic indicators in the period 1960-1998 is given by Abdelgadir and Elbadawi (2002). Despite a relatively favorable policy situation in the period 1960-1973, growth was negative, while for the following period a positive growth with a fairly high average per capita growth rate was recorded, even though that period's associated policy indicators were deteriorating. According to the authors, one possible explanation was that, except for the overvaluation index, the other two policy indicators were on the safe margins: the two-digit inflation rate was low compared to the threshold 40 percent inflation rate considered detrimental to growth, and the budget deficit was slightly above the 5 percent threshold. Further deterioration of the policy indicators, except for the budget deficit, was associated with negative growth during the period 1984-94. This was the period when the country was very unstable both in terms of politics and economics. The noticeable improvement in the policy indicators during the last episode was also reflected by positive growth in real per capita GDP.

foreign exchange market), but it also generates estimates of distortions in non-agricultural sectors for comparative evaluation.

More specifically, this study computes a Nominal Rate of Assistance (NRA) for farmers as the proportional gap between domestic producer prices for their outputs and what they would be under free markets (with no adjustment for direct interventions on input markets, due to a lack of data). 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).

Twelve commodities have been identified according to their contribution to the country's value added. Grouped into relevant categories, these are import-competing products (wheat, sugar and milk), exportable cereals (sorghum and millet), exportable oil seeds and oils (sesame and groundnuts), exportable livestock (live sheep, cattle, camels, goats), and other lightly processed exportables (cotton lint, cleaned gum Arabic and cheese). Together they have contributed between 80 and 90 percent of the value of agricultural output, with most of the rest being a wide range of vegetables and fruits. Data for the analysis were collated from various secondary sources for the period 1955 to 2004, as detailed in the Appendix. Throughout those five decades milk and beef cattle made the biggest contributions to the value of production, followed by sheep and goats and (pre-1990s) cotton. Sorghum has been the most valuable grain, followed by millet, while groundnuts and sesame have been equally valuable contributors to oilseed production. Gum Arabic, while important in exports, has contributed only 1 or 2 percent to the value of production. The consumption shares are similar, making animal products unusually high for such a low-income country (Appendix Figure 2).

Nominal rates of assistance

Our estimates of commodity assistance rates are summarized by 5-year time periods in Table 1, and annually in aggregate form in Figure 3. In most periods the importable commodities (wheat, sugar and milk, comprising about one-fifth of the value of farm production) enjoyed positive direct assistance. Not surprisingly, when international food prices spiked in 1973-74 their domestic prices did not respond fully and so the NRA for this sub-group became as negative as for exportables, but its average NRA was much higher than that for exportables, implying a strong anti-trade bias within the sector throughout the past half century. Among the exportables, the cash crops such as gum Arabic and sesame, together with live animals,

have been the most heavily taxed, and the staple foods (sorghum, millet and groundnuts) the least heavily taxed. There has clearly been a great deal of fluctuation in NRA estimates for the various covered products over time, and even for the average NRAs for exportable and import-competing subsectors of covered products (Figure 3). But in terms of trends, the 10-year average NRAs for covered exportables became ever-more negative until the mid-1990s. Since then, however, the extent of implicit taxation has fallen, from 65 percent in 1990-94 to 34 percent in 2000-04.

Taking into account the non-covered products (mostly fruits and vegetables, whose markets are not subject to government intervention apart from via exchange rate distortions), our estimated total NRA for the agricultural sector is somewhat less negative (top of Table 2), since those non-covered products account for between 10 and 20 percent of the value of agricultural production.

The middle rows of Table 2 also show the estimated NRAs for the tradable parts of agriculture and for the non-agricultural sectors, from which the relative rate of assistance (RRA) is calculated. That RRA is an indicator of the percentage by which the price of farm relative to non-farm output prices have been distorted away from their free-market levels. The RRA has been quite negative, moving from around -15 percent in the 1950s to -45 percent by the early 1970s, before becoming less negative through to the end of the 1980s as international food prices fell after their spike in 1973-74. Then the RRA repeated that cycle, becoming more negative in the first half of the 1990s before the policy reforms from 1993, after which the RRA has come much closer to zero at -18 percent in 2000-04 (and just -9 percent in 2004) compared with -56 percent a decade earlier. While this means an anti-agricultural bias is still present, the reforms have driven that inter-sectoral distortions indicator to its lowest level in the previous 50 years (Figure 4).

The bottom rows of Table 2 show what three of the above indicators would have been if distortions in the market for foreign exchange had been ignored in our calculations. They reveal that up to one-third of the NRA for the overall agricultural sector prior to 1993 was due to exchange rate distortions, and even more of the anti-agricultural trade bias index. Only a small fraction of the RRA is due to that distortion though, reflecting the fact that the exchange rate impacts on all tradable sectors, and that the sizes of those impacts depend on the shares of the import-competing and exportable sub-sectors in each sector.

Reasons behind the evolution of policy choices

The above analysis reveals a legacy of highly discriminative distortions to Sudanese agricultural production and trade, but with that no consistent long-term policy trend up to 1993. The variability of NRAs has been influenced by ad hoc agricultural policies, with the movement towards freer markets (less anti-agricultural bias and, within agriculture, less of an anti-trade bias) often being short-lived.

The increasing anti-agricultural bias (increasingly negative RRAs) from the late 1950s up to the early 1970s was associated with ambitious but unsuccessfully implemented development plans that focused on an import substitution agenda. The notable improvement from the mid-1970s to the late 1980s is attributable to the attention and support to agriculture by the socialist regime, when government control of the economy sought to boost food production. Nevertheless, these policies were more favorable to import-competing farm products than to exportables, discriminating in particular against cash crops. Distortions were affected by exchange rate volatility and the alternate installation and abolition of public marketing parastatals, engendering low and instable producer prices. The trend toward less discrimination against agriculture, noticeable since 1993, was mostly governed by progressive implementation of macro-economic reforms. Throughout the whole period there are few covered products with NRAs close to zero, the main exception being cotton.

Import-competing products

The pattern of the rate of assistance for wheat, especially the peaks in 1978 and other years, was influenced by price determination by the government with no adequate response to international prices, in spite of the attempt to consider import parity prices in setting wheat prices. The international price was obviously low in those peak NRA years, but the response to world market prices probably lagged. The rising NRA trend as from the mid-1970s was attributable to the import-substitution policies then adopted for wheat and other commodities, but might also be associated with an upsurge of instability during 1979-1981 as influenced by capital inflows from Arab countries within the bread-basket policy (UNDP 2005). The exceptionally high rates of assistance during 1989 to 1991 were influenced by a confusing exchange rate regime that accompanied a mix of tight exchange controls and the move to a free currency exchange system. This period was also associated with a continued policy of controls, and with high inflation that averaged about 119 percent during 1989/90-1994/95

(UNDP 2005). The following period witnessed a gradual consistent move towards a free market and the rate of assistance was highly influenced by the accompanying changes in the exchange rate. The positive rate of assistance to processors has been mostly due to a long-standing inclination to encourage domestic wheat flour milling.

Milling and importing of sugar are undertaken by a government monopoly which contributes a substantial share in government budget revenue. The discrepancy in price levels between factory and high consumer prices are the source of such revenue. In this case assistance to producers might not be relevant since most public and private sugar production is by direct labor and there is no farmer involvement except in one sugar plant (the Guneid sugar factory). The negative rates of assistance during 1974-76 are attributable to a noticeable rise in world sugar prices with slow domestic adjustment by the government's sugar monopoly. As from the 1980s, an investment encouraging policy in sugar production was probably behind the rising rate of assistance to farm output.

Milk is exclusively consumed in the domestic market and its prices respond sluggishly to changes in the international market. Other variations, including the peaks during the second half of the 1970s and the second half of the 1980s, can be traced back to natural conditions that influence milk production and trigger high domestic prices. Another factor that affects the estimated levels of distortions is the nature of price comparisons between fresh and dry milk on the one hand, and local and imported cheese on the other hand. Although these were substitutes, their relative prices might be subject to errors.

Exportable cereals

Sorghum trade used to be subject to a strict discipline on the ground that the crop forms the major staple food in the country and its exports are usually (and may still be) controlled by the government. The situation is also intermingled with food aid, which often includes sorghum. In many seasons the government interferes to determine floor prices for the benefit of producers under bumper harvests, but there are hardly sorghum administered prices. The fluctuations are most likely influenced by the controls on exports (and imports), although such a peak was evident for many other commodities such as millet, sesame, groundnuts, wheat and sugar. Nevertheless, since 1993 the relaxation in foreign exchange controls has mitigated the taxation of producers.

Millet is not a very important export commodity and its local consumption is concentrated in certain areas, mainly western Sudan. The trend in the rate of assistance is

upward, although one needs to keep in mind that domestic prices during 1955-1965 and export prices in the 1990-2004 period were based on extrapolated estimates. The high rates of assistance around 1990 were again a result of exchange rate movements intermingled with lags in local market adjustments. The crop is largely produced and consumed in somewhat remote areas, and so government intervention seems to be quite limited. By and large, the pattern of assistance rates can be argued to be influenced by exchange rate movements and domestic market constraints, especially transport-related infrastructure.

In general, and in spite of the differences in the rates of assistance between the two cereals, their overall patterns have been similar. While some substitutability in consumption exists between the two products, it seems that they are influenced also by similar policy measures.

Exportable oilseeds and oils

For oilseeds (sesame and groundnut), negative distortions have been on the rise up to about 1980 as a result of exchange rate distortions. But trade in oilseeds was highly affected during this period by a monopoly situation under the nationalization of oilseed exports in 1970 and the transfer of export functions to the Sudan Oil Seeds Company (FAO 2004). The monopoly was abolished in 1980, but again reintroduced in 1986 and finally removed in 1991.

However, the company continued to compete with the private sector during the period of demonopolization. Under the operation of the company, minimum producer prices used to be set to encourage production, but financial resources often ran short of fulfilling such a commitment. Because Sudan has had a high share of global sesame trade, at least in earlier years, the government demands that exporters adhere to a minimum export price.

The peak NRAs for sesame recorded in 1985 and 1988 could be mostly attributed to drought conditions inducing supply shortages, especially in 1985, with expected high domestic prices and probably time lag adjustments to world market prices. Ignoring the peak in 1991, another peak occurred in 1995, which was induced by the high increase in world market prices and the less proportional rise in domestic prices. The effect of exchange rate reforms as from the 1990s had a clear positive impact on producers' incentives, and export tax abolition in 2000 also had some effect.

The negative impact of the existing situation on groundnut producers, although of relevance to the policy dimensions, has more to do with internal market failures. Groundnut producers face, on the one hand, a cobweb type of internal markets with alternating low/high

production and prices, and on the other hand they very much suffer from traders' behavior. Directly after the crop is harvested, traders and processors are reluctant to buy and producers have no alternative market outlet, forcing prices down. Producers, not adequately equipped to store such a bulky crop that would be subjected to rainfall damage if left in the open, and facing prohibitively high credit costs, are forced to sell at those low prices. Such a situation has always been problematic in boosting production of this crop. Note though that, although groundnut is largely produced in rain-fed areas, some irrigated production occurs (unlike for sesame), which explains the insignificant effect of drought seasons on groundnut domestic price movement as compared with those of sesame.

On the other hand, the patterns of assistance to oils of sesame and groundnuts have been highly governed by the fixing of their prices in most of the period to the early 1990s. The situation is also influenced by the importation of cheaper vegetable oils, especially palm oil, in order to provide opportunities for the export of groundnut oil that fetches a relatively high price in the world market. From the early 1990s exports of groundnut oil were decreasing and intermittent on account of decreasing production and rising local consumption.

Exportable cotton

Rates of assistance to cotton, although variable, reflect a reasonable alignment of domestic and export prices. Their pattern is dictated by setting of producer prices by the government. The low rate in 1974 was probably influenced by a change in the cotton export-market policy from the fixed-price system followed in previous years to a system of tenders according to certain conditions (Bank of Sudan 1975). The 1981 peak might have been associated with the shift in the exchange rate policy whereby most exports and imports were shifted from the official to the parallel market exchange rate (Bank of Sudan 1982). The drastic reduction in cotton area in the first half of the 1990s may have been driven by the declining NRA at that time, but it also matched the government's objective of increasing food crops in the irrigated sector to boost food security. But a little later, declines in foreign currency earnings, higher world market prices and government encouragement of production resulted in less effective taxation of producers. The increase in assistance from the early 1990s was associated with the liberalization policy within which the official exchange market and foreign exchange retention policies were abandoned (Bank of Sudan 1992).

Exportable gum Arabic

Gum Arabic is clearly and consistently taxed. Trade in the commodity has been monopolized without government participation since 1969 and with its participation as from the early 1970s. Before that only a few companies were involved in gum Arabic trade, a situation that meant monopolistic competition. Floor prices are announced for gum Arabic, usually way below export border prices, and the commodity has always been subjected to relatively high export taxes prior to the late 1990s. In spite of the existence of high transport and cleaning costs, the estimated NRA is highly negative, even with the low (15 percent) level for trader costs assumed in our analysis. A recent report on the Gum Arabic Company (Khalid 2006) indicates that inland en-route fees and charges reached 40 percent in recent years. If trader costs are increased to this level, the farm NRA will still be negative, but with an overall average of about 42 percent instead of about 53 percent for the whole period. That difference is due to market failure more than government policy distortions. This discouragement is unfortunate for farmers but less so for the nation as a whole, given that Sudan is the world's main gum Arabic producer and so has some influence on the international price.

Exportable livestock

The status for producer assistance to livestock reflects the state of government intervention through export licensing, which for a long time was discouraging. This discouragement was reduced from 1992, when export earnings became a more important government objective. Direct state intervention in prices and marketing activities, however, has been quite limited (Hussein 2004).

