Distortions to Agricultural Incentives in Kenya

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At independence in 1963, Kenya inherited a relatively open and export-oriented economy with a policy environment that was favorable to the agricultural sector. Unlike many other developing countries, the ruling elite in Kenya had strong links to agriculture and implemented policies that supported both smallholder and large-scale producers. For most of the next 20 years the agricultural sector thrived, the economy in general grew, and the country enjoyed political stability. In contrast, the second 20 years of independence were marked by agricultural and economic stagnation and persistent struggles with corruption and other forms of poor governance. In recent years there have been signs of recovery and growth in both agriculure and the economy generally.

This chapter first reviews major developments in the structure of the Kenyan economy and summarizes economic policies up to independence. It then presents measures of policy-induced price distortions over the 1963-2004 period. Distortions are measured through estimated rates of assistance based on comparisons of domestic commodity prices with undistorted world market prices. Finally, the paper links changes in rates of protection and disprotection to the evolution of various policies over the same period.

From 1965 to 1981, Kenya's real GDP per capita rose at an average rate of 2.5 percent a year while agricultural value added grew at an annual rate of almost 5 percent.[1] During this period, the state presence in the economy expanded: the prices for most agricultural commodities were administered by marketing boards, and trade was restricted through import licensing regulations. Nonetheless, for the first 20 years of independence the agricultural sector was spared high direct or indirect taxation as measured in the nominal rates of assistance, except during a few periods of exchange rate distortion.

After this promising start, growth in agricultural production and in per capita income faltered in the early 1980s and stagnated until after 2004, when performance improved markedly. Slow growth in income was paralleled with rising rates of poverty. In 1982, the rural headcount poverty rate in the country was 48 percent, ranging from 26 percent in the agriculturally rich Central Province to 58 percent in Nyanza Province. Ten years later, the

[1] Unless otherwise noted, data in this paper are from the World Bank's World Development Indicators online.

average rural poverty rate was unchanged, but the rate in Central Province had risen to 36 percent. In 1997 the rural poverty rate was 53 percent (Republic of Kenya 2000). Aggregate rural and urban poverty rates were estimated to be 55 percent in 2001 and 56 percent in 2003 (International Monetary Fund 2005).

Policy initiatives starting in the late 1980s often centered on liberalizing the agricultural economy in an effort to reduce transaction costs and ensure that producer prices reflected global scarcity values. However, the process of liberalization suffered various policy reversals (World Bank 1998, WTO 2000) and was complicated by increasing macro-economic instability in the early 1990s. Nonetheless, domestic market liberalization has made considerable progress in recent years. While many marketing boards still exist, their roles are greatly diminished. Meanwhile, trade policy reforms have replaced licensing schemes with tariffs, and the tariffs have been steadily reduced. Finally, a shift to a floating exchange rate system in 1993 has eliminated currency overvaluation as a source of price distortion.

Despite the recent policy reforms, performance in the agricultural sector has been disappointing, except for the dramatic expansion in the production of horticultural products and the recovery of cereals production in 2004-06. Slow growth in the marketed supply of cereal crops is partly due to rural population growth and increased consumption on farms. External shocks, including the coffee crisis, have also been partly to blame for poor performance. Probably more important for this analysis is the problem of excessively high domestic marketing margins. As a result of the poor state of the rural infrastructure, producers face costs of delivering output and securing inputs that are sometimes prohibitively high (Omamo 1998, Obare, Omamo and Williams 2003). For certain commodities, regulations continue to protect high-cost public enterprises and parastatals, further raising transaction costs. Moreover, continued regulation and red tape raises the costs of doing business while introducing avenues for corruption (World Bank 2006). All these costs tax the agricultural sector in ways that are not fully reflected in the price distortions calculated here.

Two important developments in the agricultural sector have influenced trends in the measured rates of assistance apart from any changes in policy. First, due to growth in population and demand, wheat and maize have shifted from being exportable commodities to being importable. Since administered prices were set within the fob-cif band in the major production areas, this shift implied a change from subsidizing to taxing production, compared to the world market alternative. Second, the role of coffee in the sector has fallen compared to both tea and horticultural production. Because the market for fruits and vegetables is largely

undistorted, this has muted the weighted average rate of distortion in the agricultural economy.

Kenya has rarely experienced egregious price distortions in the agricultural sector, but the degree of government support for agricultural development has been uneven over time. Currently growth in the sector seems to be more inhibited by limited public investment and excessive red tape than by distorting policy interventions. The success in exports of fruits, vegetables and cut flowers was facilitated by targeted public investment in extension, rural roads and improvements in the Nairobi airport (Schapiro and Wainaina 1991, Minot and Ngigi 2004). The revitalization of much of the agricultural sector may require investments in physical infrastructure to reduce transactions costs as well as administrative reforms to allow more creative marketing arrangements and macro-economic stability to encourage private investment. Public investments should be targeted to commodities that have some potential comparative advantage. This analysis suggests which commodities those may be. Unfortunately the current analysis cannot reveal the precise degree to which current marketing margins are inflated by regulations.

Growth and structural changes since 1955

Kenya's strong economic performance up to 1980 was rooted in growth of the agricultural sector, which has consistantly accounted for a large share of employment, value added, and exports. The expansion of agricultural output between 1955 and 1980 was based on increases in cropped area and the opening of commercial production opportunities to smallholder, African producers. From 1960 to 1969, cereals output rose by 69 percent, with cropped area growing by 61 percent (FAOSTAT). Investment in agricultural research also produced improvements in yields for maize (the primary staple) and the export crops coffee and tea. Price booms for those exports in the 1970s further boosted performance.

The Kenyan economy has yet to experience a structural transformation into industrial production (Appendix Figure 1). Indeed the manufacturing sector has seen no growth in its share of the economy, and agriculture continues to account for almost 30 percent of national income. The significance of agriculture in the economy is larger than official data suggest since agriculture has a disproportionately large share of employment, accounting for over 50 percent of export revenues, and directly contributing to about 50 percent of manufacturing

production. In the last 10 years, growth in services, including exportable services (tourism) has eroded somewhat the centrality of agriculture. Value added data suggest that the declining share of the agricultural sector in GDP is due to more rapid expansion in services, not to an agricultural output decline. Data on marketed agricultural production from the Government of Kenya's *Statistical Abstract of Kenya* give a somewhat different impression, indicating agricultural stagnation since 1990 (Figure 1).

Not surprisingly, trends in GDP per capita have mirrored growth in the agricultural sector. Figure 1 juxtaposes data on per capita GDP with agricultural value added and with the value of marketed agricultural production. Both series show a close correspondence between strong agricultural performance and strong per capita income growth up to 1982. From that point on, the agricultural value added figures continue to grow while per capita incomes and marketed production stagnate. This pattern probably reflects the strain that population growth has placed on the agricultural sector. Kenya's total population grew at an average rate of over 3 percent annually from 1980 through 2004, with the rural population rising from 13.6 million to 20 million during that period. With this population growth, agricultural land per agricultural worker halved, falling from about 4.4 hectares in 1980 to 2.2 hectares in 2004. Meanwhile, agricultural workers faced a high dependency ratio as about 50 percent of the population was less than 15 years old throughout the period. While agricultural value added continued to grow through the 1990s, the increases in production did not match population growth and were in large part consumed on farm.

While the Kenyan economy has seen little in the way of structural transformation, the structure of the agricultural sector itself has evolved considerably since 1955. In the first instance, smallholder production expanded over estate production for both the main export crops (coffee and tea) and for maize, the primary staple. Through the 1960s the share of marketed production from smallholders increased rapidly, as did total production. For example, tea production rose from 13,000 MT with 1 percent grown by smallholders in 1960 to 20,000 MT with 5 percent grown by smallholders in 1965 and 40,000 MT with 20 percent grown by smallholders in 1970. The smallholder share of coffee production rose from 20 percent in 1960 to 50 percent in 1965 while total production rose over 65 percent (Republic of Kenya, various years). Smallholders now produce half of Kenya's coffee and about 60 percent of its tea.

Expansion of smallholder production did not initially affect the crop mix in production or in exports, but over time this has also evolved. Figure 2 shows there have been pronounced changes in the production mix. First, coffee has declined in significance. This is

due both to declining world market prices for the commodity and to low growth in output in the last 20 years. Meanwhile tea has expanded, with tea replacing coffee as the single largest export commodity by value in about 1990 and remaining in that position since then (Appendix Figure 2). Growth in both tea and sugar production was facilitated by institutional innovations and investments to support smallholder production and to formalize the marketing chains that serve smallholders.

More dramatic than the expansion of tea production has been the growth in exports of horticultural products, as exemplified by green beans exports (Appendx Figure 2). Before 1985 Kenya recorded no exports of green beans. By the year 2000, green beans exports exceeded coffee exports. Altogether, fruits and vegetables (F&V) have accounted for about 20 percent of the value of Kenya's agricultural exports since 2000, about one-quarter of which has been from green beans. Canned pineapples and other fresh vegetables represent most of the remaining exports in this class. Cut flowers exports have grown on a similar path as fruits and vegetables, and account for an even larger share of export revenue (*Economic Survey of Kenya* 2005).

The data on production shares in Figure 2 are compiled from government sources, FAOSTAT and scholarly research. Because a large share of maize production is not marketed and much of the marketed maize is sold in informal markets, total maize production is estimated at about four times the marketed output (Pearson et al. 1995, Jayne et al. 2001). Inflating marketed production figures from the *Statisitical Abstract of Kenya* by this factor results in production estimates close to those reported in FAOSTAT and Hassan and Karanja (1997). As for horticulture, government sources report only sales of specific crops and do not cover the same crops in all years. Export data are therefore used to estimate production of tradable fruits and vegetables. Moreover, Muendo, Tschirley, and Weber (2004) suggest that the domestic market for fruits and vegetables production may have much larger value than the export market. The domestic market for fruits and vegetables is dominated by tomatoes, cabbages and kales (*sukuma wiki*), with substantial production of cooking bananas and potatoes. Argwings-Kodhek (2005) places the value added from domestic horticulture to be similar in scale to export horticulture (including floriculture). Despite the limitations of the data, it is certain that maize has been and remains the core of agricultural production in Kenya and that tea and fruits and vegetables output have expanded rapidly while coffee has been in decline.

In addition to changes in crop mix and export concentration, Kenya has experienced a change in market position. As Figure 2 shows, domestic consumption patterns have been

fairly stable with maize accounting for 40 to 50 percent of food expenditures and wheat drawing an additional 10 percent. The country, however, has shifted from being a net exporter of wheat and maize in the 1950s and 1960s to becoming a net importer of both of these cereals in since the 1990s. The transition from exporter to importer occurred fairly abruptly in the 1970s for wheat, but was more prolonged for maize. Kenya was a net exporter of maize for most of the 1960s and 1970s, while during the 1980s it oscillated between maize surplus and deficit. Since the 1990s, however, it has been a fairly consistent importer, despite the government's policy of targeting maize self-sufficiency. This transition has also come despite successful research efforts to develop improved varieties of maize that have been widely adopted. Indeed, maize yields rose by 1.5 percent annually from 1975 to 1984 and continued to rise through the 1990s (Hasan and Karanja 1997).

Agricultural policy in the colonial period, 1895 to 1963

Agricultural policy during the colonial period in Kenya (1895-1963) was largely motivated by a need to make the East African railroad system profitable. Towards that end, European settlers were encouraged to enter the high potential agricultural areas of the colony (the so-called "White Highlands") and produce commercial crops to be shipped by rail to Mombasa. Coffee was the initial focus of export production, but colonial authorities promoted experimentation with a range of commodities including wheat, tea, cotton and pyrethrum. The colonial administration favored settler agriculture, and policies were biased strongly against indigenous, smallholder producers (Mosley 1983).

Colonial agricultural policies included alienation of land from local populations to create an estate sector of European-owned farms. Labor markets were also restricted, with hut taxes used as an explicit device for channeling African labor to the estate sector. Access to export markets was restricted to European producers, further encouraging labor supply to the estate sector while protecting European producers from domestic competition. Finally, starting in the mid-1930s, agricultural finance was made available to estate producers at subsidized rates (Winter-Nelson 1995). According to Smith (1976), the bulk of tax revenue prior to the Second World War was collected from native populations, while public investment in infrastructure and agricultural research concentrated on the estate sector.