Modalities for the promotion of livestock marketing and exports include the establishment of a Livestock and Meat Marketing Corporation in the mid-1970s that provided various marketing services, but that was dissolved in 1992 and most of its functions transferred to the current Animal Resources Services Company. Estimated NRAs also capture market failure relating to monopolistic competition among traders. The NRAs also are responsive to exchange rate regulations: up to the early 1980s when exchange rate distortions were low, so were the negative levels of the assistance rate, but during the 1980s and the beginning of the 1990s exchange rate distortions reflected more negatively on producers. In the period of exchange rate reform, producers started to enjoy a notable improvement in the rate of farm assistance. The rate of assistance during 2002 and 2004 might have been affected

by a monopoly situation of livestock exports granted to the Gulf Livestock Company owned by a Saudi prince through an agreement known as the Exclusive Export Agency Agreement, within which export prices were fixed. The Agreement faced local resistance and was short-lived, being finally dissolved in 2004 (Hussein 2004).

Prospects for national policy reform

Policy objectives throughout the past 50 years have targeted the development of the agricultural sector, yet with modest success. While many investments were undertaken, it is evident that malfunctioning of markets has been one of the important factors affecting agricultural performance. This is partly due to government intervention in markets through fixing or influencing prices, control over production and product delivery and disposal, and excessive internal taxation of products. There are also indications of monopolistic behavior, which is partly government induced. However, many exchange rate controls that had long been in place have recently been removed. It remains for the other distortions to agricultural incentives to be reduced. Some potential policy actions to help achieve that are canvassed in this final section.

One is to continue the on-going foreign exchange rate policy reform with the aim of allowing the real exchange rate to reach its natural equilibrium. This will not be easy while there are still trade measures in place such as ones that encourage exports to be not below a minimum export price, as is the case for sesame and live sheep. More generally, appreciations of the exchange rate (such as in 2006 when it appreciated by about 20 percent) will always raise concerns among exporters as to the decline in the competitiveness of agricultural exports.

A second useful action would be to deregulate state and state-induced market monopolies, especially in gum Arabic and cotton, through opening up export opportunities to the private sector. Intentions are now in this direction: the gum Arabic monopoly is on its way of being abolished, and the private sector can now engage in cotton exports (earlier export of rain-fed cotton was allowed for this sector). Wide involvement of the private sector in trade is, however, limited by the availability of finance and trade information, both of which need relevant policy action. Another requirement is quality assurance of some export products for which Sudan is having a big share in the international market, especially gum

Arabic, sesame and, to some extent, sheep. The government is concerned that the country could lose foreign markets if the private sector does not pay attention to this issue.

Experience already has shown that private sector engagement in processed gum Arabic (which is allowed to be privately exported to encourage processing) has resulted in messing with quality standards. Regulations regarding aspects of quality and standards as well as a strong institutional arm for implementation will be conducive to competitive export promotion. These are being prepared within the context of Sudan's accession to the WTO.

Third, domestic monopoly-like practices should be removed via policy interventions to promote finance from public and private finance sources, and training should be encouraged to empower newcomers in commerce.

Fourth, the recent trade reform process should be encouraged to continue. It has involved the removal of export taxes, as well as examining the import tariff structure in the context of negotiating Sudan's accession to the WTO. Such reforms should be aimed at raising efficiency by lowering the average tariff and its variance across industries, but with reasonable implementation periods to allow improvements in productivity to be reached.⁷

And fifth, given the high dominance of primary products in Sudan's export portfolio, investments in infrastructure and agricultural research, and the efficient provision of complementary services, are essential if greater quantities and quality of raw materials are to be forthcoming so as to encourage also an expansion in processing activities.

Of great importance in relation to all of the above policy recommendations is the adoption of a stable strategy of policy reforms that is nevertheless flexible enough to respond to internal and external changes. Such stability is needed in view of the past frequent policy shifts that have not only depressed agricultural incentives but also added to the natural uncertainty that is inevitably associated with agricultural production.

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⁷ The current structure of Sudan's tariff on agriculture comprises the applied tariff and the bound tariff offer prepared for WTO negotiations within Sudan's accession process (CWTOA 2006, CWTOA undated). The 2006 average applied agricultural tariff is 31 percent, with all tariff lines in the 0-45 percent tariff range. A modified bound tariff offer averages 44.9 percent in which 64 percent are within the 0-40 percent tariff range and 93 percent of the tariff lines in the 0-60 percent tariff range. This would provide more opportunities for protecting domestic producers if prices were to fall internationally.

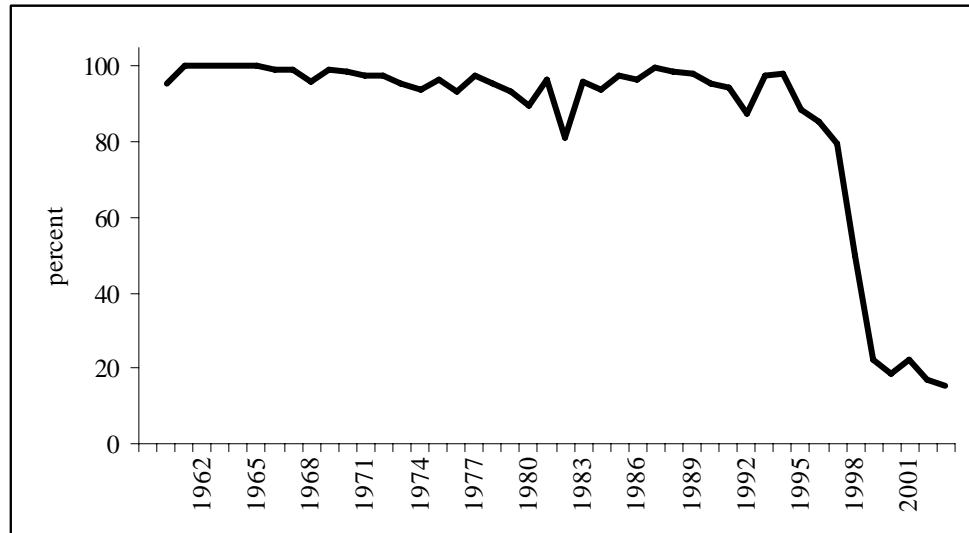
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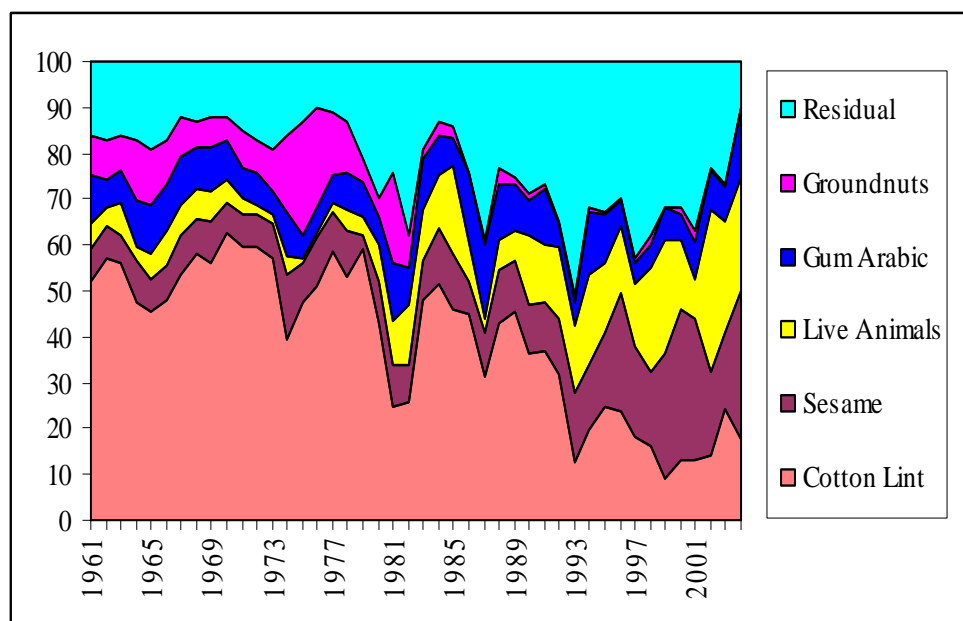
Figure 1: Product shares of agricultural and other merchandise exports, Sudan, 1961 to 2004

(percent)

(a) Agriculture's share in all merchandise exports

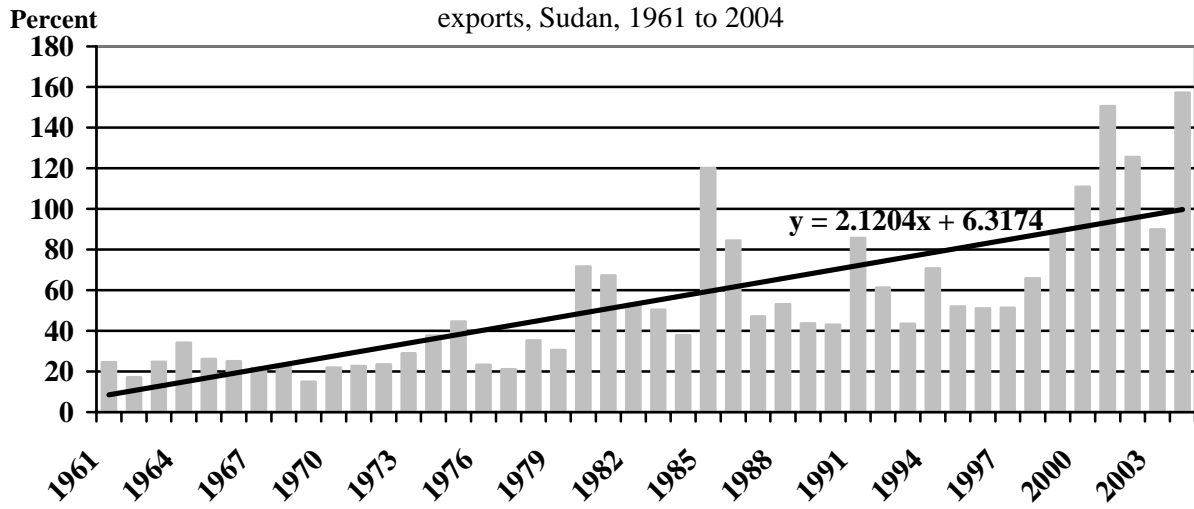


(b) Product shares of agricultural exports



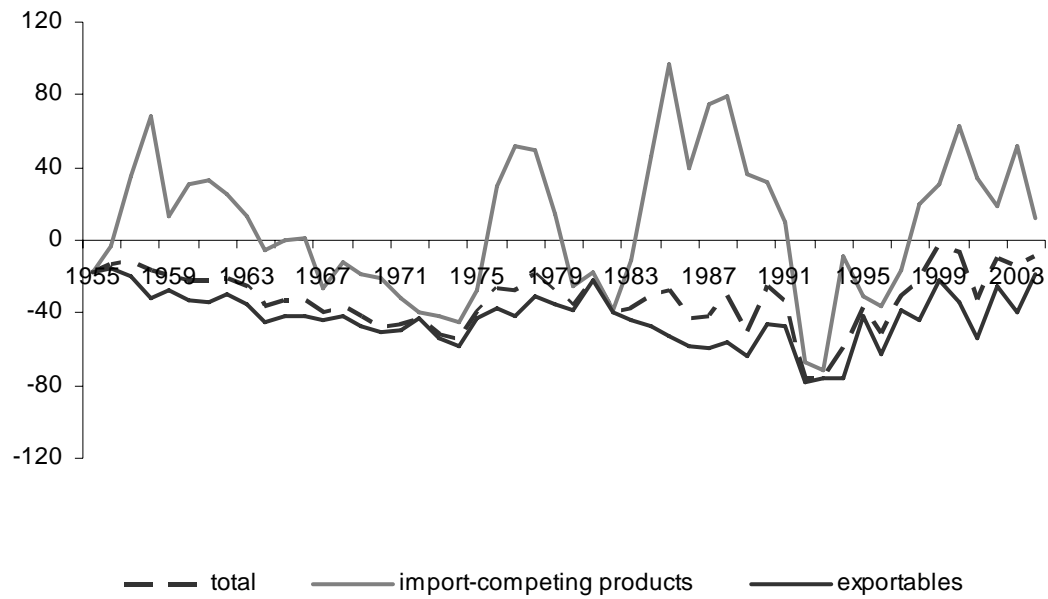
Source: Authors' compilation using FAO data (FAOSTAT)

Figure 2: Value of agricultural imports as a share of value of agricultural exports, Sudan, 1961 to 2004



Source: Authors' compilation using FAO data (FAOSTAT)

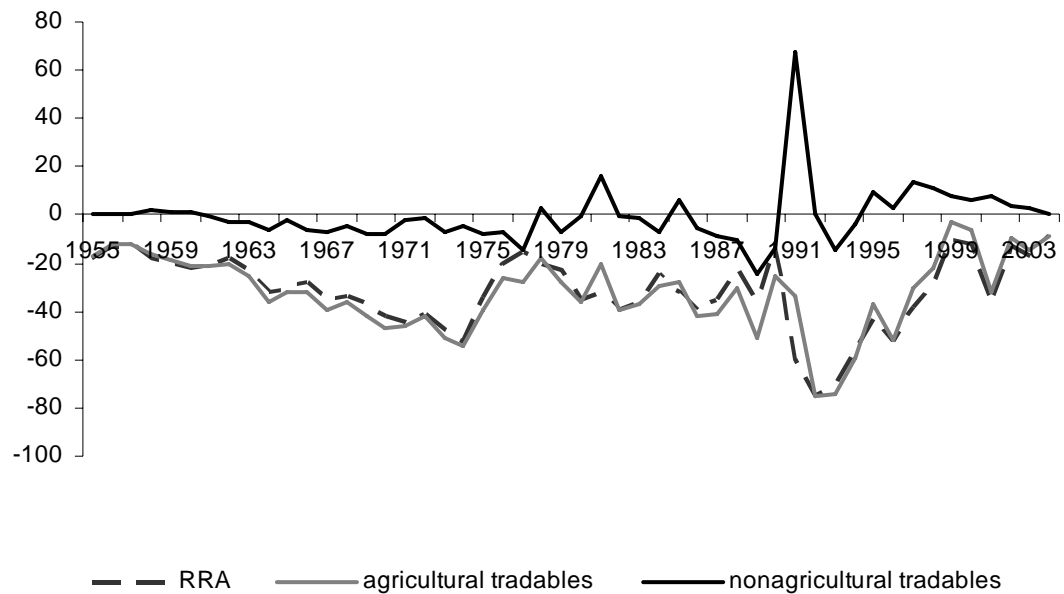
Figure 3: Nominal rates of assistance to exportables, import-competing and all^a agricultural products, Sudan, 1955 to 2004
(percent)



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 4: Nominal rates of assistance to all nonagricultural tradables, all agricultural tradable industries, and relative rates of assistance^a, Sudan, 1955 to 2004 (percent)



Source: Authors' spreadsheet

a. The RRA is defined as $100 \cdot [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, 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.

Table 1: Nominal rates of assistance to covered products, Sudan, 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	-22.3	-35.4	-43.4	-51.1	-37.7	-38.5	-58.1	-64.8	-41.8	-34.2
Sorghum	-35.3	-48.8	-39.9	-54.3	-39.7	-48.6	-23.8	75.5	-20.9	-10.9
Millet	-76.8	-73.2	-71.9	-41.2	-18.6	-6.2	7.9	76.2	8.7	0.4
Groundnuts	-41.2	-55.3	-51.7	-59.8	-59.0	-55.4	-33.3	-36.1	-52.2	-28.9
Sesame	-40.3	-52.5	-63.6	-65.3	-67.8	-59.5	-48.4	-48.1	-49.9	-38.1
Cotton	7.8	4.9	-11.8	-10.2	-7.4	2.1	-1.0	-31.9	-10.3	17.0
Gum Arabic	-33.3	-33.4	-42.0	-58.5	-47.4	-61.1	-66.7	-57.3	-59.8	-67.1
<i>Livestock</i>	<i>-10.5</i>	<i>-40.1</i>	<i>-51.1</i>	<i>-59.5</i>	<i>-34.2</i>	<i>-34.1</i>	<i>-67.1</i>	<i>-76.7</i>	<i>-47.5</i>	<i>-30.0</i>
Sheep	-33.9	-53.2	-55.8	-66.7	-51.0	-43.9	-61.7	-76.7	-61.4	-37.4
Cattle	-2.4	-36.2	-44.8	-59.8	-31.9	-32.6	-61.9	-74.5	-42.9	-45.1
Camels	5.3	-38.8	-61.7	-34.4	29.6	0.7	-69.3	-85.3	23.6	87.7
Goats	20.0	-8.4	-38.1	-60.2	-43.1	-32.6	-59.4	-53.7	-50.6	-13.3
Import-competing products^a	19.1	19.2	-11.4	-35.7	23.4	-9.3	65.3	-21.2	-6.8	35.8
Wheat	10.1	4.9	0.6	-35.6	10.6	-6.5	31.5	58.8	-19.8	22.2
Sugar	n.a.	42.4	41.2	45.2	26.5	-35.7	-16.5	-20.1	-24.4	120.5
Milk	19.4	19.0	-16.2	-41.1	26.5	-3.5	79.2	-33.1	-1.9	29.3
Total of covered products^a	-15.9	-25.4	-36.8	-48.5	-28.3	-32.9	-38.9	-53.9	-29.2	-14.6
Dispersion of covered products ^b	33.6	34.2	32.9	35.0	38.8	31.1	52.5	72.3	40.5	60.9
% coverage (at undistorted prices)	75	80	86	90	86	89	91	87	85	83

Source: Authors' spreadsheet

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

b. 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, Sudan, 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	-15.9	-25.4	-36.8	-48.5	-28.3	-32.9	-38.9	-53.9	-29.2	-14.6
Non-covered products	0.8	0.6	0.5	0.3	0.4	0.5	0.2	0.4	0.8	0.9
Total, all agricultural products	-11.7	-20.3	-31.8	-43.4	-24.3	-29.3	-35.4	-47.7	-24.5	-11.9
Trade bias index ^a	-0.30	-0.45	-0.36	-0.24	-0.46	-0.26	-0.74	-0.48	-0.35	-0.50
<i>Assistance to just tradables:</i>										
NRA, all agricultural tradables	-15.4	-24.9	-36.4	-48.1	-28.0	-32.6	-38.5	-53.6	-28.8	-14.2
NRA, all non-agricultural tradables	0.9	-2.4	-5.6	-4.7	-6.7	1.5	-8.5	7.1	8.8	4.2
Relative rate of assistance, RRA ^b	-16.1	-23.2	-32.7	-45.6	-22.7	-33.5	-32.9	-55.4	-34.7	-17.5
MEMO , ignoring exchange rate distortions:										
NRA total, all agricultural products	-7.9	-14.5	-24.8	-34.9	-13.4	-18.1	-15.8	-38.2	-23.2	-11.9
Trade bias index ^a	-0.17	-0.26	-0.05	0.21	-0.14	0.11	-0.51	-0.03	-0.30	-0.50
RRA (relative rate of assistance) ^b	-16.1	-23.1	-33.7	-44.8	-18.8	-28.6	-23.3	-56.4	-33.7	-17.6

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 non-agricultural sectors, respectively.

Appendix: Data and their sources

Data for the analysis were collated from various secondary sources for the period 1955 to 2004. Where there were gaps in early years in official data, estimates were substituted from other sources. Records of the Annual Reports of the Bank of Sudan formed a major source for quantities and values of foreign trade, supplemented in some cases with FAO data. The Bank of Sudan was also the supplier of some figures on domestic production quantities, but most of the domestic production data were taken from the records of the Ministry of Agriculture and Forests and the Ministry of Animal Resources, which were additionally used to obtain wholesale prices of various commodities. The Central Statistical Bureau was important in providing early statistics on domestic quantities and sales of various commodities and price indices subject to which missing data were derived. Supplementary data were taken from the Economic Survey Reports of the Ministry of Finance and National Economy. Records of the Sudan Cotton Company were used to get data on cotton, while those of the Gum Arabic Company are the data source for gum Arabic domestic and export prices. Data on domestic cotton and wheat prices were largely sourced from the Sudan Gezira Scheme records. Custom tariffs were provided by the Customs Department from the early 1970s, but it was not possible to trace information in earlier years. FAOSTAT balance sheets were used to get data on commodity stock change, quantities of seed, feed and processing. Official exchange rates were taken from the Bank of Sudan, supplemented during the late 1980s and early 1990s with data from Amal (2006), while the black market premium from the same source was used to derive parallel market exchange rates. Average unit values of exports and imports were used in obtaining f.o.b. and c.i.f. commodity prices at the country's border. Various computations and assumptions were made to estimate transport, processing and other related costs.

Numerous estimates were made to fill in data gaps. The major gaps were in domestic wholesale price data, especially in the period 1955-1966 and, to a lesser extent, in export price data. Wholesale prices were missing for sugar in another 21 years, so retail prices were used to estimate most missing prices, as they were also for milk prices. Price records were also not available for sesame and groundnuts oils, so price indices were used to fill in the gaps. They were derived from those of seeds, using the conversion factor and related trade costs. Missing prices for cotton, gum Arabic, live animals, wheat and millet during 1955-1966 were estimated using trend values. There were also gaps for 1985-1990 for livestock, which were estimated using price indices. Export prices were missing for sesame, groundnuts and wheat during the first ten years and for millet in the same period in addition to eight other later years, so trend values were used to fill in those gaps. More-specific notes for some of the tables follow.

Notes to Appendix Figure 2

Analysis in this study shows that total production-value of primary commodities is dominated by high and increasing share of cattle in particular and livestock share in general. Their respective contributions increased from about 12 to 44 percent and from 38 to 78 percent. Shares of most other commodities have been low and declining. That of sugar, although also low, has been slightly rising. Notable is the drastic decrease in the value share of cotton to about 1 percent, down from about 29 percent in the early 1950s. Similar to the case of production, consumption of livestock, mainly cattle and sheep, as well as milk have kept high and rising share of total consumption value. Sorghum's value share depicted a slightly declining trend while that of wheat and wheat flour was slightly rising. Other products have kept more or less constant shares, indicating the absence of drastic changes in household food consumption.

Notes to Appendix Table 4

- Sources for sorghum, millet, wheat, sesame, groundnuts and cotton:
 - Ministry of Agriculture & Forests - Agricultural Economics Department
 - Central Bureau of Statistics.
 - Annual Economic Survey, Ministry of Finance & Economy
 - Bank of Sudan Annual Reports.
- Groundnuts production is given as shelled groundnuts, computed from groundnuts in shell using a shelling out-turn of 0.65.
- Cotton production is in the form of lint, converted from seed cotton data using a ginning out-turn ratio of 0.34.
- Sources for gum Arabic data: Gum Arabic Company; Annual Reports Bank of Sudan; Central Bureau of Statistics
- Gum Arabic production is given for "hashab" (*Acacia senegal*) trees and is in the form of cleaned gum assuming cleaning loss of 10 percent. It did not include other gum types such as those from "talh" (*Acacia sayal*) tree. These other types form minor shares of gum production.
- Source for livestock numbers were mainly the Ministry of Animal Wealth and Fisheries. For the period 1961-1969 FAOSTAT data (FAO) were used.
- Sheep population in the period 1955-1960 was taken as trend value of 1961-1962; cattle population in the same period was taken as average interval of 1963 & 1965 data; those of camels and goats were estimated as interval between 1961 and 1962.
- Production of livestock types in the spreadsheets was derived from estimated off-take rates, which were 0.35 for sheep and goats, and 0.19 for cattle and camels. Sheep and goats estimates were based on El Rasheed (2005).
- Milk production was estimated from livestock numbers (sheep, cattle & goats) according to the assumptions: 85 percent of the herd is females, 35 percent of females are lactating, milk production per head/day of 0.5 kg for ewes, 0.7 kg for goats and 3.5 kg from cows; adjusted by a factor of 0.925 to match AOAD figures in later years.
- Source of sugar production was mainly from the Bank of Sudan Annual Reports, and in the period 1961-1969 FAO data (FAOSTAT) was used.

Notes to Appendix Table 5

- Commodity prices were taken as unit value of exports/imports (f.o.b./c.i.f.). Export and import values taken from the Bank of Sudan Annual Reports were provided in local currency till 1989 and in US\$ thereafter. Unit values were converted to dollars using the official exchange rate.
- Sorghum prices were derived from Bank of Sudan Annual Reports; Central Bureau of Statistics; prices for 1970 and 1997 were taken from FAO data (FAOSTAT), prices for 1957, 1985, 1991 were estimated as averages of previous and following years.
- Millet prices derived from Bank of Sudan Annual Reports; 1961-1969, 1995, 1996, 1999-2001 derived from FAO data (FAOSTAT); 1955-1960 were taken as average of 1961-1962; 1990, 1991, 1994, 1997, 1998, 2002-2004 assumed as average of previous and following years.
- Sesame prices during 1961-2004 were derived from Bank of Sudan Annual Reports; 1955-1960 from the Central Bureau of Statistics.
- Groundnuts prices during 1961-2004 derived from Bank of Sudan Annual Reports; 1955-1960 from the Central Bureau of Statistics; 1989 from FAOSTAT.

- Cotton prices Bank of Sudan Annual Reports.
- Gum Arabic prices were from the gum Arabic Company and Bank of Sudan Annual Reports.
- Live sheep prices derived from Bank of Sudan Annual Reports; Annual Economic Survey Reports of the Ministry of Finance and Economy.
- Live cattle prices derived from Bank of Sudan Annual Reports, Annual Economic Survey Reports of the Ministry of Finance and Economy; prices for 1988, 1991-1996, 2002, 2003 derived from FAOSTAT; prices for 1987 assumed as average of 1986 and 1988; price for 2004 assumed same as 2003.
- Live camels from Bank of Sudan Annual Reports, Annual Economic Survey Reports of the Ministry of Finance and Economy; prices for 1978 and 1979 estimated as averages of 1977 and 1980 with equal increments.
- Live goats prices derived from Bank of Sudan Annual Reports; prices for 1971-1976 derived from data of the Central Bureau of Statistics, 1987 price taken as an average of 1986 and 1988; prices during 1961-1970 taken from FAOSTAT import prices by Nigeria; 1955-1960 prices taken as equal intervals for prices in 1962-1961.
- Sesame oil prices during 1961-2004 derived from Bank of Sudan Annual Reports; prices during 1955-1960 estimated as trend values of 1961-1972; prices for 1985 and 1986 assumed as following the change in primary product prices during the same years.
- Groundnuts oil prices during 1961-2004 derived from Bank of Sudan Annual Reports; prices during 1955-1963 assumed as average of 1964-1965; prices for 1985, 1986, 1969, 1971, 1972 assumed as following the change in primary product prices during the same years.
- Wheat prices derived from Bank of Sudan Annual Reports and Annual Economic Survey Reports of the Ministry of Finance & Economy; Import quantity in 1987 taken from FAO data; prices during 1963-1967 from FAO data; 1978 price taken as average of previous & following year; prices in the period 1955-1960 taken as values with equal intervals to the difference between 1962 and 1961.
- Sugar prices derived from Bank of Sudan Annual Reports; 1957 price taken as average of 1956 and 1958; 1965 price taken as average of 1964 and 1966; prices for 1961, 1962, 1966-1969, 1975, 1982-1984, 1989, 1991-1993, 2004 taken from FAO data, price for 1986 taken as the international free market price adjusted for freight.
- Milk prices taken as New Zealand farmer price at world market prices, from FAO.
- Wheat flour from Bank of Sudan Annual Reports; 1965 from FAOSTAT; 1957, 1973 assumed as average of previous and following years.
- Cheese prices taken from FAOSTAT (Cheese of whole cow milk); 1958-1960 prices estimated as 10.8 times international price of milk, which was the ratio prevailing of the two price levels in 1961; prices for 1972 and 1976 assumed as averages of preceding and following years.