Agricultural commodity markets came under administered pricing systems during the colonial period (Mosley 1983, Winter-Nelson 1995). Export-crop marketing boards were established in the 1930s to reduce costs of marketing and enforce quality control. These boards passed world market prices to producers and also enforced exclusion of African farmers from markets. The boards invested in processing capacity and agricultural research and extension in addition to performing marketing services.

Under the Sale of Wheat Ordinance of 1933, the Kenya Farmers Association (KFA) became the sole legal marketer of wheat. It used this position to maintain an artificially high domestic price, while exporting surpluses at a lower free-market price. To maintain this system, a high import tariff was introduced to keep cheaper foreign wheat out of the colony. In a similar manner, the maize market came to be regulated with the KFA as the sole legal maize buyer, outside of small local markets. Because coffee growers forcefully opposed regulations that could increase the domestic price of maize, thus raising their labor costs, the KFA administered maize markets in such a way as to stabilize local prices and provide services to growers without imposing a high tax on consumers. Annually, the KFA announced a price to ensure a "guaranteed minimum return" to producers and used its market position to deliver (subsidized) crop-secured loans in cash or inputs. The maize purchase price was typically set between import and export parity. It thus shielded consumers from high import prices, but ensured profitable production for European settler farmers given the prices charged for inputs.

Starting in 1955, the colonial government began an effort to develop a class of African commercial farmers. The government's Swynnerton Plan initiated a partial liberalization of the agricultural sector by allowing Africans to produce crops for export. The Swynnerton Plan also introduced a system of land registration and titling for Africans, while continuing to exclude them from owning farms in the "White Highlands". In addition to removing cropping restrictions, policy at this point included substantial investment in infrastructure and extension to serve the nascent smallholder commercial farm sector as well as the estate sector. While allowing broader access to markets, the state continued to administer prices for major commodities through marketing boards.

At independence the Kenyan government maintained a supportive stance towards export agriculture and expanded efforts to commercialize smallholder production. At the same time, an indigenous Kenyan elite entered into large-scale agricultural production. In contrast to many other African countries, Kenya refrained from imposing high implicit or explicit taxes on the agricultural sector in the 1960s. While government control of markets

expanded in the post-colonial period, prices were typically administered to pass through world prices to large-scale export crop farmers or to the cooperative societies representing smallholder producers. Similarly, the administered prices for maize and wheat were held above export parity but below the cif price in the main growing regions. This pricing was consistent with the colonial price administration (Jabara 1985). However, since commercial maize production became more geographically dispersed as the market came to serve surplus producers throughout the country, the pan-territorial pricing scheme introduced larger distortions in some regions than in others.

Direct and indirect distortions to agricultural incentives

The main focus of the present study's methodology (Anderson et al. 2008) is on government-imposed distortions that create a gap between actual 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 foreign exchange market), but it also generates estimates of distortions in non-agricultural sectors for comparative evaluation. This involves computing a Nominal Rate of Assistance (NRA) for farmers plus an NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a Relative Rate of Assistance (RRA).

This study calculates NRAs for maize, wheat, coffee, tea, sugar, export fruits and vegetables, and fruits and vegetables. These commodities account for about 75 percent of the value of agricultural production and value added. The remaining 25 percent is primarily non-tradable beef for slaughter and raw milk, exportable cut flowers, and importable dairy products. In calculating the overall NRA to agriculture, prices for the nontradable residual commodities are assumed to be undistorted, while prices for exportables are influenced by exchange rate distortions and prices of importable dairy are affected by both trade protection and exchange rate distortions. Trade protection is measured through the trade weighted ad valorem tariff rates on milk and dairy reported in Sandri, Valenzuela and Anderson (2006) or by the average applied tariff for agriculture from the *Statistical Abstract of Kenya*.

Data on world prices, domestic prices, and volumes of production and trade came from Government of Kenya sources (primarily the *Statistical Abstract of Kenya* and the

Economic Survey), FAOSTAT, and COMTRADE. The application was particularly constrained by the availability of reliable data on the appropriate margins to apply for processing and marketing commodities. Sources for data on these costs included Nyoro, Kiiru and Jayne (1999, 2004), Jayne, Myers and Nyoro (2005), World Bank (2005) and Pearson et al. (1994). (Additional sources are noted in the discussion of specific commodities and in the Appendix.) For many crops actual marketing costs are not documented for long periods of time. Consequently, documented costs for specific years were discounted by the CPI and applied to a range of up to 20 years to estimate the actual costs incurred. Even if these estimates of the actual costs are accurate, they include implicit taxation introduced by inefficiencies in the management of public and parastatal intermediaries. Because mismanagement of parastatal marketing boards has been an important issue in Kenya, especially in the 1980s and 1990s, an alternative "best practices" margin was also calculated and applied to estimate the commodity specific rates of assistance to farmers. These "best practices" are typically based on costs incurred in the sector after parastatal reforms were adopted. Rates of assistance to farmers (NRAs on output for farmers) are adjusted downward from the NRA to the commodity whenever the estimated margin charged exceeded the estimated "best practices" margin. This creates a wedge between the NRA on output to primary production (farmers) and the NRA for the commodity systems for many crops, notably maize and wheat, in the 1970s and 1980s. Given the likelihood of technical changes since the late 1950s, the "best practices" margins for the 1950s and 1960s have been inflated, bringing them closer to estimated actual margins in that period.

Other areas in which data are problematic include the estimates of the appropriate world price (or shadow price) for agricultural outputs and the parameters for estimating support to the non-agricultural sectors that are used to calculate the RRA. When world prices are particularly difficult to establish (eg. sugar), upper and lower bounds were explored. Uncertainty in the RRA calculation emerges from limited information on the tradability of output from non-agricultural sectors and from lack of precise data on the applied tariffs, taxes and subsidies as well as nontariff barriers. However, direct distortions tend to be small in most non-agricultural sectors. Finally, the amount of non-commodity specific support that agriculture has received is difficult to estimate. In calculating the aggregate rates of support this analysis presents indicators that exclude all such support, and separate indicators that treat the entire agricultural budget as assistance to the sector.

The NRA estimates shown in Figure 3 and Table 1 reveal modest to moderate rates of taxation to the sector overall for most of the post-colonial period. Positive rates of assistance

to agricultural producers (and commensurate taxation on food consumers) in the late 1950s/early 1960s are driven largely by high domestic prices for wheat and maize which are exportables for much of this period (see Appendix Table 8). The general shift towards taxation of agricultural production in the 1970s and through the 1980s is followed by a reduction in distortions from the mid-1990s and, in the last years covered here (2000-2004), the NRA for covered farm products is sligtly positive.

There is considerably more variability in rates of assistance for importables than for other classes of commodities. The negative rates of assistance for importables in the early 1960s arise because maize and wheat were importable in some years during this period and were priced below import parity (but above export parity). Maintenance of a domestic price within the fob-cif band in Kenya implied that maize production was supported on average in the 1960s, but it was taxed when maize was an importable (Table 1). Because cereals account for a large share of production, importables as a group were subject to negative rates of assistance when maize and wheat were importable. The pronounced spike in assistance to importables in the late 1960s (see Figure 3) reflects protection of the nascent sugar industry and the exportable status of maize and wheat at that time. Sugar prices have been often held above the international free market price and the Kenyan cif price. Since sugar was the only commodity designated as an importable in 1967-69, importable agriculture appears to have received high protection in that period. In the mid-1980s the NRA on sugar output increased above its level in the late 1960s and another spike in assistance to importables appears. In later years the support to sugar continued, but by the 1990s maize had become an importable commodity so the overall NRA for that class of goods is lower.

There are three periods during which tradable agriculture and the sector in general had distinctly negative rates of assistance (the early years of the 1970s, of the 1980s and of the 1990s). In each of these periods the cause of the taxation on agriculture is an overvaluation of the Kenya Shilling. The severe drop in the NRA on output in the early 1990s reflects the additional effect of unusually high world prices for maize and tea that were not matched with increases in farm gate prices. Excessive charges by parastatal marketing boards also contributed to negative NRAs in the 1980s and early 1990s. Only during the late 1970s/early 1980s do prices for non-tradables appear highly distorted. This is a result of maize being treated as a non-tradable during this time, when the equilibrium price fell within the fob-cif band. Since the fob-cif band is wide in Kenya, the shadow price is difficult to estimate precisely. Consequently, there is a large margin for error on the NRA on output for maize

during this period. Prices for other non-tradable commodities (fruits and vegetables) were undistorted throughout the period.

In contrast to the negative rates of assistance in the 1980s and early 1990s, the years since then have seen little price distortion outside of sugar and wheat, which are importable commodities and receive protection. The decline in aggregate price distortions reflects in part the rapid expansion of horticulture in the agricultural sector. Both tradable and non-tradable horticulture have become substantial shares in total production and neither of these commodity groups is subject to direct intervention. The only distortions that are recorded in the tradable fruits and vegetables sector are those that enter through currency overvaluation. The non-tradable fruits and vegetable sector has been assumed to be undistorted. While the growth in fruits and vegetables as a share of the sector mutes the level of distortion in aggregate, policy reforms (including exchange rate liberalization) have also brought the NRAs for coffee, tea and maize closer to zero in the last decade under study.

Considering only support for tradable agriculture, the pattern is of assistance in the 1950s and 1960s followed by taxation through the early 1990s and relatively undistorted prices since the mid-1990s. Treatment of non-commodity specific public spending influences the measured level of support, but does not alter this general impression. As Table 2 suggests, total agricultural spending (treated as non-commodity specific support here) has been between 6 and 20 percent of the value of agricultural production, averaging about 10 percent. The total NRA for agriculture including this support was 9 percent in the 2000-04 period. Excluding this spending the NRA for agriculture was only 3 percent. In either treatment, the agricultural sector has negative rates of assistance through most of the 1970-94 period.

Meanwhile, non-agricultural sectors are estimated to have had trade protection that implies nominal rates of assistance of over 20 percent from 1960 through 1990 and gradually declining to less than 10 percent since then (Figure 4). Given these estimates, and treating the agricultural budget as support for tradable agriculture, the 5-year averages of the RRA were negative from the late 1960s through to the late 1990s and turned slightly positive after 2000. Excluding non-commodity specific spending, the RRA remains negative also through the 2000-2004 period.

The final three rows of Table 2 report values of three indicators if exchange rate distortions are not taken into account. They suggest that distortions in the local market for foreign currencies accounted for up to 10 of the negative NRA and RRA percentage points from Independence until the end of the 1980s..

Distortions by commodity

Coffee and tea

The data for NRAs for coffee and tea reveal very little impact directly from agricultural policy. Official records of producer prices indicate that growers consistently received close to the export parity price converted at the official exchange rate. As Figure 5 indicates, deviations from export parity occurred primarily when the Kenya Shilling became overvalued as in the early 1970s, early 1980s, and early 1990s. When the exchange rate is undistorted, the NRA is usually near zero. Negative NRAs that are not explained by exchange rate distortion can be attributed to charges by the parastatal intermediary in excess of the "best practices" cost estimate.

The impression of generally modest price distortions in tea and coffee is subject to at least two important caveats. First, there was considerable public investment in both these sectors in the 1960s and 1970s. Moreover, both sectors received subsidized credit through the central government at that time. While neither of these effects is quantified in the analysis, their impact would be to increase the rate of assistance, bringing the NRAs closer to zero.

A second feature of the analysis may be more misleading. The producer prices used are the prices paid out by the central marketing authority. These prices were paid directly to estate producers, but channeled through cooperatives for smallholders. Beginning after the coffee and tea booms of the 1970s there were repeated complaints of delayed payments to smallholder growers, with delays of over a year often reported. Discounting the value of farmer prices for these delays would make the NRAs more substantially negative in many instances. However, the extent and duration of actual delays are unknown.

The deviation between the NRA to estate producers and that for smallholders may be more pronounced for coffee than for tea. Smallholder producers are required to use cooperative societies for the initial (wet) processing of the Arabica coffee. Cooperatives charge about twice the costs reported by estate growers for this service (World Bank 2005). These costs are deducted from the grower price. (As described in the Appendix, the NRA falls by about seven percentage points if the full cost differential is treated as a tax.) Given payment delays, smallholders may have faced some taxation even when the NRAs are positive and intermediaries, including cooperative unions and parastatal agencies, could have captured positive rates of assistance when the NRA is negative.

Wheat and maize

Based on shares of production and consumption, maize is the single most important commodity in the agricultural sector. As a result, price distortions in maize tend to drive the overall degree of distortion in the sector. An exception to this tendency arose during the coffee boom in the 1970s, when the value of coffee production briefly exceeded that of maize.

Distortions to incentives for cereals production have probably been somewhat greater than those in coffee and tea, but are still generally modest. Until the mid-1990s, prices for maize and wheat were administered by the National Cereals and Produce Board (NCPB) or its predecessor institutions. In the case of wheat, this system implied a price that was above both import parity and the export parity for much of the period. Following the colonial administration's lead of setting the maize price to balance a positive return to farmers with affordability for consumers, the administered maize prices tended to fall between export and import parity, at least for producers in Kitale District, a major supplier of maize for the country.

During the last 50 years, population growth and some income growth have caused cereals demand to rise more rapidly than supply. As a result, cereal crops have gradually shifted from being exportable to being importable. Based on trade patterns, both maize and wheat were exportable products through most of the 1960s but, from the mid-1970s, wheat was an importable. In the case of maize, production growth was more robust, but by the 1980s the commodity could reasonably be classified as a non-tradable, with a domestic equilibrium price falling somewhere within the rather wide fob-cif band. Since 1990, Kenya's average position in maize has been one of a significant importer, despite occasional surpluses. In this analysis, wheat is treated as exportable from 1960 to 1971, save for 1962, and as importable from 1956 to 1959 and 1972 onwards. Maize is treated as exportable from 1956 to 1976 except for 1961, and during 1964-66 and 1970-71. It is taken as a non-tradable from 1977 to 1991 and as an importable from 1992 onwards.

This transition from exportable crop to importable crop occurred while prices were administered to fall within the fob-cif band. The effect of agricultural policy then was to subsidize maize and wheat while they were export crops. In both cases these subsidies were defended from international trade through import restrictions via state trade. The National Cereals and Produce Board (NCPB) was the sole entity with the legal right to import maize and wheat. Tariffs were also in place, but these tariffs were suspended when large imports were deemed necessary. They were redundant when the NCPB simply declined to import. The shift to importability for wheat implied a rise in the reference price for measuring

distortions from the fob to the cif price. This, plus exchange rate distortions, resulted in implicit taxation of the commodity in the 1970s, but wheat appears to be subsidized in the late 1980s and 1990s. The measured protection to wheat is consistent with high applied import tariffs in the 1990s and after 2000.

In contrast to wheat, the rates of assistance to maize are negative for most of the 1970s, 1980s and 1990s. The shift to referencing against the higher cif price implied a major reduction in the NRA for maize in the 1980s. This downward pressure on the NRA was exacerbated by marketing costs in excess of the "best practices" estimate. In the 1990s the market for maize was liberalized and marketing margins fell, encouraging a recovery in the NRA. The market has been largely undistorted since 2000. While a duty on imported maize exists, this duty was repeatedly suspended when the country faced substantial maize deficits. Undocumented trade in maize from neighboring countries has also muted the effect of the tariff. The combination of these factors has led to an NRA for maize that is now quite modest.[2]

As with coffee and tea, exchange rate distortions overwhelmed direct interventions in the early 1970s and early 1990s. In each of these periods there was a negative NRA for cereals. In other periods, the negative NRA is associated with intermediation charges in excess of the "best practices" margin and with the administration of the price.

There are at least two caveats that should be made concerning the calculated NRAs for maize and wheat. First, pan-territorial pricing with high transportation costs implied very different experiences across the country. The NRAs were calculated based on transport costs from Kitale District, a region with a large cereals surplus (Nyoro, Kirimi, and Jayne 2004). However, other parts of the country would have somewhat different NRAs. Second, the reference price for maize in the 1980s, when the crop is classified as non-tradable, is taken as the average of the fob and cif prices, weighted 3 to 1 in favor of the cif price. (A simple mean was applied for 1978-80.) Revisions of this crude proxy to other levels within the fob-cif band could change the sign on the NRA. Despite these concerns, the results presented here are consistent with other analyses of rates of assistance to cereals in Kenya. Shapouri, Missiaen and Rosen (1992) report producer subsidy equivalents for maize and wheat in Kenya in the 1980s that are similar in levels and in patterns over time to our NRAs.

[2] The low rates of assistance shown in this analysis are consistent with Jayne, Myers and Nyoro (2005) who indicate that maize prices have averaged only 2 to 3 percent above import parity over the last 15 years, despite the *de jure* 20 to 30 percent tariff.

Consistent with this study, the distortions they identify in the early 1980s are due to exchange rate misalignment while later distortions result from administered pricing of the commodities.

Sugar

In this analysis sugar has been treated as an import substitute product throughout the period. Although Kenya has occasionally exported large volumes of sugar, this classification is based on the high cost of domestic production compared to the international free market price. The NRAs to sugar production have varied widely through time but are now large and positive. These direct rates actually understate the full support this sector receives, as the government has made and continues to make significant investments in the sector while repeatedly writing off debts and providing subsidized credit.

Estimating the NRA for sugar is complicated by distortions both within and outside of Kenya. Kenya has occasionally had preferential access to markets in Europe and exported sugar at well above the free market price. Meanwhile the country has imported sugar at a relatively high cost from sources in the region (primarily South Africa, Malawi and Egypt). Imports from these and other COMESA countries are not subject to the 100 percent tariff applied to other sugar exporters. Use of import unit values and export unit values from customs data would suggest that Kenyan producers often face an import price that is less than the export parity for the same quality product, and export and import parity prices that are above any free market level. The use of these data could suggest that Kenyan producers cannot compete with imports, but can compete in the export market. Rather than using Kenyan cif prices, one could apply a "free market" reference world price adjusted for shipping costs. This approximation, however, is subject to error due to quality differentials, variation in transportation costs, and other factors.

Using the free market prices from the Global Economic Monitor Database, the NRA data indicate rates of protection in excess of 100 percent in many years. When the cif price is taken as the reference, the NRA figures are more modest, but still exceed 50 percent. The two series present a reasonable set of bounds for the assistance estimate. In calculating the weighted average NRA and other aggregate measures of assistance for agriculture, the lower bound is used.[3] The NRA estimates for sugar are comparable in size and volatility to

[3] Appendix Figure 4 presents NRA estimates using both the cif price and the free market reference price for sugar adjusted for shipping costs. Only when the Kenya shilling was significantly overvalued did the NRAs become negative. While the cif data can be expected to understate the degree of protection, the rates indicated from use of the reference price cannot be defended based on actual policies.. Because sugar's share of

estimates made by other analysts. Earley and Westfall (1996) report producer subsidy equivalents (PSEs) for Kenyan sugar as follows:

1982	1983	1984	1985	1986	1987	1988	1989
-262	15	-8	97	96	63	63	-9

These calculations confirm the impression of a pronounced increase in assistance in the mid-1980s, as well as periods of taxation in the early 1980s and emerging again at the end of the decade. High measured rates of assistance to sugar are consistent with import restrictions in the 1970s and 1980s and with high import duties since the 1990s. The consumer tax equivalent on sugar is even greater than the NRA because the commodity has been subject to exceptionally high excise taxes in addition to the interventions mentioned above.

In addition to uncertainty regarding the appropriate reference price, there is considerable question about the best-practices and actual processing costs for sugar. Estimates of post-farm costs range from $100 to $300 per MT, varying by year, factory, and source of cane. The average cost in African, Caribbean and Pacific (ACP) countries reported in Odek, Kegode and Ochola (2003) is $105 per MT. Given the low sucrose content of Kenyan cane sugar, a slightly higher than average value of $150 is used in the analysis from 1980 onwards with a higher cost of $200 applied before 1980 to reflect lower processing capacity (Jackson 2004). Use of a higher cost would increase the NRA. Overall, it is clear that the total costs of sugar production are high in Kenya relative to other East and Southern African producers. Jackson (2004) places production costs for raw sugar in Kenya, Tanzania and Uganda at about $290/MT compared to $210 sugar exporters of Eastern and Southern Africa. The Kenya Wetlands Forum (2005) reported costs in Kenya to be 40% above costs in other COMESA countries.

Fruits and vegetables

Growth in horticultural production and export has been a bright spot in Kenya's recent economic performance (Minot and Ngigi 2004, Voor Den Dag 2003). As mentioned above, exports of fruits and vegetables have recently grown from a small share of total exports to being a major component. Because of the significance of horticulture in the agricultural economy, an NRA has been calculated for the composite category of export fruits and vegetables.

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agricultural production is small, the choice has little impact on the weighted average NRA, but has considerable effect on the estimated assistance to importables when maize is treated as an exportable or non-tradable.

The NRAs reported in Table 1 are based on the volumes and revenues from fruits and vegetables exports reported by the FAO and on the internal marketing margins associated with green beans. Green beans are the largest single fresh vegetable export (this category having previously been dominated by processed pineapples).

The constructed NRA for tradable fruits and vegetables represents an estimate of the NRA for green beans that is scaled up to the volume of total fruits and vegetable exports. While this implies aggregation of such distinct products as apricots and zucchinis, the approach allows for inclusion of this important sector in calculation of the NRA. To ignore it completely would imply a measure of price distortions that failed to reflect the conditions in a highly dynamic part of the country's agricultural economy. The biases implied by treating this diverse set of crops as one constituent part (green beans) may be small since the major components of the fruits and vegetables group appear to be uniformly unaffected by policy.

The exportable fruits and vegetables sector has emerged with little policy intervention, but it has benefited from rural infrastructure and public investment in increased airfreight capacity and in extension as well as a supportive macro-economic policy environment. While trade restrictions do prohibit the import of certain horticultural crops, the bulk of fruit and vegetable exports have not been subsidized or protected directly. For all of these commodities, the main distortions to producer incentives have been indirect, through occasional currency overvaluation. Fruits and vegetables do face a 1 percent cess for services from the Horticulture Development Authority.

The great majority of fruits and vegetables grown in Kenya are destined for domestic markets and either do not meet standards of or lack access to international markets (Muendo, Tschirley, and Weber 2004). Data from FAOSTAT suggest that by weight only about 5 percent of Kenyan vegetable production and about 7.5 percent of fruit production is exported. The non-export production sells at a much lower price in largely unregulated (and undistorted) markets. While there are import duties on horticultural products from Uganda and Tanzania, these duties are unlikely to be relevant given the porous nature of the borders and the high costs to long distance transportation of the commodities. Because production of non-tradable fruits and vegetables has expanded rapidly and now accounts for a large share of the agricultural sector, the RRA calculation for this study includes an estimate of the NRA for non-tradable fruits and vegetables.

Tomatoes, onions, kale, and cooking bananas constitute about half of the value of domestically consumed vegetables and fruits (Ayieko, Tschirley and Mathenge 2005). Evidence in Muendo, Tschirley, and Weber (2004) suggests the total value of domestically

traded fruits and vegetables is about three times the value of the exported counterparts. Argwings-Kodhek (2005) estimate the agricultural value added from the domestic horticulture sector to be similar in level to that of export fruits and vegetables plus floriculture. Further, based on Muendo, Tschirley and Weber (2004), we set the price of the domestic products to be about half of the price of the export version of the same product. Since the non-traded crops tend to be bulky, lower priced goods (potatoes rather than green beans), the price per kilogram of the non-traded vegetables and fruits group is set at 15 percent of the price in the exportable sector. At this price, the value of the non-tradable fruits and vegetables is about 1.5 to 2 times that of their export counterparts. These prices are assumed to be completely undistorted by policy. Their inclusion in the analysis therefore tends to bring the calculated total NRA for covered farm products towards zero, but has no effect on the calculated rates of assistance in the importable and exportable sub-groups.