Notes to Appendix Table 6:

- Seed cotton prices were taken from records of the Sudan Gezira Board; prices for 1955-1966 were estimated as trend values for the years 1965-1966 (justified by export prices that follow a similar trend that was decreasing). Yet cotton lint prices were used in the calculations taking lint as primary product.
- Raw gum Arabic floor prices and cleaned gum prices were data of the Gum Arabic Company; prices during 1955-1964 were estimated as trend values of the period 1965-1966; prices in 1968 and 1969 were estimated as average intervals between 1967 and 1970. Cleaned gum Arabic prices were used in the calculations taking cleaned gum as primary product.
- All prices of live animals in the period 1970-1984 taken from records of the Agricultural Economics Department, Ministry of Agriculture and Forests and in the period 1991-2004

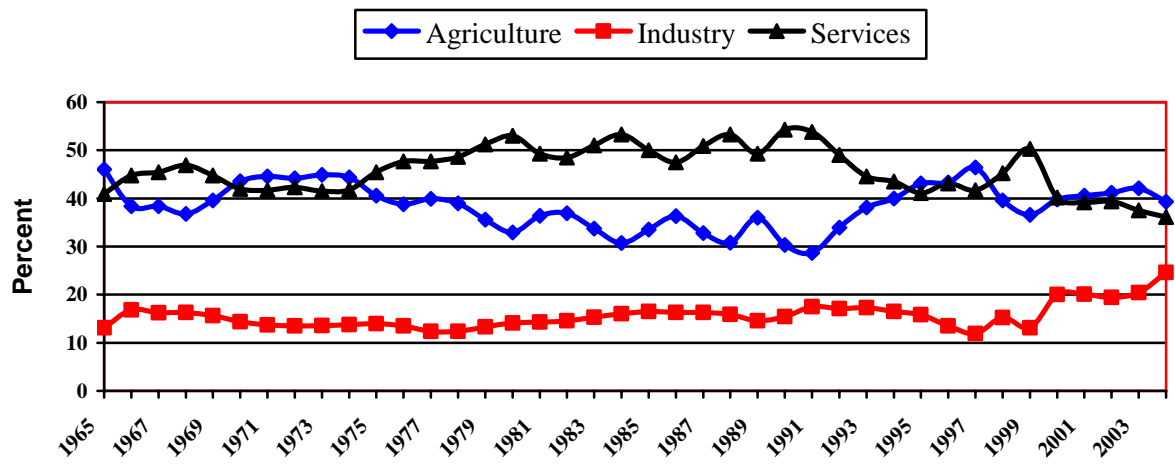
were from the Ministry of Animal Resources. They were computed averages in different wholesale markets. All prices were adjusted for trek costs (9.3 percent), feed costs (0.64 percent) and transport to port (10 percent) according to El Rasheed (2005).

- Live sheep prices for 1955-1964 were estimated as trend values of the period 1965-1969, prices for 1968 and 1969 estimated average with equal increments between 1967 and 1970; prices in the period 1985-1990 were derived from price indices from Central Bureau of Statistics.
- Live cattle prices during 1955-1964 and 1985-1990 were derived from price indices from the Central Bureau of Statistics; prices for 1968 and 1969 were an estimated average with equal increments between 1967 and 1970.
- Live camels prices for 1955-1964 and 1985-1990 were derived from price indices from the Central Bureau of Statistics; prices for 1968 and 1969 were estimated as average of 1967 and 1970 with equal increments.
- Live goats prices during 1985-1990 were derived from price indices from Central Bureau of Statistics; prices for 1955-1964 were taken as trend values of the period 1965-1967; prices in 1968 and 1969 were estimated as equal increments between 1967 and 1970.
- Sesame and groundnuts oil prices were estimate based on conversion the conversion factor (oil content; 50 percent for sesame and 40 percent for groundnuts) and adjusted by 17 percent miller's costs, and 4 percent wholesale cost margin.
- Wheat prices were derived from the Statistical Bulletin and records of the Planning and Socioeconomics Department of the Sudan Gezira Board; Prices for 1955 and 1965 were estimated as trend value to the period 1966-1974; prices for 1986-2002 were from the Department of Agricultural Economics, Ministry of Agriculture and Forests; price for 1985 was taken as average of 1984 and 1986. Prices were adjusted for transport and distribution costs from port.
- Wheat flour prices were derived from primary product wholesale price after allowing for transport (5 percent), processing cost margin (15 percent) and transaction costs of millers (2 percent).
- Sugar prices for 1989-2004 were from the Sudan Sugar Company, adjusted for transport and distribution costs from port; Prices for 1955-1967, 1970, 1977-1981, 1984-1988 were estimated from retail prices deducting 10 percent production tax, 15 percent retailer margin and 5 percent transport; prices for 1968, 1969, 1971-1976, 1982, 1983 were estimated as averages of equal increments between cells on which data is available.
- Milk prices for 1967-2003 were taken as goats milk prices from the FAO data (FAOSTAT); prices for the period 1955-1966 were derived from retail prices (Sudan Department of Statistics), adjusted by 30 percent marketing margins ; prices for 2004 were assumed equal to the 2003 price.
- Cheese prices were calculated using the conversion factor of 20 percent (11 kg milk for 1 kg cheese), adjusted by 20 percent processing costs and 15 percent margin to processors.

Notes to Appendix Table 7

- Official exchange rate taken from the World Bank (2006). The rate for 1991 from Bank of Sudan Annual Reports; rates for 1990, 1991, 1995 from Amal (2006).
- Parallel exchange rate derived from Black-Market Premium (Web Board) with some modifications, 1955-1959 assumed constant equal to the rate in 1960; 1991 rate taken from Bank of Sudan; rates during 1988-1991 and 1994-1996 taken from Amal (2006).
- Exchange rate distortions for both importable and exportable goods are derived using the project's methodology (see Anderson et al. 2008).

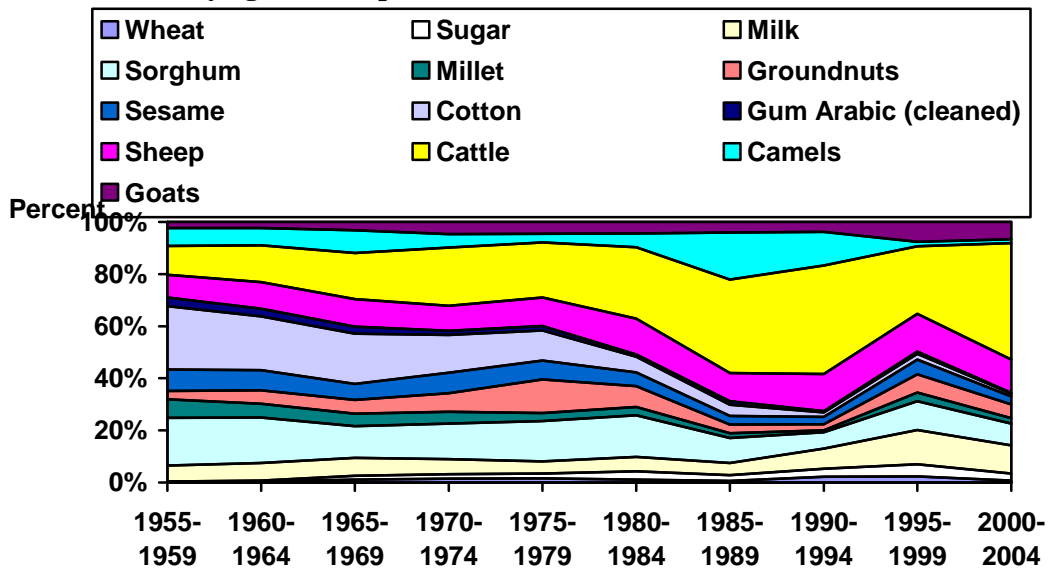
Appendix Figure 1: Shares of economic sectors in GDP, Sudan, 1965 to 2004



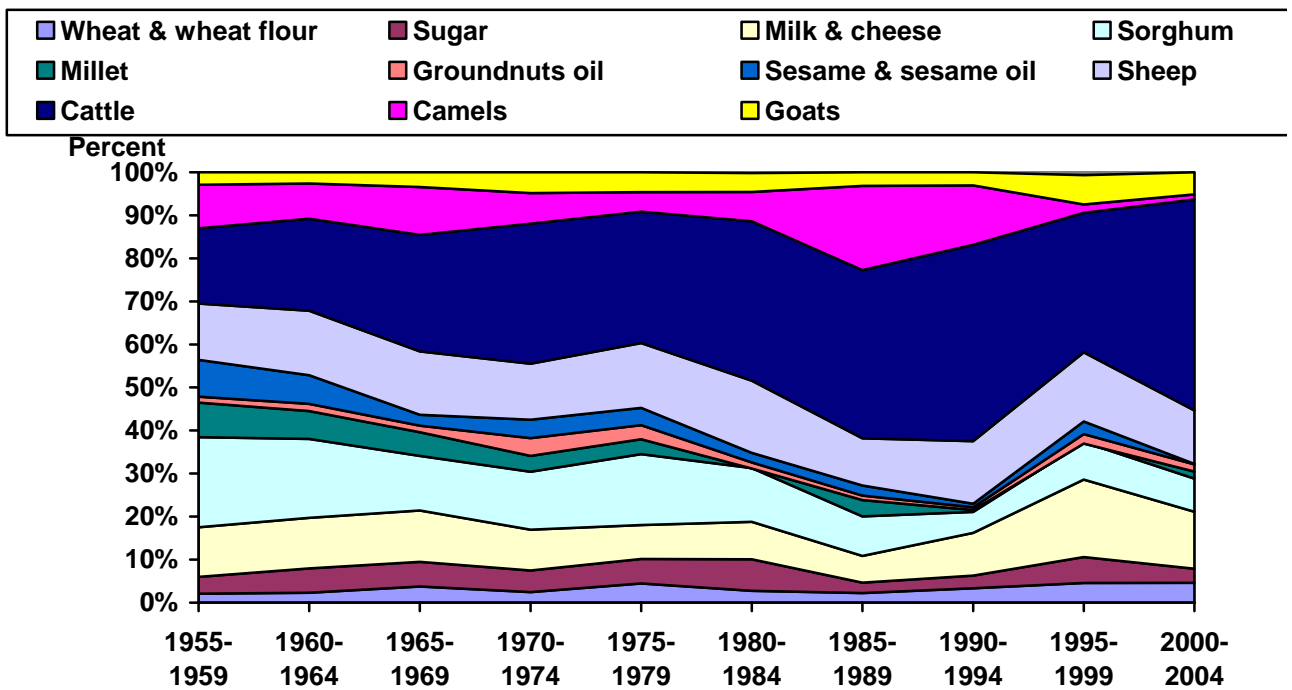
Source: derived from Web Board (WDI Indicators 2006) and Bank of Sudan Annual Reports

Appendix Figure 2: Agricultural production and consumption shares by farm product, Sudan, 1955 to 2004 (percent, 5-year averages)

a) Primary agriculture production share



b) Final household food consumption shares



Source: Authors' calculations

Appendix Table 1: Shares of economic sectors in GDP, Sudan, 1965 to 2004

Year	Shares of Main Sectors in GDP (percent)			GDP Agric. (current US\$ m)
	Agriculture	Industry	Services	
1965	46.0	13.1	40.9	606.692
1966	38.4	16.8	44.8	521.539
1967	38.4	16.2	45.4	560.167
1968	36.8	16.3	46.9	545.951
1969	39.6	15.6	44.8	637.565
1970	43.6	14.4	42.0	801.407
1971	44.6	13.7	41.7	883.571
1972	44.2	13.5	42.3	951.857
1973	44.9	13.6	41.5	1219.714
1974	44.4	13.8	41.8	1559.571
1975	40.6	14.0	45.4	1718.143
1976	38.8	13.5	47.7	2056.429
1977	39.9	12.4	47.7	2656.286
1978	39.0	12.4	48.6	2805.263
1979	35.6	13.3	51.2	2699.535
1980	32.9	14.1	53.0	2278.591
1981	36.4	14.3	49.3	3183.780
1982	36.9	14.6	48.5	3156.187
1983	33.7	15.3	51.0	2640.399
1984	30.7	16.0	53.3	2873.318
1985	33.5	16.5	50.0	3920.512
1986	36.3	16.3	47.5	5511.296
1987	32.8	16.3	50.9	6521.865
1988	30.8	15.9	53.3	2630.000
1989	36.0	14.6	49.3	5676.667
1990	30.3	15.4	54.3	6787.933
1991	28.7	17.5	53.8	7864.307
1992	33.9	17.1	49.0	1396.743
1993	38.1	17.3	44.6	2051.509
1994	40.0	16.5	43.5	2424.711
1995	43.1	15.8	41.1	2206.492
1996	43.3	13.5	43.1	3445.023
1997	46.4	11.9	41.7	4904.963
1998	39.6	15.2	45.2	4790.145
1999	36.6	13.1	50.3	3807.167
2000	39.8	20.0	40.2	4693.528
2001	40.6	20.1	39.2	5300.734
2002	41.2	19.4	39.4	6066.613
2003	42.1	20.4	37.5	7137.174
2004	39.3	24.6	36.1	7743.872
Average	38.4	15.6	45.9	3230.930

Sources: World Bank (WDI Indicators 2006); 1988-1995: Bank of Sudan Annual Reports (GDP agric provided in SD converted to US\$ at official exchange rate).