Policies behind the distortions since 1960

Kenyan agriculture benefited from a supportive policy environment during the first 20 years of independence. Unlike their counterparts in other African countries, the Kenyan political elite had strong agricultural interests at independence. Government interventions supported both the estate sector and smallholder production. Through the Kenya Tea Development Authority (KTDA) and other institutions significant investments were made to facilitate smallholder production of export agriculture. Pressure for efficient operation of these public enterprises in agriculture can probably be explained by the coincidence of interests of the numerous smallholders and the politically important estate producers (Jabara 1985, Bates 1989).

The policy stance towards cereals has been somewhat more complicated as the country has historically tried to balance demands for low cost maize with support for producers. Until 1996, maize and wheat prices were administered by a parastatal, the National Cereal and Produce Board (NCPB) and enforced by the state. The NCPB also controlled all import and export of maize and all long-distance trade within the country. In general, prices were held within the fob-cif band for the major cereals producing region (Kitale District). However, the combination of high transportation costs and pan-territorial pricing meant that some producers received prices outside of their local fob-cif band. In some

instances, when the NCBP found itself unable to cover the costs of serving specific regions, it failed to open buying centers or to deliver maize for consumers (Bates 1989, Pearson et al. 1994).

Price administration allowed the NCPB to deduct its intermediation costs from the wholesale prices and provided little incentive to control those costs. Since liberalization of the maize market in 1996, marketing margins appear to have fallen considerably for maize. Based on Nyoro, Kirimi and Jayne (2004), costs of moving maize from Kitale District to Nairobi have dropped from about $400/MT to $200/MT. The main beneficiaries of this decline have probably been the consumers (Argwings-Kodhek, Mukumbu and Monke 1993, Nyoro, Kiiri and Jayne 1999, Nyoro, Kirimi and Jayne 2004). The present analysis uses marketing margins from the post-reform period to estimate best practices margins. Thus, excess charges by the NCPB are treated as a tax amounting to 50 percent of the margin that was charged, and lowering the farmer NRA. The liberalization of maize markets seems fairly thorough now, although the NCPB does influence prices through maintenance of stabilization stocks. Moreover, the route to liberalization was slow. In 1988 limited unlicensed maize trade was allowed. In 1992 the liberalization process was practically halted, and finally in 1996 the NCPB was significantly downsized. Despite increased competition from private traders, the NCPB remains a major player in the Kenyan maize market. Jayne, Myers, and Nyoro (2005) present analysis suggesting that maize purchasing by the NCPB supported domestic producer prices in 2002, when they otherwise may have fallen significantly. Their analysis suggests that the NCPB may be serving to maintain a price floor, in contrast to its earlier tendency to impose a producer tax.

In contrast to maize, the NRA on wheat has been increasing recently and suggsts significant price distortion. Like maize, the domestic wheat market has been liberalized, but imports of both cereals have been subject to tariffs of 35 percent. The maize tariff has been suspended repeatedly when large imports are required, and Jayne et al. (2001) suggest that maize smuggling has diminished the impact of the tariff. Tariffs on wheat, in contrast, have not been suspended and informal trade flows are unlikely to be large. From a political economy perspective, the difference between the treatment of maize and wheat could be explained by the fact that maize is grown primarily by smallholders and is consumed as a staple, while wheat is grown primarily on estates and is consumed less widely.

Like cereals, coffee and tea markets have been administered by parastatal bodies. The Kenya Tea Development Authority (KTDA) and the Coffee Board of Kenya with the Kenya (coffee) Planters Cooperative Union (KPCU) have had a policy of passing through to farmers

the world price minus processing and marketing costs. In general, producer prices appeared to be close to export parity calculated at the official exchange rate. However, both coffee and tea producers complained of long delays in payments which imply a reduction in the real price received. These delays may be attributable to the local cooperative societies through which smallholder production was channeled in addition to the national organizations. The NRA data reported here are based on payments by the KTDA and the Coffee Board of Kenya, and so do not reflect local deductions made by cooperative societies.

The system of pass-through pricing implied little incentive to hold intermediation costs down. Payment delays may have been partly a mechanism for covering rising costs of intermediation by reducing the real prices paid to farmers (Pearson et al. 1994). Liberalization and privatization have progressed to a degree for Kenyan tea and coffee. The KTDA has been replaced with a private body, the Kenya Tea Development Agency. The estimated NRA for tea takes the costs incurred by the private agency as an estimate of best practice for calculating the marketing margins. Using this estimate, tea is subject to slight taxation on average over the period and is currently undistorted. If a more generous margin is assumed, set at the average costs incurred in the late 1980s, tea would appear to be undistorted on average over the last 40 years, but to be subsidized at present. Given the absence of any policy to explain the subsidy and the likelihood of some inefficiency in the earlier administration, the NRA based on “best practices” seems preferable.

For coffee the implicit taxation through the deviations from best practices appears to be larger than for tea. The cost figures used suggest $100/MT for final processing and marketing of Arabica coffee. Costs charged over time have ranged from $25 to $800 with an average well over the “best practices” figure. Coffee marketing has also been liberalized with the Coffee Board playing a reduced role. However, liberalization of the coffee system is a continuing process. Through 2006, coffee growers were critical of requirements that all Kenyan coffee to pass through the Coffee Board auction, because they felt that the system precluded access to the highest prices available through direct contracting. This problem may have been particularly serious for the highest quality and specialty coffees. Further criticisms suggested that coffee producers are being forced to work through the Coffee Board when more innovative and lower cost intermediation may be possible. In a sign of government responsiveness, starting in January 2007 coffee cooperatives were allowed to directly market coffee to international dealers, avoiding the Coffee Board auction for the first time.

In contrast to coffee and tea, sugar policy in Kenya has been highly distortionary. Sugar prices have been administered at a level well above the free market price, imports of

sugar have been taxed heavily and subjected to quotas, and consumers of sugar have faced high excise taxes. While liberalization is fairly well advanced in cereals, tea and coffee markets, the sugar market remains tightly controlled by the state. Because farm level costs are high in many of the sugar growing areas, some of the assistance to the sector is passed onto farmers to support production. However, sugar factories are well-positioned to capture a large share of the subsidy to the sector. Currently Kenya demands about 200,000 MT of sugar in excess of domestic production. Imports from outside the COMESA region are subject to a 120 percent tariff. A quota of approximately 100,000 MT of table sugar and 100,000 MT of refined sugar limits duty free imports from COMESA countries. The quota on imports from COMESA is allowed under a protective provision that was due to expire in February 2008, but the Government of Kenya was seeking to extend this protective quota provision to 2011. After that time Kenyan sugar industry may be subject to competition from lower-cost sources in the COMESA region (FAO 2007, Export Processing Zones Authority 2005).

The liberalization of Kenya's agricultural sector was a priority of the international financial institutions (World Bank 1998). Kenya agreed to numerous adjustment lending programs in the 1980s and 1990s which stressed liberalization and privatization. The country's compliance with those programs was often poor. Nonetheless, once the national leadership was convinced of the need for reform (or its inevitability) and found politically acceptable mechanisms for introducing reform, the liberalization program gathered speed. The success of liberalization of maize markets and of markets for agricultural inputs attests to the potential for further gains in areas that remain controlled.

Fiscal and trade policy

Historically, the Government of Kenya has relied on excise taxes, income taxes and import duties for revenues. The mix has been complicated but trade taxes are becoming decreasingly important as a source of revenue. Export duties were largely eliminated in the 1970s and tariffs have played a decreasing role since the introduction of a VAT system in 1989 (Karinga and Wanjala 2005, Muriithi and Moyi 2003). Import duties accounted for almost 40 percent of tax revenue in the 1960s, falling to about 25 percent in the 1970s and to about 16 percent since the value added tax was introduced. Excise duties continue to bring about 16 percent of government revenue, as they did in the 1960s, while income taxes have consistently accounted for about one-third of revenue.

The VAT now accounts for 25 to 30 percent of government revenue. It was initially differentiated into 15 categories with rates ranging from zero to 150 percent. It was soon simplified to a system of 4 (and later 3) categories ranging from zero to 16 percent with a standard rate of 16 percent. In addition a few goods, including sugar, remain subject to excise taxes. Both imported and domestically produced goods are subject to the same VAT rates. Imports, however, are subject to separate import duties. Thus the tax on imported sugar from non-COMESA sources includes both an import duty of 120 percent and a development duty of 7 percent in addition to the 16 percent VAT charged on all non-cereal agricultural products.

Average import tariffs have been falling in Kenya (Appendix Figure 5). This reflects efforts to comply with WTO as well as a strategy since the mid-1970s of reducing import tariffs of industrial inputs in order to increase the effective protection of manufacturing sector. While average tariffs have been falling, tariffs on agricultural products have risen over the past 15 years. Average tariff rates on food and livestock are now about 35 percent, with much higher rates on sugar and a few other specific agricultural products.

While the trend in increased applied import duties in agriculture appears pronounced, it is not clear how great the practical implications are. Since trade in most agricultural products was controlled by parastatal organizations for most of the period 1955-90, non-tariff barriers to imports were the more relevant source of distortion. Partly in response to WTO and IFI pressures, the non-tariff barriers have been replaced with tariffs. The trend in the calculated NRA towards zero would suggest that the current applied tariffs in agriculture have less impact than the non-tariff barriers of the past. Be that as it may, the applied tariffs are distorting for specific crops (e.g., wheat) and uncertainty about the application of tariffs may negatively impact potential importers of maize.

Regulation, red tape and rent seeking

Over the last 20 years Kenya has preserved a large state presence in much of the economy and has also developed a reputation for corruption. Allegations and evidence of fraud and corruption have at times been particularly strong in the area of customs and international trade. The abundance of red tape and the possibility of corruption among those administering paperwork raise transactions costs and create inefficiencies in the economy that are not captured in this analysis. According to www.doingbusiness.org, importing into Kenya in 2005 required 13 documents, 20 signatures, and 62 days compared to 9 signatures and 34

days in South Africa and 10 signatures and 25 days in Thailand. Exporting from Kenya requires 15 official signatures and 45 days, compared to 7 signatures and 31 days in South Africa and 10 signatures and 23 days in Thailand.

Many of the regulations in the Kenyan economy are perceived to foster corruption and rent seeking, further raising transactions costs. The “corruption perception index” published by Transparency International ranked Kenya 144 out of 158 countries in 2005. This placed Kenya in a tie with Somalia, Sudan, and the Democratic Republic of Congo. Apparent improprieties in the 2007 presidential election reinforced the impression of corruption in the country. Even if corrupt practices were controlled in Kenya, the relatively onerous paperwork requirements constitute an impediment to trade and economic growth. Initiatives are now in progress in Kenya to create a fast track that would remove license requirements in the absence of environmental, health, and safety considerations. Moreover, the 2006 report fromDoing Business (World Bank 2006) indicates a marked reduction in red tape since 2005.

Prospects

The Kenyan economy has historically benefited from good performance in agriculture, while the agricultural sector has benefited from a political elite that had strong rural links, largely through the estate sector. In the recent past, agricultural production has faltered, the economy in general has suffered, and poverty has spread. While direct taxation of the agricultural sector does not seem to have been a substantial factor in this decline, indirect taxation through currency overvaluation played a role. Other policy factors that probably contributed to the decline in the sector include growing domestic marking margins, which are due to both poor infrastructure services and high costs in the parastatal marketing enterprises. One explanation for the government’s tolerance of these raising costs in the agricultural sector could be that the political elite found it increasingly attractive to use agricultural marketing institutions and monetary policy to serve short-term political goals including redistribution, employment, and patronage rather than long-term economic development (Bates 1981).

Sound public investment in developing the horticulture sector indicates that the Government of Kenya is willing to make strategic moves to enhance agricultural output. Meanwhile heavy investment in sugar and continued protection of the sector suggests that

agricultural policy will continue to be used to affect politically important distributional objectives.

Policy reforms to liberalize the agricultural markets were made in the hopes of reducing marketing margins and increasing agricultural output. In the case of maize markets, in which the NCPB now plays a much-reduced role, this goal was achieved. Marketing margins have fallen by half compared to the pre-reform period, and consumer prices have fallen as a result. There is less evidence of such reductions in marketing margins or a shift towards competitive and open markets in the case of coffee, tea and sugar. However, the loosening of administrative regulations restricting trade and marketing systems is encouraging.

Further expansion of the agricultural sector probably requires public investments in areas of potential comparative advantage (such as horticulture), continued policy reforms to reduce the costs of doing business, and maintanance of a stable macro-economic environment to encourage private investment. Whether policy makers in Kenya will find such policies in their interests remains to be seen, but the current political debate and recent administrative reforms suggest the possibility of further progress.

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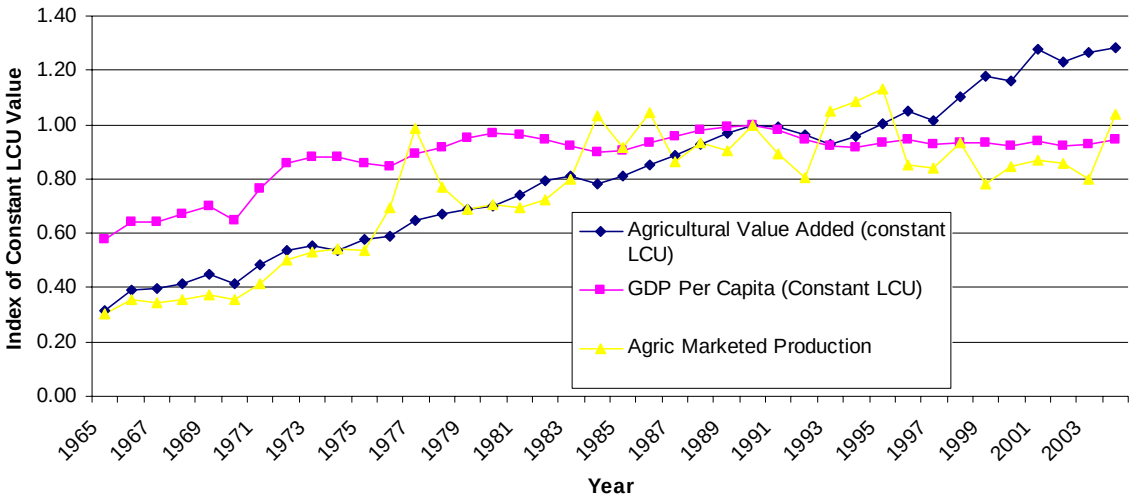
Figure 1: Agricultural value added, marketed production, and national income, Kenya, 1965 to 2004

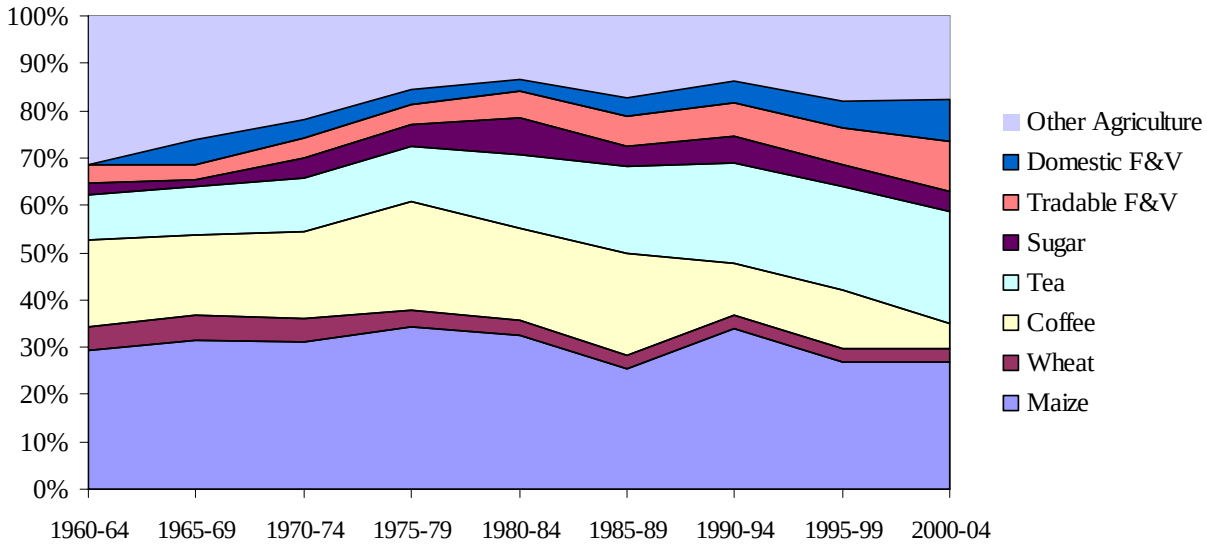


Source: World Development Indicators Online and Government of Kenya, *Statistical Abstract of Kenya* (various years).

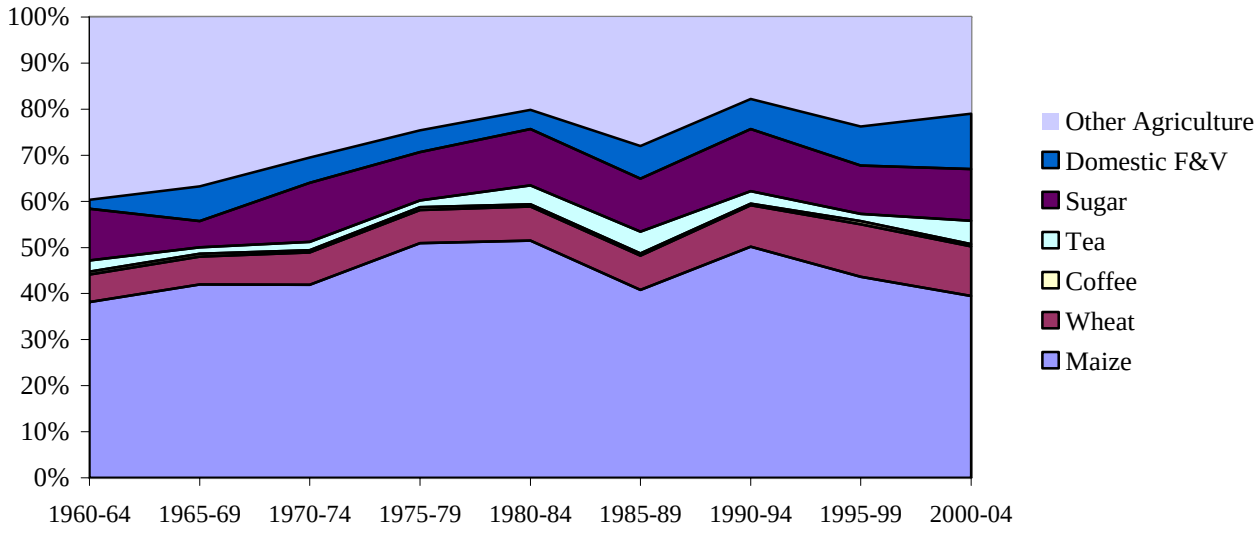
Figure 2: Agricultural production and consumption shares by farm product, Kenya, 1960 to 2004

(percent, five year averages).

(a) Primary agricultural production shares



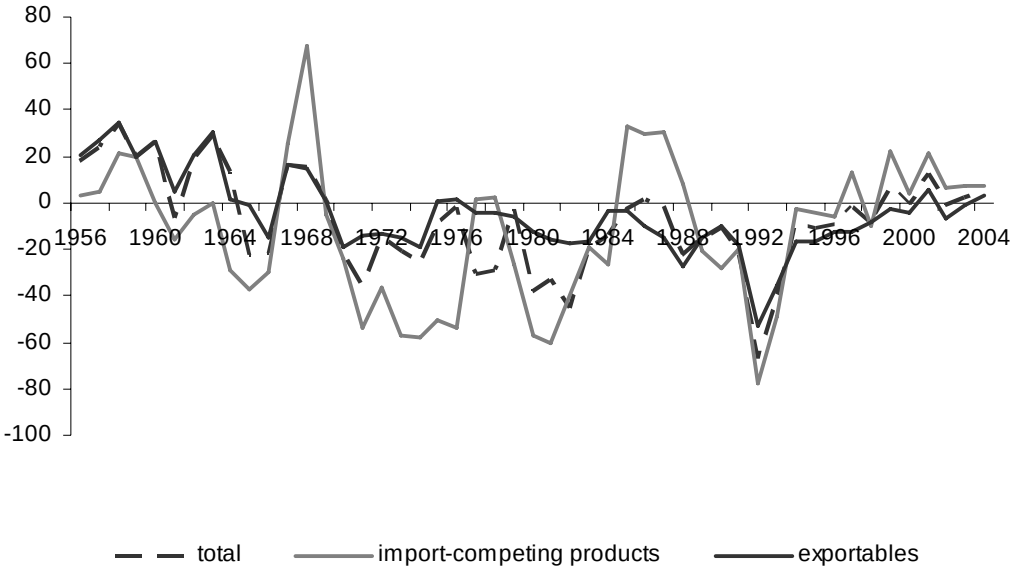
(b) Final household food consumption shares



Sources: FAOSTAT, and Government of Kenya, *Statistical Abstract of Kenya* (various years).

Figure 3: Nominal rates of assistance to exportables, import-competing and all[a] agricultural products, Kenya, 1956 to 2004

(percent)

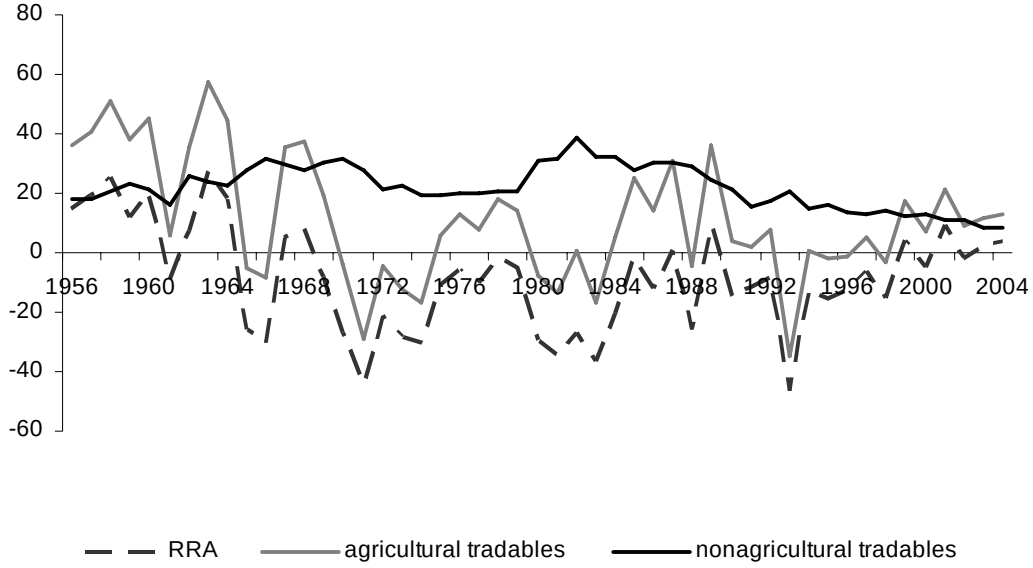


Source: Authors' spreadsheet

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], Kenya, 1956 to 2004

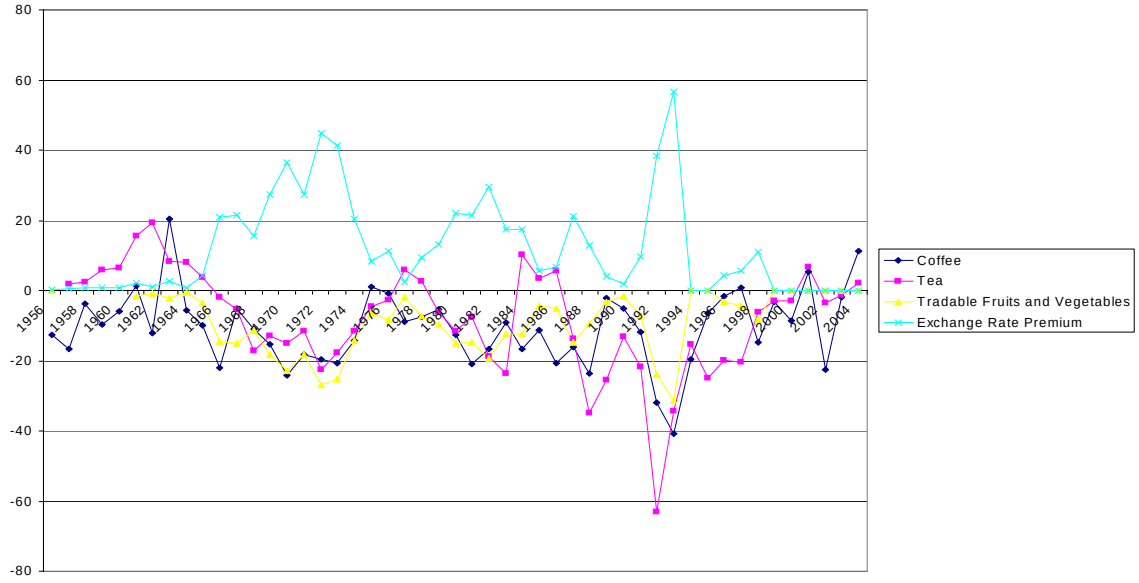
(percent)



Source: Authors' spreadsheet

a. The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and nonagricultural sectors, respectively.