Appendix Table 2: Contribution of agriculture to total trade, Sudan, 1960 to 2004

Year	Value (\$ million)				percent Ag exports	percent Ag imports	Ag imports as percent of ag exports
	Total ag exports	Total ag imports	Total merchandize exports	Total merchandize imports			
1961	170.869	42.052	178.525	237.880	95.7	0.2	24.6
1962	220.547	37.980	214.300	260.900	102.9	14.6	17.2
1963	233.687	58.011	221.500	285.000	105.5	20.4	24.8
1964	195.508	66.945	192.700	274.200	101.5	24.4	34.2
1965	196.194	51.140	192.800	207.600	101.8	24.6	26.1
1966	208.976	52.552	200.414	222.456	104.3	23.6	25.1
1967	219.57	47.895	221.400	213.500	99.2	22.4	21.8
1968	239.713	55.608	241.700	257.600	99.2	21.6	23.2
1969	253.702	37.693	263.700	265.590	96.2	14.2	14.9
1970	297.579	65.291	300.000	311.145	99.2	21.0	21.9
1971	331.596	75.015	336.800	355.155	98.5	21.1	22.6
1972	353.091	82.856	361.239	353.479	97.7	23.4	23.5
1973	403.928	116.614	413.855	479.474	97.6	24.3	28.9
1974	419.93	158.115	440.451	707.086	95.3	22.4	37.7
1975	402.898	179.461	429.364	1000.318	93.8	17.9	44.5
1976	556.204	129.868	577.649	1022.145	96.3	12.7	23.3
1977	600.912	126.704	643.902	1087.914	93.3	11.6	21.1
1978	477.651	168.080	489.276	997.718	97.6	16.8	35.2
1979	570.329	174.498	597.210	1265.981	95.5	13.8	30.6
1980	552.803	396.148	594.017	1712.600	93.1	23.1	71.7
1981	475.874	319.731	531.730	1716.490	89.5	18.6	67.2
1982	496.274	263.815	514.986	1293.900	96.4	20.4	53.2
1983	505.91	255.068	623.394	1354.121	81.2	18.8	50.4
1984	601.852	227.521	628.496	1146.402	95.8	19.8	37.8
1985	356.918	428.393	379.265	930.275	94.1	46.1	120.0
1986	325.158	274.509	333.282	960.895	97.6	28.6	84.4
1987	514.173	242.071	532.960	930.196	96.5	26.0	47.1
1988	507.097	269.180	508.575	1059.590	99.7	25.4	53.1
1989	661.681	288.872	671.129	1335.029	98.6	21.6	43.7
1990	549.756	236.546	560.000	825.000	98.2	28.7	43.0
1991	381.236	326.345	400.000	1280.600	95.3	25.5	85.6
1992	367.356	225.225	390.000	1081.200	94.2	20.8	61.3
1993	455.26	197.546	520.000	1145.000	87.6	17.3	43.4
1994	473.353	334.835	486.000	1162.000	97.4	28.8	70.7
1995	498.199	258.585	507.000	1025.000	98.3	25.2	51.9
1996	548.011	279.979	620.186	1504.390	88.4	18.6	51.1
1997	508.905	260.877	594.182	1579.720	85.6	16.5	51.3
1998	472.223	310.650	595.700	1924.600	79.3	16.1	65.8
1999	390.415	348.730	780.000	1415.000	50.1	24.6	89.3
2000	398.729	441.831	1806.700	1552.700	22.1	28.5	110.8
2001	312.776	471.137	1688.700	1585.500	18.5	29.7	150.6
2002	383.704	481.697	1718.000	1915.000	22.3	25.2	125.5
2003	440.436	395.799	2609.400	2710.600	16.9	14.6	89.9
2004	405.689	637.941	2609.400	2710.600	15.5	23.5	157.2

Source: FAOSTAT, FAO website.

Appendix Table 3: Value of major export commodities (\$ million) and their share (percent) in total agricultural exports, Sudan, 1961 to 2004

Year	Cotton lint	Sesame	Groundnuts	Live animals	Gum Arabic	Total	percent share of total ag exports
1961	89.480	11.995	15.425	9.624	17.640	144.164	84
1962	124.960	16.202	19.180	8.555	13.114	182.011	83
1963	130.860	13.862	18.385	15.849	16.331	195.287	84
1964	92.880	18.536	26.371	5.810	19.415	163.012	83
1965	89.590	13.641	24.686	10.731	20.675	159.323	81
1966	99.964	16.226	20.838	15.670	20.626	173.324	83
1967	117.330	18.750	18.694	14.515	23.943	193.232	88
1968	139.280	17.854	13.204	15.040	22.657	208.035	87
1969	142.014	23.027	17.205	16.488	23.940	222.674	88
1970	185.881	19.307	15.700	14.903	24.925	260.716	88
1971	198.144	22.964	26.787	12.562	22.100	282.557	85
1972	212.120	25.146	26.456	6.120	24.894	294.736	83
1973	229.403	31.240	37.489	8.466	20.006	326.604	81
1974	165.288	60.786	70.361	16.917	40.658	354.010	84
1975	189.940	35.155	99.119	4.019	21.172	349.405	87
1976	285.225	58.040	120.643	5.724	31.709	501.341	90
1977	352.150	52.437	81.281	12.570	37.357	535.795	89
1978	252.693	48.448	54.568	22.083	37.080	414.872	87
1979	338.766	16.725	30.560	23.620	42.517	452.188	79
1980	235.667	49.740	20.461	44.349	35.204	385.421	70
1981	118.568	42.938	94.451	47.347	60.259	363.563	76
1982	129.125	40.664	34.302	64.576	40.196	308.863	62
1983	243.289	43.488	12.341	55.320	56.210	410.648	81
1984	311.445	73.909	20.588	71.234	49.312	526.488	87
1985	163.550	42.748	10.116	69.647	20.666	306.727	86
1986	146.688	23.542	0.986	28.605	48.922	248.743	76
1987	162.049	48.000	3.580	15.281	84.967	313.877	61
1988	217.213	59.723	19.211	34.672	60.802	391.621	77
1989	299.432	73.993	11.300	42.733	65.536	492.994	75
1990	200.000	58.000	5.800	82.896	41.944	388.640	71
1991	140.000	40.500	3.800	48.796	44.828	277.924	73
1992	116.000	44.500	1.600	56.396	18.730	237.226	65
1993	57.118	68.200	6.419	66.396	23.100	221.233	49
1994	93.952	66.742	3.676	91.986	65.700	322.056	68
1995	122.951	80.449	2.735	75.806	51.400	333.341	67
1996	128.209	141.132	1.301	81.401	29.531	381.574	70
1997	91.941	102.702	4.880	69.248	22.428	291.199	57
1998	75.420	76.921	8.662	106.047	23.666	290.716	62
1999	34.614	107.834	0.148	96.277	26.356	265.229	68
2000	51.651	131.302	4.814	58.656	23.140	269.563	68
2001	41.125	94.751	7.623	27.859	24.275	195.633	63
2002	55.173	68.773	3.377	137.507	31.851	296.681	77
2003	106.328	74.270	0.172	106.738	35.416	322.924	73
2004	72.603	130.000	1.049	101.003	60.596	365.251	90

Source: FAOSTAT, FAO website; (gum Arabic: Bank of Sudan Annual Reports)

Appendix Table 4: Area and production of major farm commodities, Sudan, 1955 to 2004

a) Cereal grains

Year	Sorghum		Millet		Wheat	
	Area (ha)	Production (t)	Area (ha)	Production (t)	Area (ha)	Production (t)
1955	615292	767341	670168	12053	17211	361405
1956	1144990	777086	680012	12383	17683	366713
1957	1054974	1097477	276425	10108	31000	193759
1958	1095378	1139000	422689	12933	20000	262000
1959	1366387	1372000	421849	13697	23000	297000
1960	1365966	1313000	331092	16092	22775	280000
1961	1288655	1051000	391597	16387	26000	226000
1962	1477311	1434000	318908	17227	29000	205000
1963	1477731	1266000	447899	22689	31000	291000
1964	1376891	1348000	592437	23529	37000	373000
1965	1326891	1138000	601261	56723	56000	358000
1966	1344538	1095000	607983	57143	69000	253000
1967	1336975	850000	544958	72689	78000	252000
1968	1974790	1980000	610084	110924	111000	369000
1969	1168067	710000	636975	124370	152000	278000
1970	2055872	1534914	634454	121918	115000	427000
1971	2056000	1536490	733193	121849	163000	439740
1972	1912000	1588145	881933	121008	124000	440790
1973	1720000	1297671	1070588	104202	152000	354172
1974	2373000	1694322	1140336	178571	235000	284970
1975	2343000	1790005	1085714	248319	269000	403104
1976	2734000	2147284	1129412	123529	263000	387072
1977	2813000	3146622	1127311	265966	289000	450744
1978	2887000	2081931	1282773	247479	312000	500692
1979	2902000	2355205	1299580	241176	165000	553647
1980	2332000	1487443	974790	190756	231000	308560
1981	2927000	2082912	1091597	183613	218000	491022
1982	3913000	3334033	1228992	138235	142000	508950
1983	3564000	1891557	999160	94538	176000	228288
1984	3690000	2002342	1271008	140756	157000	314600
1985	3356000	1094257	1439496	48319	79000	167874
1986	5527000	3591113	1734454	151261	199000	408672
1987	4960000	3269930	1544538	118487	157000	290404
1988	3390000	1363526	1096218	144118	181000	153931
1989	5579000	4421581	2385714	165126	247000	493986
1990	3802000	1538289	1560084	257983	409000	159659
1991	2760000	1182384	661765	463025	686000	85050
1992	5101000	3581412	1118908	379412	838000	308908
1993	6200000	4043144	1558824	326471	455000	448910
1994	4686000	2386674	1069328	357563	475000	221415
1995	4630000	2622617	3238235	278151	448000	971082
1996	5045000	2449448	2419328	297899	527000	437608
1997	6556000	4181679	1634034	329412	642000	439457
1998	5311000	2869321	2808824	255042	585000	641760
1999	6314000	4282786	2763445	141597	172000	670854
2000	4528000	2349308	2394538	92017	214000	501512
2001	4195000	2486041	2200420	120168	303000	481804
2002	5751000	4393649	2815126	115546	247000	897800
2003	5322000	2824598	2444118	129832	330000	581700
2004	7330000	4692813	2640756	172269	398000	766770

Appendix Table 4 (cont'd): Area and production of major farm commodities, Sudan, 1955 to 2004

b) Main export crops

Year	Sesame		Groundnuts		Cotton (lint)		Clean Gum Arabic	Sugar
	Area	Prod. (t)	Area	Prod. (t)	Area	Prod. (t)	Prod. (t)	Prod.
1955	158803	89096	84644	28284	277144	89776	44548	
1956	250124	149489	103568	34542	242182	98029	37189	
1957	333228	153108	193232	94982	309235	136813	37598	
1958	212981	131458	188450	83639	294701	50669	39487	
1959	255779	132638	168067	104000	358845	127342	33656	
1960	416387	179000	193697	120900	381513	123930	45976	
1961	291597	127000	197899	125450	380672	114750	42796	13000
1962	412185	232000	198319	96850	476050	206693	44425	13000
1963	326050	142000	291597	148850	447899	160793	38363	14000
1964	497479	174000	355882	187850	440756	104757	26564	20000
1965	468908	184000	327311	182000	448739	149462	33955	18000
1966	398319	160000	392857	198250	441176	189863	36048	27000
1967	388655	134000	389076	204100	486555	181257	32051	77000
1968	518487	187000	355882	193050	482773	178006	55391	10136
1969	457983	122000	328571	128050	469748	221372	41286	10600
1970	560084	202000	455042	265200	527729	229495	31557	72582
1971	780252	297000	384034	220350	507983	248540	34754	91380
1972	807143	296000	635294	251550	512185	233240	28321	11264
1973	1196218	340000	690336	369850	494538	188360	23346	12057
1974	936134	244000	734454	359450	511345	228140	21118	12865
1975	915126	224000	752941	603200	512185	220660	41850	11394
1976	955042	233000	971849	508300	412605	107440	38700	13870
1977	943697	237000	799580	477100	423950	155380	28927	13820
1978	994118	263000	1126891	670800	470588	190060	28980	11960
1979	857563	216000	983613	523900	424790	128860	23658	12980
1980	831513	222000	988655	557700	415546	109820	18629	20760
1981	846218	221000	894538	462800	403782	97240	21930	23890
1982	858824	242000	998319	479700	408403	161160	28786	36000
1983	512605	140000	655882	295750	423109	193460	20300	41850
1984	914706	206000	765546	263250	427731	213860	30600	49690
1985	768067	130000	717647	245700	418487	220660	10182	45150
1986	1057983	134000	427731	185900	335294	140420	16242	47190
1987	938235	216000	541597	246350	347899	185640	22741	40770
1988	960084	233000	684454	280800	330252	150960	18000	35180
1989	1174370	194000	682773	381550	332353	174760	21830	39580
1990	1101681	140000	544118	141700	294958	138720	20167	43260
1991	463866	80000	223109	79950	184034	78540	10319	44340
1992	537815	97000	229412	117000	189496	94860	6437	47030
1993	1347479	266000	503361	247000	148319	57460	8960	42310
1994	1231513	175000	780672	278200	121008	50320	20168	42800
1995	1347059	170000	887815	464100	184034	88060	35373	42800
1996	1494118	313000	1084034	479700	247899	104040	27262	45900
1997	1861345	416000	945798	529750	289916	100640	15971	50000
1998	1582353	281000	1532353	717600	176471	80580	11672	55700
1999	1404622	262000	1387395	504400	120588	54400	19049	61000
2000	2175210	329000	1515546	680550	171429	49980	3218	66400
2001	1881092	282000	1463025	615550	169748	78880	32574	69200
2002	1588235	296000	1531933	643500	144538	59884	11520	69700
2003	771429	122000	1024790	358150	166807	86360	12600	72810
2004	1589496	401000	1068067	508950	164286	80920	10800	75510