Figure 5: Nominal rates of assistance to producers of export crops, Kenya, 1956 to 2004 (percent)



Source: Authors' spreadsheet

Table 1: Nominal rates of assistance to covered farm products, Kenya, 1956 to 2004
(percent)

	1956-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Exportables [a, b]	**25.5**	**16.8**	**3.3**	**-16.3**	**-2.3**	**-13.0**	**-14.1**	**-26.6**	**-10.5**	**-0.6**
Coffee	-10.7	-0.4	-12.7	-19.4	-4.3	-15.2	-14.8	-21.9	-5.0	-3.3
Tea	2.6	11.5	-6.7	-15.6	-1.0	-10.2	-13.0	-29.5	-14.9	0.2
Vegetables and fruits – tradable	n.a.	-1.3	-12.5	-21.5	-6.7	-14.8	-7.4	-12.8	-3.2	0.0
Import-competing products[a, b]	**12.3**	**-16.6**	**4.2**	**-46.0**	**-25.3**	**-40.5**	**16.1**	**-35.4**	**2.9**	**9.3**
Nontradables[a]	**0.0**	**8.0**	**0.0**	**-5.5**	**-19.1**	**-44.2**	**-1.3**	**-6.0**	**0.0**	**0.0**
Vegetables and fruits – nontradable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mixed trade status[a]										
Wheat	12.3	5.1	10.1	-26.8	-7.7	-20.5	18.6	-10.7	36.8	46.2
Maize	59.4	44.3	13.1	-24.1	-17.2	-46.4	-1.3	-34.5	-5.3	0.5
Vegetables and fruits – tradable	n.a.	-1.0	-9.9	-17.4	-5.3	-11.8	-5.8	-10.5	-2.5	0.0
Sugar	n.a.	-29.1	42.7	-47.9	-24.6	-47.9	21.1	-27.1	30.6	36.5
Total of covered products[a]	**23.7**	**15.8**	**-2.3**	**-24.1**	**-14.7**	**-29.9**	**-8.0**	**-30.0**	**-4.5**	**3.7**
Dispersion of covered products	30.5	25.8	32.7	20.2	25.7	23.9	20.4	21.7	18.7	19.1
% coverage (at undistorted prices)	64	66	70	79	82	85	81	85	80	78

Source: Authors' spreadsheet

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

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

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

Table 2: Nominal rates of assistance to agricultural relative to nonagricultural industries, Kenya, 1956 to 2004
(percent)

	1956-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Covered products	23.7	15.8	-2.3	-24.1	-14.7	-29.9	-8.0	-30.0	-4.5	3.7
Non-covered products	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-1.2	-0.3	0.0
All agricultural products	15.2	10.1	-2.2	-19.2	-12.3	-25.7	-6.6	-26.8	-3.7	2.9
Non-product specific (NPS) assistance	11.4	12.8	11.9	7.5	10.7	7.1	17.2	21.0	6.1	6.4
Total agricultural NRA (incl. NPS)[a]	26.6	23.0	9.7	-11.8	-1.7	-18.6	10.5	-5.8	2.4	9.3
Trade bias index[c]	0.12	0.18	0.09	0.64	0.48	0.57	-0.24	0.31	-0.12	-0.09
Assistance to just tradables:										
All agricultural tradables	41.5	37.7	15.7	-13.3	11.8	-6.5	20.3	-4.3	3.1	12.3
All non-agricultural tradables	20.0	21.9	29.2	24.5	20.0	33.2	28.3	18.0	13.8	10.3
Relative rate of assistance, RRA[b]	17.9	12.7	-10.4	-30.2	-6.9	-29.9	-6.1	-18.7	-9.3	1.9
MEMO, ignoring exchange rate distortions:										
NRA, all agricultural products	26.9	23.4	15.6	-3.4	1.2	-15.3	13.5	-4.6	3.0	9.3
Trade bias index[c]	0.13	0.20	0.28	1.19	0.62	0.92	-0.16	0.64	-0.08	-0.09
RRA (relative rate of assistance)[b]	18.4	13.7	0.4	-16.3	-1.4	-21.4	0.2	-15.5	-8.1	1.9

Source: Authors' spreadsheet

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

b. The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

c. Trade bias index is $TBI = (1+NRAag_x/100)/(1+NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

Appendix: Data sources, time series construction, and sensitivity analysis

Data for calculating nominal rates of assistance to commodities and the RRA to the agricultural sector are incomplete and often contradictory. This appendix documents the sources of data for the analysis, methods used for constructing data, and methods used to reconcile data that were contradictory. Simple sensitivity analysis is presented to indicate the robustness of the results in the face of concerns about data quality. Additional appendix tables present raw data and estimated NRAs.

Input prices

There has been no effort to include input prices or input price distortions in this analysis. Throughout the period in question, fertilizer and other agricultural inputs were free from import duty. Through much of the period prior to liberalization (1993), targeted agricultural finance subsidized credit and made fertilizer available at a below-market rate to some growers. Coffee growers, for example, received credit for inputs through the Second Coffee Improvement Program (SCIP). Subsidized credit and fertilizer were rationed. Under such rationing, it is reasonable to conclude that input prices were subsidized to some growers but that inputs were unavailable for others.

Fertilizers were distributed through various commodity support programs (Kenya Tea Development Association, SCIP) and contract farming schemes (eg. sugar and tobacco). Well documented inefficiencies in the controlled distribution systems imply that on average inputs faced a tax through excessive marketing margins. Indicative of the scale of this tax, Ariga, Jayne, and Nyoro (2006) report that marketing margins for fertilizers dropped from Ksh 262/ton over 1990-95 (pre-reform) to Ksh 137/ton during 2003-05. However, this implicit tax prior to liberalization was off-set for some growers when credit schemes (including that of the SCIP) collapsed and debts for inputs were written off. Limited information on input use rates and on the size of this tax as well as the distribution of subsidized finance and fertilizer prevent incorporation of input price distortions in the analysis.

Exchange rates

Data on exchange rates are based on official rates reported in the WDI and on parallel market rates compiled by Easterly and distributed through the Poverty Alleviation Through Reducing Distortions to Agricultural Incentives project of the World Bank. The parallel market rate for the period 1957-63 is estimated based on differential inflation rates in Kenya and the United Kingdom. These rates suggested little change in the degree of exchange rate distortion over the 1957-65 period. In the NRA calculations it is assumed that exporters are able to exchange 25 percent of their foreign exchange on the parallel market. This implies consistent evasion of legal processes. The assumption is made in the absence of any data. For most of the period, the degree of exchange rate distortion is sufficiently modest that results cannot be influenced by the assumed share of foreign exchange flowing into the parallel market. During periods of macro-economic

distortions (mid-1970s, early 1980s, early 1990s) this parameter is more important, but the calculated NRAs are not substantively affected by altering the value.

Maize

Data on volumes of maize traded and on export and import unit values were taken from FAOSTAT, Comtrade, and from the Government of Kenya's *Statistical Abstract*, and its *Economic Survey*. In most cases these data sources were consistent. When one source diverged from the others, the value on which two sources agreed was used. During the periods when maize was not traded in large quantities, the export price from South Africa reported in FAOSTAT was used as a reference price. A charge of $15/ton was applied for shipping costs.

Data on the volume of production since 1961 were taken from FAOSTAT. Data for earlier years are based on the volume of marketed production reported in the *Statistical Abstract*, adjusted upwards to account for on-farm consumption and informal trade. Data on producer prices were taken from the *Statistical Abstract*. Retail prices are reported in the *Statistical Abstract* for unmilled maize in Nairobi. Milling is not included in the analysis.

Marketing margins applied to the producer price cover the costs of moving maize from farms in a major production region (Kitale) to Nairobi. Fob and cif prices are adjusted by transport costs between Mombasa and Nairobi. Data from Jayne, Myers and Nyoro (2005) suggest that transportation costs are approximately equivalent along these two routes.

Over the time frame studied, Kenya moved from being consistently maize surplus to being maize deficit. For a number of years in the interim, the country sometimes had large surpluses to sell, sometimes required large imports and occasionally had negligible trade. During this time, producer and consumer prices were administered and typically held within the fob-cif band. Because of high inland transportation costs, this band is rather wide. With a domestic price within this band, the classification of the country as an importer or an exporter will produce the impression of either a large subsidy or a large tax on producers. In the baseline analysis used here, the country has been classified as a maize exporter for most years up to 1979 and as a maize importer since 1992. In the interim years maize is classified as a non-tradable on the grounds that the country was roughly self-sufficient in the crop during this period, with the average equilibrium price falling in the fob-cif band. To estimate the undistorted price during this period, fob and cif prices are constructed from trade data and the average of those values is taken as the reference price.

Trade status based on the rule-of-thumb suggested in Anderson et al (2008), is reported in Appendix Table 1 under "Trade Classification: Varied". Using this classification, the reference price varies widely during the 1979-1992 period and the measured NRA for maize is somewhat different from what is reported in the main text. Appendix Table 1 reports the NRA using the more variable set of reference prices and the prices based on the smoothed tradability classification. As the data show, the NRA using the more varied trade classification is highly unstable. Moreover, it suggests rates of assistance in the late 1980s that are exceedingly high and inconsistent with policies in place at the time.

The marketing margins for maize since the early 1990s have been subject of many careful analyses through the Tegemeo Institute of Egerton University, Kenya. These papers (cited in the main text) suggest a steady decline in margins since liberalization of domestic trade. Data for earlier periods are scarce. The administered prices were intended to allow mark-ups along the value chain that equaled the costs of intermediation. Recent experience suggests those costs were inflated, at least immediately prior to reform. During the period of the analysis there were forces leading to lower marketing costs, such as use of larger vehicles for road transport between Nairobi and Kitale. Meanwhile, deterioration for the rail service probably led to increasing costs on the Mombasa-Nairobi route. The NRA calculations for maize assume that the low costs of intermediation experienced since reform could have been achieved in the 1970s and 1980s. A slightly higher intermediation cost is applied from the late 1950s through the early 1970s. Actual charges in excess of the estimated costs are treated as a tax on producers that is transferred to the marketing agents. Appendix Table 1 presents the "best practice" marketing margin used in the baseline analysis and the actual mark up charged under the administered pricing system and during the years immediately following liberalization. The difference between these two charges is treated as a tax on producers in the baseline NRA calculation. The NRA that emerges if one assumed that the actual marketing margin covered only the costs of efficient intermediation is given in the last column of Appendix Table 1. These results suggest a tax (subsidy) that is as much as 25 percentage points lower (higher) than the baseline during the 1980s. The divergence between the two series is smaller in the 1970s and 1990s. After 1997 the NRA estimates are identical.