Appendix Table 4 (cont'd): Area and production of major farm commodities, Sudan, 1955 to 2004
c) Livestock (numbers) and milk production (MT)

Year	Sheep	Cattle	Camels	Goats	Milk Production (MT)
1955	6560167	4005833	1988000	6110000	828290
1956	6763667	4533333	1990000	6140000	908554
1957	6967167	5060833	1992000	6170000	988817
1958	7170667	5588333	1994000	6200000	1069080
1959	7374167	6115833	1996000	6230000	1149343
1960	7577667	6643333	1998000	6260000	1229607
1961	7848000	7000000	2000000	6290000	1286292
1962	7851000	7000000	2002000	6320000	1287035
1963	8255000	8050000	2000000	6585000	1451529
1964	8660000	9105000	2000000	6850000	1616761
1965	8660000	9105000	2000000	6850000	1616761
1966	9526000	10012000	2200000	7539000	1778024
1967	10478000	11014000	2420000	8293000	1955934
1968	11526000	12115000	2662000	9123000	2151489
1969	11500000	12000000	2500000	8600000	2122356
1970	11400000	12600000	2600000	8800000	2212012
1971	11500000	12900000	2600000	8800000	2257005
1972	12500000	13800000	2600000	9700000	2424347
1973	13800000	14100000	2700000	10500000	2507646
1974	14700000	14700000	2800000	10900000	2618437
1975	15300000	15300000	2800000	11200000	2721962
1976	15400000	15400000	2400000	11300000	2740372
1977	16300000	16300000	2400000	11800000	2896816
1978	17300000	17300000	2500000	12200000	3067047
1979	18400000	18400000	2600000	12700000	3255688
1980	19500000	19500000	2300000	13300000	3446641
1981	20000000	20000000	2700000	13700000	3536380
1982	20900000	20900000	2700000	14200000	3692824
1983	21300000	21300000	2800000	14200000	3757217
1984	20900000	20900000	2800000	14300000	3695135
1985	19600000	19600000	2700000	13800000	3474297
1986	19700000	19700000	2700000	13900000	3492707
1987	19900000	19900000	2700000	14200000	3531839
1988	20200000	20200000	2700000	14500000	3587069
1989	20600000	20600000	2700000	14800000	3658398
1990	21000000	21000000	2800000	15300000	3734349
1991	21600000	21600000	2800000	18700000	3909534
1992	25100000	25100000	2800000	22700000	4565443
1993	27700000	27700000	2900000	27600000	5097271
1994	30100000	30100000	2900000	33300000	5615394
1995	31000000	31000000	2900000	34200000	5781084
1996	31700000	31700000	2900000	35200000	5916889
1997	33100000	33100000	2900000	36000000	6160760
1998	34600000	34600000	3000000	36500000	6413795
1999	35800000	35800000	3000000	37300000	6625469
2000	37100000	37100000	3100000	38500000	6862488
2001	38300000	38300000	3200000	39900000	7088032
2002	39500000	39500000	3300000	41400000	7315887
2003	39600000	39600000	3500000	60000000	7761939
2004	39800000	39800000	3700000	42200000	7382675

Appendix Table 5: Commodity export prices, Sudan, 1955 to 2004

a) Exportable cereal grains and oil seeds (US\$/MT)

Year	Sorghum	Millet	Sesame	Groundnuts	Sesame Oil	Groundnuts Oil
1955	54.98	75.75	203.72	137.50	471.63	350.82
1956	41.15	75.75	193.76	169.59	468.01	350.82
1957	55.09	75.75	204.61	179.09	464.40	350.82
1958	69.02	75.75	214.32	154.48	460.79	350.82
1959	65.50	75.75	176.72	159.08	457.18	350.82
1960	46.11	75.75	173.87	188.14	453.56	350.82
1961	57.51	76.57	191.00	178.73	500.00	350.82
1962	56.27	74.93	209.92	158.17	448.50	350.82
1963	60.58	86.48	199.03	155.82	405.89	350.82
1964	72.21	84.98	183.20	169.56	363.29	370.78
1965	61.53	89.10	194.86	155.25	442.62	330.86
1966	69.06	90.15	219.25	192.90	466.67	411.12
1967	70.74	100.38	293.03	171.48	495.08	365.46
1968	50.54	83.63	209.62	149.32	417.58	250.00
1969	56.29	84.30	198.48	206.23	442.11	345.28
1970	88.87	111.16	222.77	240.30	272.62	764.18
1971	96.08	126.69	271.95	232.77	441.78	740.24
1972	86.45	146.41	316.81	238.80	464.79	759.42
1973	89.41	109.28	301.84	269.57	836.33	716.14
1974	141.67	122.79	566.47	526.62	1021.39	598.10
1975	142.25	114.25	605.53	481.76	765.18	410.03
1976	122.20	131.40	559.47	396.00	811.85	570.29
1977	131.82	141.42	563.79	577.37	824.10	352.43
1978	150.44	110.93	669.01	564.81	809.97	580.05
1979	183.19	243.44	913.36	620.03	1628.94	708.13
1980	300.61	202.86	869.71	536.28	628.06	298.03
1981	318.18	277.40	1075.58	1260.41	596.45	995.27
1982	273.42	354.43	641.92	391.66	783.17	465.45
1983	198.85	261.70	691.54	618.46	1311.36	850.83
1984	174.92	299.21	874.92	877.92	3452.91	940.75
1985	181.38	303.82	678.07	615.57	2676.04	800.00
1986	187.84	319.20	809.28	651.16	3193.85	652.17
1987	138.03	176.63	697.40	491.10	1125.00	775.06
1988	102.80	163.70	506.67	388.22	958.36	503.10
1989	105.41	240.44	1054.62	418.52	3524.59	596.72
1990	102.52	177.91	1296.84	501.31	1181.82	784.59
1991	101.70	177.91	1009.06	1140.54	1066.67	913.73
1992	100.89	115.38	559.01	605.86	1166.67	1607.80
1993	99.14	128.56	542.35	429.60	1200.00	575.63
1994	96.62	134.28	511.71	547.24	1208.33	659.50
1995	107.89	140.00	825.81	581.65	1250.00	909.36
1996	149.97	140.00	896.62	597.89	1312.50	902.25
1997	150.00	222.25	682.74	477.88	1010.50	861.60
1998	154.78	222.25	626.39	558.06	1200.00	866.07
1999	99.42	304.50	767.07	491.40	614.60	828.13
2000	96.01	178.05	690.47	540.59	676.96	728.08
2001	164.11	178.05	570.72	508.70	500.00	580.33
2002	133.57	178.05	479.91	432.93	1148.65	778.14
2003	179.09	178.05	684.24	601.06	1672.41	964.29
2004	183.47	178.05	561.17	748.27	2236.36	1089.74

Appendix Table 5 (cont'd): Commodity export prices, Sudan, 1955 to 2004

b) Exportable cotton lint and cleaned gum Arabic (US\$/MT)

Year	Cotton Lint	Gum Arabic
1955	920.47	320.90
1956	1043.82	313.24
1957	1102.28	330.78
1958	761.34	310.46
1959	641.39	343.36
1960	925.68	385.37
1961	844.43	344.24
1962	885.06	339.16
1963	780.31	346.65
1964	837.09	370.80
1965	932.68	356.47
1966	787.96	368.33
1967	763.88	460.44
1968	836.20	591.54
1969	895.94	521.21
1970	787.34	442.77
1971	763.20	592.82
1972	906.40	705.86
1973	1112.68	667.08
1974	1669.97	2034.21
1975	1441.28	1426.47
1976	1623.85	1277.09
1977	2099.73	1254.65
1978	1976.66	1118.73
1979	1975.98	999.61
1980	2095.21	1439.84
1981	2003.88	1994.39
1982	1521.81	1456.65
1983	1511.43	1465.67
1984	2004.36	1444.41
1985	1718.54	1457.48
1986	876.77	2865.80
1987	905.10	5073.28
1988	1491.81	3526.39
1989	1833.61	4186.29
1990	1450.88	1936.74
1991	1579.24	2251.98
1992	908.31	1616.75
1993	1044.68	1359.54
1994	1297.40	2343.50
1995	1560.19	2781.23
1996	1492.85	1898.98
1997	1365.61	831.71
1998	1357.23	1001.86
1999	1273.98	1026.36
2000	1271.39	956.04
2001	1063.59	1056.08
2002	875.96	880.03
2003	1318.46	979.32
2004	1480.50	2221.83

Appendix Table 5 (cont'd): Commodity export prices, Sudan, 1955 to 2004

c) Exportable live animals (US\$/head)

Year	Sheep	Cattle	Camels	Goats
1955	10.50	48.41	97.94	4.02
1956	9.54	49.55	92.89	4.14
1957	13.64	65.95	94.39	4.27
1958	20.88	76.84	52.82	4.39
1959	19.20	56.27	98.92	4.51
1960	18.90	66.38	99.90	4.64
1961	19.18	69.72	101.67	4.76
1962	19.74	59.86	105.69	5.50
1963	20.01	69.31	126.60	5.79
1964	20.63	69.40	129.24	6.11
1965	21.18	81.60	155.95	6.47
1966	22.30	84.17	172.79	7.03
1967	20.63	69.40	178.35	7.78
1968	20.63	69.40	169.77	8.24
1969	22.38	93.79	161.42	9.23
1970	27.42	105.94	205.11	11.00
1971	25.83	109.40	179.47	12.77
1972	30.65	135.96	119.66	13.88
1973	33.12	238.49	149.35	28.96
1974	37.94	238.49	179.04	34.16
1975	36.97	167.79	208.73	27.25
1976	30.36	217.97	201.50	25.55
1977	55.33	233.17	227.45	37.35
1978	68.22	249.14	221.78	23.69
1979	74.69	303.20	258.33	27.18
1980	85.58	324.29	537.70	28.41
1981	117.77	472.39	529.04	32.34
1982	70.52	327.09	391.01	37.27
1983	74.54	509.67	397.11	39.58
1984	64.97	278.76	706.00	43.65
1985	76.64	557.64	492.22	30.03
1986	50.12	532.50	675.12	35.52
1987	99.36	538.56	2132.69	34.03
1988	74.56	544.61	2155.74	32.53
1989	72.15	855.29	7920.00	73.85
1990	97.33	435.89	1490.68	28.28
1991	79.85	601.42	1201.75	14.32
1992	63.66	600.00	520.90	17.59
1993	100.40	600.00	2205.94	33.71
1994	78.56	600.00	2106.96	23.10
1995	85.32	283.91	178.78	33.85
1996	62.66	266.35	184.96	25.41
1997	57.61	246.54	190.15	25.70
1998	57.36	311.27	214.15	29.05
1999	50.59	193.69	188.80	28.27
2000	48.93	455.85	192.16	25.34
2001	66.67	833.33	220.71	25.00
2002	75.03	316.78	177.13	25.68
2003	74.09	624.06	203.06	40.92
2004	69.07	624.06	185.20	25.49

Appendix Table 5 (cont'd): Commodity export prices, Sudan, 1955 to 2004

d) Importable products (US\$/MT)

Year	Wheat	Sugar	Milk	Wheat Flour	Cheese
1955	52.29	114.51	57.65	88.56	622.60
1956	53.43	93.20	61.12	88.24	660.14
1957	54.57	99.98	47.18	79.21	509.51
1958	55.71	106.77	41.83	70.17	451.74
1959	56.85	91.96	62.83	67.55	678.53
1960	57.99	99.05	54.26	64.77	585.98
1961	64.84	173.57	51.46	78.66	555.56
1962	68.18	168.69	53.45	94.32	1090.91
1963	77.65	190.91	58.47	94.67	1250.00
1964	84.85	207.82	64.15	110.50	1409.09
1965	88.28	201.62	66.09	79.96	1526.32
1966	66.08	195.42	63.40	91.87	1357.14
1967	79.30	187.67	59.22	82.05	954.55
1968	62.54	186.11	45.42	70.94	882.35
1969	131.43	164.53	45.01	137.36	842.11
1970	87.19	121.70	44.89	79.18	717.95
1971	135.67	144.18	55.92	103.54	750.00
1972	104.52	221.52	84.85	113.68	849.14
1973	127.08	254.86	88.21	141.07	948.28
1974	227.54	682.67	104.06	168.46	2000.00
1975	185.50	764.83	91.70	234.78	2000.00
1976	172.20	438.72	73.78	247.50	4750.00
1977	170.57	272.51	88.86	478.64	7500.00
1978	140.00	253.61	101.80	164.16	2000.00
1979	173.42	306.66	100.19	198.43	2000.00
1980	249.19	780.73	121.43	284.89	1740.74
1981	397.64	708.48	139.70	297.43	1976.19
1982	157.24	418.33	155.40	192.75	1035.71
1983	202.38	324.78	147.76	245.38	1250.00
1984	208.78	297.43	116.94	254.37	2666.67
1985	178.50	216.36	118.89	201.19	2500.00
1986	195.77	195.69	118.42	253.18	2750.00
1987	170.95	267.25	119.79	436.46	3333.33
1988	213.00	373.40	153.30	307.18	3500.00
1989	180.55	459.15	196.16	248.16	3000.00
1990	168.86	346.15	214.17	146.86	3500.00
1991	215.48	473.10	139.60	201.76	4000.00
1992	148.83	368.01	179.40	159.48	3000.00
1993	205.05	342.32	197.78	218.48	4333.33
1994	183.18	400.88	196.86	267.02	2571.43
1995	282.00	401.61	223.11	297.19	2400.00
1996	234.47	564.26	274.26	331.88	2800.00
1997	229.50	300.00	240.02	254.95	2021.74
1998	209.21	884.46	183.06	250.62	2489.36
1999	214.22	406.10	189.46	240.56	2000.00
2000	199.44	243.83	171.73	225.26	1374.30
2001	211.30	280.98	210.56	216.56	1064.33
2002	194.13	267.58	245.84	222.19	1557.89
2003	210.53	328.45	210.70	218.53	3500.00
2004	240.90	392.62	281.46	313.44	3846.15

Appendix Table 6: Commodity wholesale domestic prices, Sudan, 1955 to 2004 (US\$/MT)

a) Cereal grains

Year	Sorghum	Millet	Wheat	Wheat Flour
1955	1.84	0.85	2.49	3.74
1956	1.70	0.90	2.58	3.88
1957	1.72	0.96	2.68	4.03
1958	2.36	1.02	2.78	4.17
1959	1.81	1.08	2.87	4.31
1960	1.17	1.13	2.97	4.46
1961	1.50	1.19	3.06	4.60
1962	1.73	1.25	3.16	4.75
1963	1.82	1.31	3.26	4.89
1964	2.17	1.37	3.35	5.04
1965	2.00	1.42	3.45	5.18
1966	2.46	1.50	3.46	5.20
1967	3.02	1.50	3.46	5.20
1968	1.80	1.62	3.92	5.89
1969	1.80	1.73	4.38	6.58
1970	3.37	4.91	4.00	6.00
1971	2.35	3.13	4.17	6.27
1972	2.20	3.72	3.17	4.76
1973	2.35	5.09	3.45	5.19
1974	4.09	6.42	5.34	8.01
1975	4.46	5.56	7.47	11.22
1976	4.38	6.93	7.43	11.16
1977	6.26	6.88	8.75	13.14
1978	6.32	6.88	12.00	18.03
1979	6.89	15.89	9.65	14.50
1980	10.04	18.06	15.75	23.66
1981	17.07	32.84	18.46	27.72
1982	18.27	45.81	26.53	39.85
1983	28.00	52.55	32.30	48.52
1984	25.51	71.20	41.58	62.45
1985	52.40	101.12	70.56	105.98
1986	52.69	84.45	80.75	121.29
1987	46.46	167.12	88.25	132.55
1988	51.84	224.70	195.48	293.61
1989	165.70	320.70	302.70	454.67
1990	307.46	382.01	519.12	779.72
1991	1589.82	2553.91	2076.48	3118.90
1992	1397.55	1838.28	922.88	1386.18
1993	1272.42	4336.36	1384.32	2079.27
1994	4127.51	9840.05	6921.60	10396.33
1995	6040.32	18670.80	8652.00	12995.41
1996	13516.45	52370.46	25994.45	39043.99
1997	34461.08	38306.08	34608.00	51981.64
1998	32461.61	44512.62	52754.13	79237.34
1999	34340.90	40862.72	66476.20	99848.06
2000	47772.42	61290.77	75135.12	112853.87
2001	52361.25	67959.71	71903.89	108000.52
2002	31288.06	59568.62	62911.17	94493.35
2003	33118.05	70557.60	67404.85	101242.90
2004	45197.21	71955.34	59578.83	89488.12

Appendix Table 6 (cont'd): Commodity wholesale domestic prices, Sudan, 1955 to 2004

b) Oil seeds and vegetable oils

Year	Sesame	Groundnuts	Sesame Oil	Groundnuts Oil
1955	7.03	4.86	17.12	14.79
1956	7.33	5.07	17.85	15.43
1957	7.95	6.27	19.34	19.07
1958	5.43	4.28	13.21	13.03
1959	4.95	3.90	12.04	11.88
1960	5.20	4.10	12.65	12.47
1961	5.35	4.22	13.01	12.83
1962	5.34	4.21	12.99	12.81
1963	5.23	4.13	12.74	12.56
1964	5.55	4.38	13.51	13.32
1965	5.25	4.14	12.78	12.60
1966	5.57	4.40	13.56	13.37
1967	6.55	5.17	15.95	15.73
1968	3.92	5.51	9.55	16.75
1969	4.04	5.33	9.83	16.21
1970	6.61	6.80	16.09	20.69
1971	6.18	5.57	15.03	16.93
1972	6.65	5.98	16.18	18.19
1973	7.07	6.61	17.21	20.11
1974	10.31	12.13	25.09	36.89
1975	13.92	13.12	33.87	39.90
1976	13.70	12.18	33.33	37.05
1977	11.50	12.77	27.99	38.85
1978	13.52	13.33	32.91	40.56
1979	20.55	18.11	50.02	55.09
1980	31.37	19.84	76.34	60.35
1981	36.37	36.88	88.50	112.19
1982	47.61	40.28	115.86	122.54
1983	82.74	67.61	201.35	205.68
1984	94.16	94.73	229.16	288.15
1985	202.46	119.31	492.71	362.93
1986	193.84	231.59	471.73	704.49
1987	200.47	242.68	487.87	738.23
1988	264.46	255.04	643.58	775.82
1989	578.18	308.90	1407.06	939.67
1990	889.93	844.39	2165.72	2568.65
1991	3324.26	2998.90	8089.91	9122.67
1992	4859.37	4549.59	11825.76	13839.87
1993	6287.17	7125.19	15300.46	21674.81
1994	12059.59	10414.91	29348.22	31682.14
1995	43036.17	27431.06	104732.83	83445.28
1996	65402.97	32403.25	159164.67	98570.67
1997	69153.51	60559.02	168291.99	184220.53
1998	103568.10	74391.05	252043.33	226297.57
1999	138806.69	71087.66	337799.96	216248.66
2000	115375.41	154494.68	280777.59	469972.82
2001	100513.31	111356.68	244609.19	338747.01
2002	85619.05	114054.09	208362.51	346952.53
2003	175245.95	147737.25	426478.55	449416.71
2004	212931.16	155599.17	518189.27	473332.68

Appendix Table 6 (cont'd): Commodity wholesale domestic prices, Sudan, 1955 to 2004

c) Cotton, gum Arabic and sugar

Year	Seed Cotton	Cotton Lint	Gum Arabic (Raw)	Gum Arabic (Cleaned)	Sugar
1955	13.70	36.14	6.21	8.24	8.14
1956	13.30	36.30	6.29	8.82	8.14
1957	12.90	36.47	6.37	9.39	8.14
1958	12.50	36.63	6.45	14.95	9.77
1959	12.10	36.79	6.54	9.97	9.77
1960	11.70	36.96	6.62	10.54	9.77
1961	11.30	37.12	6.70	11.12	9.77
1962	10.90	37.28	6.78	14.95	9.77
1963	10.50	37.45	6.86	11.69	11.40
1964	10.10	37.61	6.95	12.27	11.40
1965	9.70	37.77	7.03	12.84	9.77
1966	9.30	37.94	7.11	14.95	11.40
1967	8.90	22.47	10.30	13.42	11.40
1968	8.50	26.71	10.20	13.99	11.40
1969	10.10	27.03	10.10	14.57	11.40
1970	10.20	27.03	10.00	14.95	11.40
1971	10.91	36.56	10.00	14.95	12.56
1972	10.91	36.71	10.00	16.10	13.72
1973	10.96	52.03	10.00	16.10	14.88
1974	15.53	41.49	18.00	27.60	16.05
1975	12.38	43.58	34.00	49.45	17.21
1976	13.00	57.58	20.00	33.35	18.37
1977	45.85	84.36	20.00	33.35	19.54
1978	25.17	95.83	20.00	33.35	19.54
1979	28.60	120.39	25.00	41.40	24.01
1980	35.93	158.34	28.00	46.00	26.05
1981	47.25	160.50	36.00	57.50	26.05
1982	47.90	235.60	42.00	109.25	31.84
1983	70.30	203.21	61.00	96.60	37.62
1984	60.64	264.62	89.00	144.90	43.41
1985	78.96	319.38	116.00	179.40	48.84
1986	95.30	521.61	205.00	322.00	48.84
1987	155.65	583.19	668.00	972.90	113.95
1988	174.03	661.40	890.00	1279.95	216.51
1989	197.37	1250.79	890.00	1317.90	305.70
1990	373.25	1589.56	890.00	1407.60	739.46
1991	474.34	1874.58	957.00	1434.05	999.02
1992	559.39	3526.69	2938.00	4761.00	1693.48
1993	1052.39	9019.35	17808.00	28158.90	2408.72
1994	2691.44	29269.95	38955.00	56829.55	6921.60
1995	8734.38	80414.28	77910.00	113915.55	11536.00
1996	23996.23	192262.16	55650.00	98556.15	25958.31
1997	57372.49	201984.65	55650.00	88957.10	58259.11
1998	60273.76	217338.39	44520.00	81916.80	98107.91
1999	64855.43	231523.49	46746.00	87036.60	113896.08
2000	69088.37	282148.21	48972.00	84476.70	123472.12
2001	84195.17	360201.64	66780.00	112635.60	128460.28
2002	107486.91	381970.49	77910.00	127995.00	179961.60
2003	113982.90	400517.18	77910.00	127995.00	195431.38
2004	119517.37	466095.01	89040.00	141306.48	211108.80

Appendix Table 6 (cont'd): Commodity wholesale domestic prices, Sudan, 1955 to 2004

d) Live animals and products

Year	Sheep	Cattle	Camels	Goats	Milk	Cheese
1955	0.400	2.29	3.65	0.24	3.14	21.64
1956	0.408	2.39	3.81	0.24	3.92	27.05
1957	0.417	2.59	4.13	0.24	4.23	29.21
1958	0.425	1.77	2.82	0.24	4.70	32.46
1959	0.434	1.61	2.57	0.24	4.70	32.46
1960	0.442	1.70	2.71	0.24	4.70	32.46
1961	0.451	1.74	2.78	0.24	4.70	32.46
1962	0.460	1.74	2.77	0.24	4.70	32.46
1963	0.468	1.70	2.72	0.24	4.70	32.46
1964	0.477	1.81	2.88	0.24	4.70	32.46
1965	0.477	1.71	2.73	0.24	4.70	32.46
1966	0.498	1.80	2.63	0.24	4.70	32.46
1967	0.516	1.92	2.66	0.24	3.10	21.39
1968	0.505	1.97	2.86	0.26	2.60	17.94
1969	0.516	2.02	3.06	0.27	2.70	18.63
1970	0.484	2.08	3.27	0.28	2.90	20.01
1971	0.549	2.52	3.95	0.31	2.80	19.32
1972	0.588	2.78	4.86	0.32	3.10	21.39
1973	0.558	3.15	4.88	0.72	3.60	24.84
1974	0.668	3.65	6.25	0.45	4.60	31.74
1975	1.037	5.95	10.49	0.63	5.80	40.02
1976	1.096	5.71	11.25	0.73	8.30	57.27
1977	1.087	5.22	12.11	0.79	10.80	74.52
1978	1.894	8.11	14.28	0.96	11.00	75.90
1979	2.323	14.74	22.98	1.48	11.50	79.35
1980	3.488	18.33	30.74	2.09	11.70	80.73
1981	5.834	23.33	44.51	2.47	12.00	82.80
1982	6.067	25.49	64.61	2.94	20.00	138.00
1983	8.762	39.00	66.22	4.67	40.00	276.00
1984	8.070	35.86	64.85	3.41	70.00	483.00
1985	8.921	60.53	100.01	5.02	130.00	897.00
1986	11.510	78.09	129.04	6.48	142.00	979.80
1987	14.383	97.59	161.25	8.09	185.00	1276.50
1988	21.447	145.51	240.44	12.07	300.00	2070.00
1989	37.335	253.31	418.56	21.01	400.00	2760.00
1990	38.143	258.79	427.61	21.47	500.00	3450.00
1991	53.493	362.94	599.70	30.10	345.20	2381.88
1992	179.910	1079.46	1199.40	83.96	1534.00	10584.60
1993	719.640	2998.50	3478.26	359.82	2301.00	15876.90
1994	839.580	3478.26	3958.02	389.81	11508.00	79405.20
1995	1439.280	8395.80	9595.20	599.70	14383.00	99242.70
1996	2158.920	11994.00	13193.40	839.58	43216.00	298190.40
1997	4797.600	16791.60	53973.00	4197.90	57535.00	396991.50
1998	5997.000	35982.00	59970.00	4797.60	95154.00	656562.60
1999	10314.840	49645.20	79160.40	4967.91	110250.00	760725.00
2000	8912.741	59850.06	86956.50	6305.25	122500.00	845250.00
2001	9571.212	70039.68	89326.21	6310.04	122500.00	845250.00
2002	13462.066	67868.85	77515.30	5993.40	122500.00	845250.00
2003	16365.813	81357.10	85811.07	8946.32	137714.00	950226.60
2004	26331.628	95625.76	132718.11	10511.54	129792.00	895564.80

Appendix Table 7: Official and parallel (black market) exchange rates, Sudan, 1955 to 2004
(per US \$)

Year	Official	Black-market	Exchange Rate Distortion
1955	0.035	0.042	0.089
1956	0.035	0.042	0.089
1957	0.035	0.042	0.089
1958	0.035	0.042	0.089
1959	0.035	0.042	0.089
1960	0.035	0.042	0.089
1961	0.035	0.044	0.121
1962	0.035	0.046	0.143
1963	0.035	0.048	0.155
1964	0.035	0.056	0.229
1965	0.035	0.048	0.155
1966	0.035	0.052	0.193
1967	0.035	0.054	0.216
1968	0.035	0.050	0.181
1969	0.035	0.058	0.251
1970	0.035	0.068	0.320
1971	0.035	0.060	0.264
1972	0.035	0.046	0.134
1973	0.035	0.056	0.232
1974	0.035	0.056	0.231
1975	0.035	0.061	0.273
1976	0.035	0.057	0.238
1977	0.035	0.055	0.223
1978	0.038	0.049	0.130
1979	0.043	0.073	0.259
1980	0.050	0.086	0.232
1981	0.056	0.058	0.015
1982	0.095	0.149	0.195
1983	0.130	0.200	0.175
1984	0.130	0.263	0.254
1985	0.230	0.329	0.127
1986	0.250	0.556	0.239
1987	0.300	0.556	0.192
1988	0.450	0.663	0.343
1989	0.450	1.130	0.535
1990	0.713	1.500	0.683
1991	1.500	3.000	0.726
1992	9.743	18.975	0.242
1993	15.931	28.436	0.213
1994	28.961	40.000	0.124
1995	50.000	52.632	-0.040
1996	125.079	144.929	0.050
1997	157.574	177.000	0.040
1998	200.802	223.113	0.031
1999	252.550	252.550	0.000
2000	257.123	257.123	0.000
2001	258.702	258.702	0.000
2002	263.306	263.306	0.000
2003	260.983	260.983	0.000
2004	257.905	257.800	0.001