Wheat

Data on volumes of wheat traded and on export or import unit values were taken from FAOSTAT, Comtrade, and from the Government of Kenya's *Statistical Abstract*, and its *Economic Survey*. Export volumes and unit values were consistent across these sources, but import volumes and values sometimes diverged (Appendix Table 2). When one source diverged from the others, as in 1980 and 1998, the value on which two sources agreed was used.

Data on volume of production was taken from the *Statistical Abstract* and from FAOSTAT. As Appendix Table 2 shows, these data were consistent up to the mid-1980s, but diverge dramatically after that point. The analysis uses the FAOSTAT series. Since wheat has a relatively high, positive NRA in most years and the FAOSTAT series shows much larger production than the GOK data, use of the GOK data would tend to lower the NRA to agriculture.

Data on producer prices were taken from the *Statistical Abstract*. Retail prices are reported in the *Statistical Abstract* for wheat flour in Nairobi. However, the reference prices in calculating rates of assistance are for wheat grain. The commodity is not treated as a processed good.

Marketing margins cover the costs of moving wheat from farms in a major production region to Nairobi and from Mombasa to Nairobi, when the country is wheat deficit, or Nairobi to Mombasa when the country is wheat surplus. Data from Jayne, Myers and Nyoro (2005) suggest that transportation costs are approximately equivalent along these two routes. Costs of domestic marketing of wheat were assumed to be the

same in absolute value as those for maize. The percentage mark-up for wheat is lower than that of maize because of the commodity's higher value.

Coffee

Data on volumes of coffee traded and on export unit values were taken from FAOSTAT and from the Government of Kenya's *Statistical Abstract* and its *Economic Survey*. Export volumes and unit values differed by less than one percent in all but three years between 1961 and 1994. During this period the difference was never greater than five percent. After 1994 there is a much wider divergence between the export unit values calculated using FAO and GOK data. The FAO data are used because they seem more consistent with general trends in the global market. FAOSTAT data suggested unrealistic variation in domestic consumption of coffee in the 1980s and onwards. In constructing the spreadsheets, the domestic consumption data were smoothed and the storage values adjusted accordingly. Since coffee represents a small share of consumption, there is little impact on the calculated consumer subsidy equivalent from this manipulation of the data.

Almost all of Kenya's coffee is *Arabica*, and about 50 percent is grown by smallholders with the other half produced on large estates. Producers harvest coffee cherries which are pulped and dried into parchment. Pulping is done on-farm for estate producers and at cooperative societies for smallholders. The parchment is then milled at factories into clean coffee (also known as green coffee) and exported through the Coffee Board of Kenya's auction. For most of the period, all coffee was milled at the Kenya Planters Cooperative Union factory in Nairobi.

Prices are reported in terms of clean coffee equivalent, except at the retail level. Producers deliver parchment coffee, which is converted to clean coffee with a conversion factor of 1.25 to 1. Marketing margins for moving parchment coffee from pulper to mill are based on Pearson et al. (1994) who report data for 1989. These costs are a very small share of the revenue and so results are not sensitive to this value. Costs of light processing and marketing are taken from World Bank (2005). This document sets costs of milling at US$62-65 per ton and costs of onward marketing at US$50 per ton. By comparison, Temu (2002) reports milling costs in Tanzania at $50/ton in 1999.The World Bank data are used to estimate costs in the analysis. Retail prices are for roasted coffee and come from the *Statistical Abstract of Kenya*. The retail margin includes the costs of roasting and packaging beans.

World Bank (2005) indicates that cooperative pulping implies a charge of about Ksh 15/kg above the costs incurred in estate pulping. If these extra charges result from poor management, rather than the intrinsic difficulties of pooling from multiple smallholders, the differential in markup can be treated as a tax. In the baseline analysis, the producer rate of assistance is based on payments to estate producers and to cooperative societies. Thus, it assumes that cooperatives make no excess charges on smallholders. If one assumes that the differential charges for pulping are unjustified, then a separate NRA must be calculated for smallholders and for estate producers. Appendix Table 3 presents NRA estimates for smallholders, assuming that they face an excess charge amounting to 10 percent of the producer price to estates and the baseline NRA, representing the NRA to estate producers.

Separate treatment of smallholder coffee in the analysis would imply that a substantial share of coffee production faced a negative NRA that is eight to ten percentage points lower than what is suggested in the baseline analysis (Appendix Table 3). Smallholder coffee has been about 50 percent of total production since the 1970s and coffee was a large share of total production up to about 2000. Thus, separate treatment of smallholders would imply a lower NRA to agriculture during the 1970s through 2000, but it would not change the general patterns of assistance through time. Given uncertainty about the degree to which the higher charges on smallholder pulping are justified, the baseline analysis does not distinguish among producer types.

Tea

Data on volumes of tea produced and traded and on export unit values were taken from FAOSTAT and from the Government of Kenya's *Statistical Abstract* and its *Economic Survey*. Data on export and production volumes were consistent across the sources. Calculated export unit values were also consistent, except in 1998 and 2001 when the FAO data indicate unit values of 15 percent and 25 percent above the GOK reports. Data on export prices in Mombasa provided by the World Bank were close to those reported by the GOK. Therefore, the GOK data on export unit values were used throughout the period. FAOSTAT data were used for volumes produced and exported. As with coffee, FAOSTAT data suggested unrealistic variation in domestic consumption of tea. In constructing the spreadsheets, the domestic consumption data were smoothed and the storage values from FAOSTAT were adjusted accordingly. Since tea represents a small share of consumption, there is little impact on the calculated consumer subsidy equivalent from this manipulation of the data.

Data on marketing and processing costs for tea are scarce. *The Statistical Abstract of Kenya* provides an estimate of the total costs between the farm gate and the London auction during the 1950s and 1960s. Fifty percent of this value is taken as an estimate of the costs of light processing and transportation to Mombasa from 1957 to 1965. These costs are assumed to increase at 2.5 percent a year from 1965 to 1975. The rising costs are meant to capture the effect of increased smallholder production and implied additional costs for collection, distribution, and processing. Pearson et al. (1994) provide a cost for coffee processing in 1988. This value is used as the basis for estimating costs from 1976-2000. The average cost charged from 2000 to 2005 is used as the estimated cost for that period. To estimate the "best practices" marketing margin, the average costs from 2000 through 2005 is applied from 1980 onwards.

Sugar

This analysis covers only sugar that is produced and delivered for processing in domestic refineries. FAOSTAT reports total sugar cane production while the Government of Kenya's *Statistical Abstract* reports volumes of sugar delivered for processing. For the period 1965-95 the FAOSTAT data exceed the GOK values by 15 to 25 percent. This differential may indicate the quantity of sugar that is processed informally or consumed as cane. From 1996 on the two series are identical. The analysis assumes that the GOK data accurately measures sugar cane delivered to factories throughout the period, while the residual production is not consistently captured. The GOK data are used in the

analysis to gauge volume. Where import unit values were used to estimate the cif price, the data from FAOSTAT were used. As shown in Appendix Table 4, the GOK and FAO data were similar in most years. When they differ, as in 1991 and 1992, the FAO data seem more reasonable and more consistent with world market conditions. Methods for selecting prices used in the RRA calculation are described in the main text of this report. Annual data are reported in Appendix Table 4. Retail price data and excise tax collection data were taken from the *Statistical Abstract*.

Fruits and vegetables

Data sources and methods for calculating the NRA values for export and non-tradable fruits and vegetables are described in the main text.

Other agricultural activities

The main agricultural activities that are not explicitly treated in the RRA calculation are floriculture, meat and dairy. Appendix Table 5 presents the value of marketed production for selected agricultural products as well as the total value of marketed production. For reasons explained in the main text, these data understate the value of maize production and horticulture production. However, they do confirm the significance of animal products.

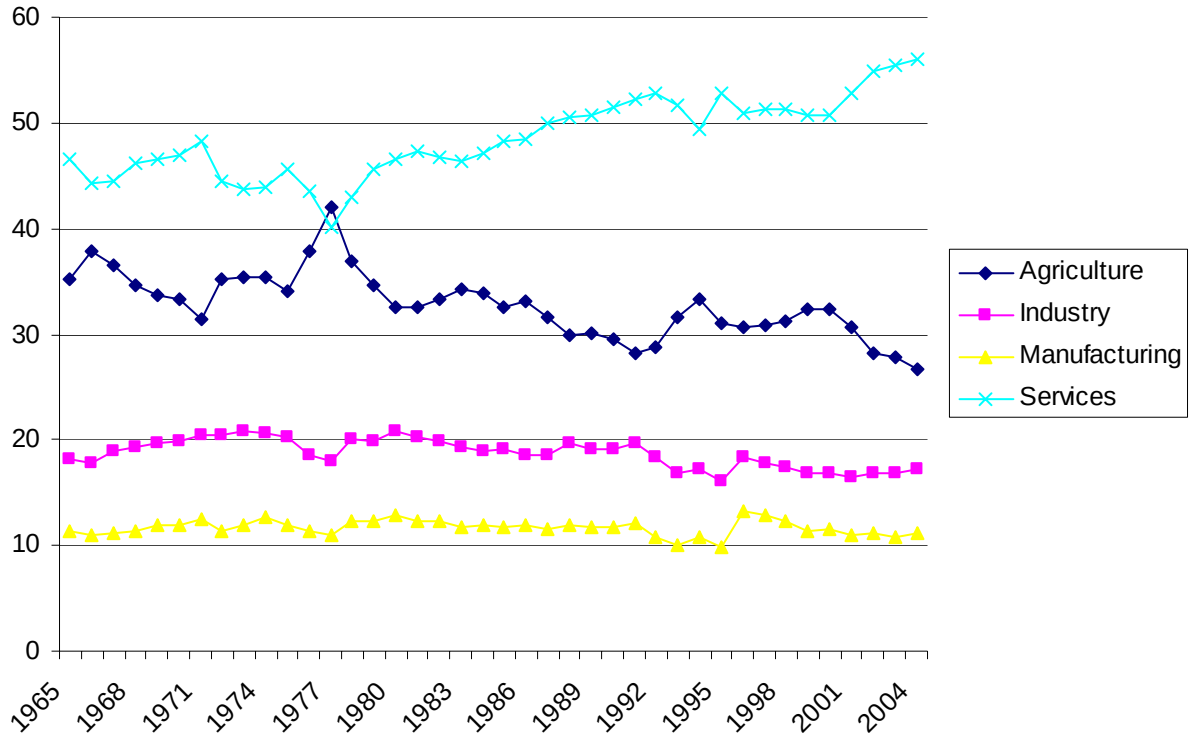
In the analysis, floriculture is treated as an exportable with negligible domestic consumption. Up to 1980, the share of dairy production that is processed into packaged milk or butter is also considered exportable. After that time, this production is treated as importable. The analysis also adds a negligible value for other exportable production, reflecting minor exports of sisal and a few other products. The great majority of Kenyan meat is slaughtered in small facilities and is not inspected. This production is considered non-tradable. Slaughtering and butchering activities are treated as a marketing function rather than a form of light processing. Milk and butter are treated as lightly processed.

Non-agricultural sectors

The rates of assistance to non-agricultural sectors are calculated using the assumptions that non-tradable production is non-distorted and that the primary distortions to tradable production is through the exchange rate and import tariffs. Shares of production to manufacturing, services and non-agricultural primary production are based on value added data from the *World Development Indicators*. Shares of each of these sectors that are importable, exportable or non-tradable are estimated with reference to data from the *Statistical Abstract*. Tariff rates are taken from the *Statistical Abstract.* To be consistent with the rest of the country studies in this project, the NRA for non-agriculture relates only to tradable goods (not services). Importable manufacturing and non-agricultural primary production are protected at the average tariff rates provided in the *Statistical Abstract of Kenya*. The division over exportable, importable and non-tradable in these sectors was based on little data or knowledge. But the RRA estimates turn out to be robust to changes in the non-agricultural NRA.