Appendix Table 8: Annual distortion estimates, Sudan, 1955 to 2004

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

	Groundnut											Sugar	Wheat	All covered
	Cattle	Camel	Cotton	Goat	ut	ic	Milk	Millet	Sesame	Sheepme	at Sorghum			
1955	24	-2	2	27	-32	-46	-18	-80	-37	-18	-35	na	7	-18
1956	26	7	-6	23	-42	-41	-3	-78	-31	-8	-20	na	8	-13
1957	3	14	-9	20	-33	-41	35	-77	-30	-35	-40	na	10	-12
1958	-40	40	18	17	-47	1	70	-75	-54	-56	-34	na	12	-17
1959	-25	-32	35	14	-53	-39	13	-74	-49	-52	-47	na	13	-20
1960	-33	-29	3	11	-58	-43	31	-73	-46	-50	-51	na	26	-22
1961	-37	-31	8	4	-56	-35	33	-72	-51	-51	-52	47	12	-22
1962	-29	-36	3	-12	-52	-13	25	-71	-57	-53	-44	47	8	-21
1963	-40	-48	12	-17	-53	-35	13	-74	-56	-53	-46	50	-4	-26
1964	-42	-51	0	-28	-58	-41	-6	-75	-53	-58	-51	26	-18	-36
1965	-49	-58	-1	-25	-52	-30	0	-73	-55	-55	-42	22	-11	-33
1966	-50	-65	8	-35	-61	-25	-1	-73	-59	-58	-40	40	14	-33
1967	-38	-66	-24	-42	-50	-48	-32	-76	-65	-54	-30	41	-7	-40
1968	-33	-60	-17	-40	-36	-56	-22	-68	-69	-53	-39	49	39	-37
1969	-53	-59	-25	-48	-59	-52	-26	-69	-70	-59	-50	54	-32	-42
1970	-62	-69	-23	-59	-59	-47	-27	-40	-60	-72	-46	89	-16	-47
1971	-51	-53	1	-58	-63	-57	-39	-63	-67	-63	-62	90	-39	-46
1972	-49	1	1	-53	-54	-55	-48	-56	-64	-61	-54	59	-29	-43
1973	-71	-28	2	-55	-60	-57	-48	-28	-64	-70	-57	33	-43	-51
1974	-66	-23	-32	-76	-63	-76	-44	-19	-72	-68	-53	-46	-51	-55
1975	-26	5	-26	-61	-58	-42	-24	-29	-67	-52	-52	-51	-21	-40
1976	-43	22	-16	-48	-50	-54	42	-19	-63	-35	-43	-5	-11	-27
1977	-50	19	-7	-61	-64	-53	56	-24	-68	-64	-23	65	8	-28
1978	-25	48	8	-23	-60	-45	44	0	-68	-48	-29	84	86	-19
1979	-16	54	4	-22	-63	-43	14	-21	-73	-56	-52	40	-9	-28
1980	-19	-18	6	-13	-61	-63	-20	-11	-64	-52	-65	-51	-15	-36
1981	-13	48	29	11	-62	-59	-13	46	-59	-29	-31	-33	-23	-21
1982	-38	32	17	-48	-39	-52	-41	-28	-59	-44	-61	-37	27	-40
1983	-55	-2	-15	-43	-53	-69	-8	-17	-51	-43	-37	-30	-12	-38
1984	-39	-56	-26	-69	-62	-62	65	-21	-64	-51	-49	-28	-11	-30
1985	-63	-30	-25	-53	-51	-66	116	-20	-29	-67	-25	-20	28	-28
1986	-67	-57	23	-67	-42	-80	54	-59	-63	-58	-52	-42	-13	-43
1987	-61	-84	27	-58	-22	-67	91	42	-57	-75	-45	-5	4	-42
1988	-55	-81	-17	-48	-18	-51	92	63	-39	-60	-37	2	47	-30
1989	-64	-94	-12	-72	-34	-69	43	13	-54	-49	41	-16	92	-51
1990	-48	-75	-3	-45	8	-49	18	31	-58	-72	95	93	153	-25
1991	-74	-79	-34	-26	-17	-78	-39	332	-2	-76	390	-6	291	-34
1992	-88	-85	-52	-74	-64	-85	-68	-27	-61	-85	-34	-69	-65	-76
1993	-79	-93	-44	-62	-48	-29	-71	1	-66	-75	-60	-69	-75	-75
1994	-84	-95	-26	-61	-61	-45	-5	44	-54	-75	-13	-50	-9	-60
1995	-43	4	0	-72	-33	-36	-28	81	-30	-73	-21	-42	-49	-38
1996	-67	-48	-5	-80	-71	-70	-34	90	-63	-80	-52	-66	-31	-52
1997	-60	67	-9	-21	-45	-50	-19	-29	-59	-60	-2	18	-24	-31
1998	-47	29	-18	-37	-55	-70	39	-35	-47	-60	-29	-47	0	-22
1999	2	66	-20	-43	-58	-73	33	-63	-50	-34	0	15	5	-3
2000	-49	76	-10	-20	-18	-73	60	-6	-55	-42	51	104	44	-7
2001	-67	56	22	-20	-38	-67	30	3	-53	-55	-4	83	30	-33
2002	-19	66	46	-27	-26	-56	9	-11	-53	-44	-31	164	21	-10
2003	-50	62	11	-31	-31	-60	44	6	-32	-31	-45	136	21	-15
2004	-40	178	15	32	-32	-80	3	10	2	21	-26	116	-5	-9

Appendix Table 8 (continued): Annual distortion estimates, Sudan, 1955 to 2004
 (b) Nominal and relative rates of assistance to all agricultural products, to exportable and import-competing agricultural industries, and relative^a to non-agricultural industries (percent)

	Total ag NRA				Ag tradables NRA			Non-ag tradables	
	Covered products		Non-covered products	All products (incl NPS)	Export-ables	Import-competing	All	NRA	RRA
	Inputs	Outputs							
1955	0	-18	1	-13	-18	-15	-17	1	-18
1956	0	-13	1	-9	-15	-2	-12	1	-13
1957	0	-12	1	-9	-19	35	-12	1	-12
1958	0	-17	1	-12	-31	67	-16	2	-18
1959	0	-20	1	-15	-27	14	-19	1	-20
1960	0	-22	1	-17	-33	31	-21	1	-22
1961	0	-22	1	-17	-34	33	-21	0	-21
1962	0	-21	1	-17	-29	25	-21	-3	-18
1963	0	-26	1	-21	-35	14	-25	-3	-23
1964	0	-36	0	-30	-45	-5	-36	-6	-32
1965	0	-33	1	-27	-41	1	-32	-2	-31
1966	0	-33	1	-28	-41	1	-32	-7	-27
1967	0	-40	0	-35	-44	-25	-39	-7	-35
1968	0	-37	1	-32	-42	-11	-36	-4	-33
1969	0	-42	0	-37	-48	-18	-42	-8	-37
1970	0	-47	0	-43	-51	-20	-47	-8	-42
1971	0	-46	0	-42	-49	-31	-46	-2	-45
1972	0	-43	1	-38	-43	-39	-42	-1	-41
1973	0	-51	0	-46	-54	-40	-51	-7	-47
1974	0	-55	0	-49	-58	-44	-55	-5	-52
1975	0	-40	0	-35	-43	-27	-40	-8	-34
1976	0	-27	0	-23	-37	30	-26	-7	-21
1977	0	-28	0	-24	-42	52	-28	-15	-15
1978	0	-19	1	-15	-31	49	-18	3	-21
1979	0	-28	0	-25	-35	16	-28	-7	-22
1980	0	-36	0	-32	-38	-25	-36	0	-36
1981	0	-21	1	-18	-22	-16	-21	17	-32
1982	0	-40	1	-35	-40	-38	-39	0	-39
1983	0	-38	1	-34	-44	-11	-37	-1	-36
1984	0	-30	0	-27	-47	46	-30	-7	-24
1985	0	-28	1	-25	-52	96	-28	6	-32
1986	0	-43	0	-39	-58	39	-42	-5	-39
1987	0	-42	0	-38	-59	75	-41	-9	-36
1988	0	-30	1	-27	-56	78	-30	-10	-22
1989	0	-51	-1	-47	-64	37	-51	-25	-35
1990	0	-25	0	-21	-46	32	-25	-14	-14
1991	0	-34	0	-26	-47	12	-33	68	-60
1992	0	-76	1	-69	-78	-67	-75	0	-75
1993	0	-75	1	-69	-75	-70	-74	-15	-70
1994	0	-60	0	-53	-76	-9	-60	-4	-58
1995	0	-38	1	-32	-41	-30	-37	9	-42
1996	0	-52	1	-44	-62	-36	-52	3	-53
1997	0	-31	1	-25	-38	-16	-30	13	-38
1998	0	-22	1	-19	-43	20	-22	11	-30
1999	0	-3	1	-3	-22	30	-3	8	-10
2000	0	-7	1	-5	-33	62	-7	6	-12
2001	0	-33	1	-26	-53	33	-32	8	-37
2002	0	-10	1	-8	-25	19	-9	4	-13
2003	0	-15	1	-12	-39	51	-14	3	-17
2004	0	-9	1	-7	-18	12	-9	0	-9

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

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

	Wheat	Sugar	Milk	Sorghum	Millet	Groundnuts	Sesame	Cotton	Gum Arabic	Sheep	Cattle	Camel	Goat	Non-covered
1955	0	0	12	10	6	1	4	18	3	4	5	6	2	28
1956	0	0	14	7	6	1	7	20	2	4	6	5	2	27
1957	0	0	10	11	3	3	6	23	2	5	7	4	1	23
1958	0	0	11	17	4	3	6	7	2	9	11	3	2	26
1959	0	0	15	16	4	3	4	13	2	7	7	5	1	22
1960	0	0	13	11	4	4	6	16	3	7	9	4	1	22
1961	0	0	13	11	3	4	4	13	2	8	10	5	2	23
1962	0	0	12	13	2	2	8	20	2	7	8	4	2	20
1963	0	0	15	12	4	4	5	14	2	7	11	5	2	19
1964	0	0	18	15	5	5	5	9	1	8	11	5	2	16
1965	1	0	17	10	5	4	5	12	1	7	13	6	2	17
1966	0	1	17	11	3	5	5	13	2	8	14	7	2	13
1967	1	1	17	8	3	4	5	15	2	8	12	7	2	13
1968	1	2	13	12	4	3	5	13	3	8	12	7	3	14
1969	2	2	14	5	3	3	3	20	2	9	17	6	3	12
1970	1	1	11	13	5	6	5	15	1	8	15	7	3	9
1971	2	1	13	13	5	4	7	13	2	7	15	5	3	10
1972	1	1	17	10	5	4	7	12	1	8	17	3	3	11
1973	1	1	15	7	2	6	6	9	1	8	24	3	5	11
1974	2	3	13	11	2	8	6	10	2	7	18	3	5	12
1975	2	3	12	11	2	12	6	9	2	7	13	3	4	13
1976	2	2	10	12	2	8	6	14	2	6	17	3	4	14
1977	1	1	10	15	2	9	5	8	1	9	16	2	5	15
1978	1	1	11	10	2	11	6	9	1	10	16	2	3	18
1979	1	1	11	13	4	9	6	6	1	11	20	3	3	13
1980	1	3	13	12	2	8	5	5	1	12	20	4	3	11
1981	1	2	11	13	3	11	5	3	1	12	21	3	2	12
1982	0	2	15	21	4	4	4	4	1	9	18	3	3	11
1983	1	2	15	9	1	4	2	5	1	11	31	3	4	10
1984	1	3	13	10	3	6	5	7	1	10	19	7	5	11
1985	0	2	13	5	1	4	2	7	0	12	36	5	3	9
1986	1	2	12	16	3	3	3	2	1	7	31	6	4	10
1987	0	2	10	10	1	2	3	3	2	12	27	16	3	8
1988	1	2	14	3	1	2	3	3	1	10	30	17	3	10
1989	0	2	10	6	1	2	2	3	1	5	25	32	4	8
1990	1	2	19	3	1	1	4	3	1	12	22	11	3	18
1991	2	3	12	2	0	2	2	1	0	10	31	9	2	23
1992	2	3	20	8	1	1	1	1	0	10	39	4	3	8
1993	1	2	18	6	1	2	2	0	0	12	31	13	4	7
1994	1	2	19	4	0	2	1	1	1	10	33	12	3	11
1995	2	2	25	5	2	4	2	2	1	13	18	1	6	16
1996	2	3	30	6	1	5	5	2	1	9	17	1	4	15
1997	2	2	27	10	2	4	5	2	0	9	16	1	4	17
1998	2	6	22	7	2	6	3	1	0	9	21	1	5	15
1999	1	3	27	8	4	4	4	1	0	10	16	1	6	15
2000	0	2	21	3	1	6	4	1	0	8	32	1	4	17
2001	0	1	18	4	1	3	2	1	0	7	40	1	3	19
2002	0	2	28	8	2	4	2	1	0	11	21	1	4	16
2003	1	2	20	5	1	2	1	1	0	9	32	1	8	16
2004	1	2	23	8	1	3	2	1	0	8	30	1	3	16

Source: Authors' spreadsheet

a. At farmgate undistorted prices