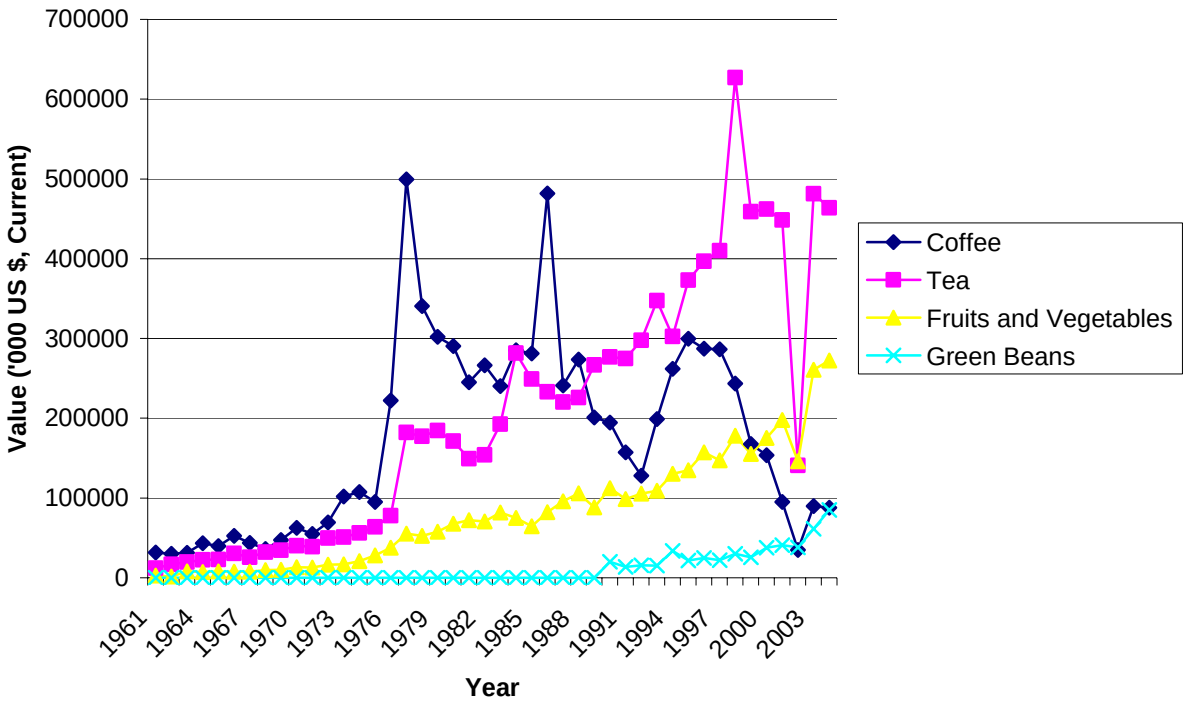
Appendix Figure 1: Sectoral shares of GDP, Kenya, 1965 to 2004

(percent)



Source: World Development Indicators Online

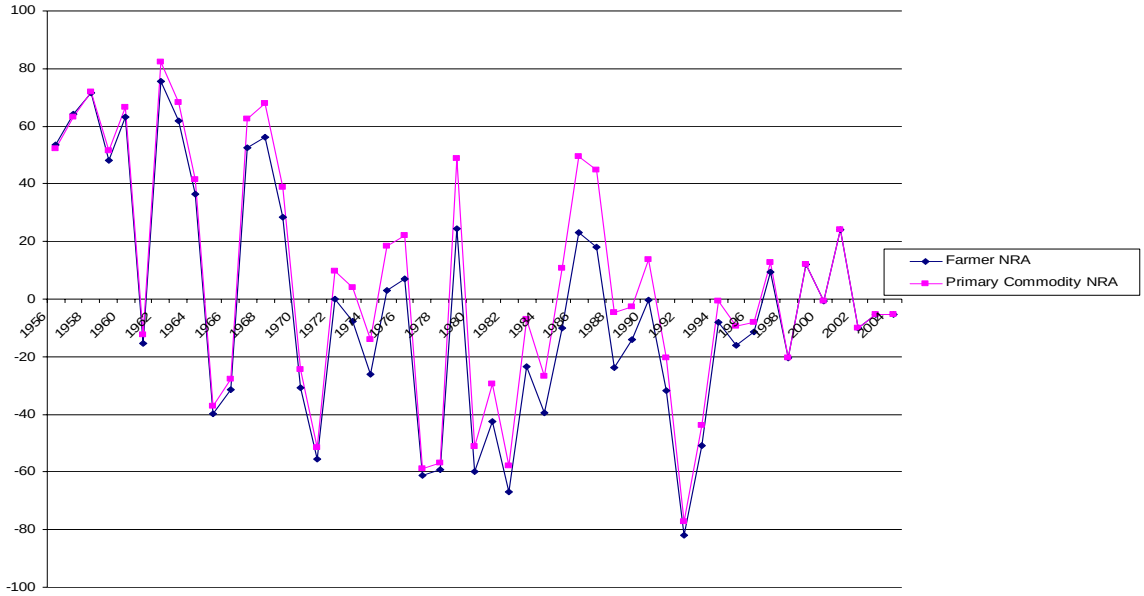
Appendix Figure 2: Value of agricultural exports, by commodity, Kenya, 1960 to 2004



Source: FAOSTAT

Appendix Figure 3: Nominal rates of assistance to maize, Kenya, 1956 to 2004

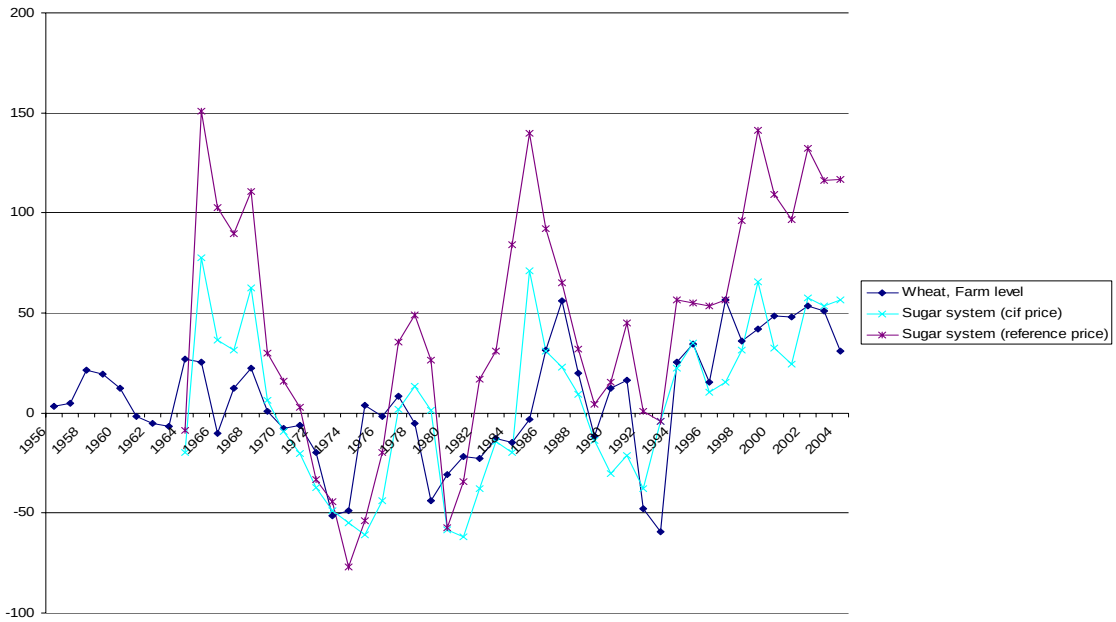
(percent)



Source: Authors' spreadsheet

Appendix Figure 4: Nominal rates of assistance to import-competing crops (wheat and sugar), Kenya, 1956 to 2004

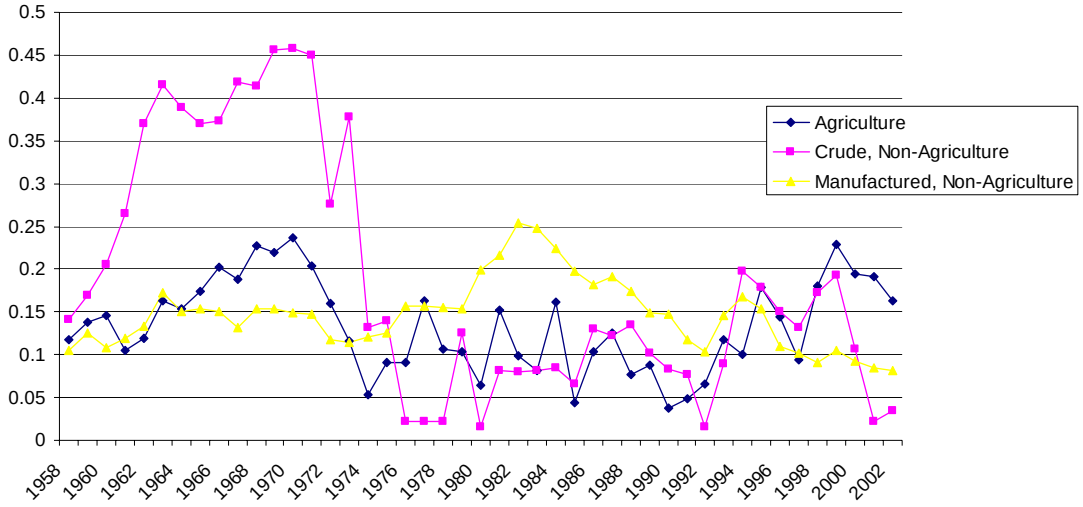
(percent)



Source: Authors' spreadsheet

Appendix Figure 5: Average applied import tariffs, by SITC, Kenya, 1958 to 2004

(proportion)



Source: Calculated from *Statistical Abstract of Kenya* (various years).

Appendix Table 1: Maize data and alternate NRA calculations, Kenya, 1956 to 2004

	Producer Price Ksh/MT	Marketing Margin (a)		Imports as % of Consumption	Exports as % of Production	Trade Classification		World Prices			Nominal Rates of Assistance		
		Best Practice	Actual Margin			Varied	Smoothed	fob	Imputed cif (b)	cif	Base-line	Varied Trade Clas.	Actual Margin
1956	385	0.29	0.28	0.00	0.56	H	X	57.76	n.a.	n.a.	0.54	0.54	0.52
1957	418	0.27	0.26	0.00	2.80	X	X	56.49	n.a.	n.a.	0.64	0.64	0.63
1958	385	0.29	0.29	0.01	10.42	X	X	52.16	n.a.	n.a.	0.72	0.72	0.72
1959	307.78	0.36	0.39	0.01	5.89	X	X	54.95	n.a.	n.a.	0.48	0.48	0.51
1960	359.59	0.31	0.34	0.00	1.08	H	X	52.87	n.a.	n.a.	0.63	0.63	0.67
1961	390.5	0.28	0.32	9.97	0.14	M	M	61.54	53.06	63.10	-0.16	-0.15	-0.12
1962	319.3	0.35	0.40	2.40	5.49	X	X	47.02	51.31	57.81	0.76	0.76	0.82
1963	328.4	0.34	0.39	0.06	7.28	X	X	51.06	51.96	51.59	0.62	0.62	0.68
1964	361.9	0.31	0.35	0.74	0.08	H	X	52.85	55.45	55.99	0.36	0.36	0.41
1965	355.3	0.31	0.37	6.34	0.01	M	M	76.92	62.48	77.61	-0.40	-0.40	-0.37
1966	400.7	0.28	0.35	11.87	0.78	M	M	53.31	89.88	70.95	-0.32	-0.32	-0.28
1967	352.6	0.32	0.40	0.01	9.33	X	X	50.84	57.88	171.72	0.53	0.53	0.63
1968	308	0.36	0.46	0.01	16.54	X	X	48.32	53.12	107.53	0.56	0.56	0.68
1969	275.5	0.40	0.52	0.02	11.05	X	X	53.03	56.97	96.65	0.28	0.28	0.39
1970	275	0.40	0.53	0.97	0.32	H	X	69.87	65.55	75.90	-0.31	-0.31	-0.25
1971	333.3	0.33	0.45	2.03	0.01	M	X	n.a.	61.26	86.49	-0.56	-0.56	-0.52
1972	388.9	0.29	0.41	0.01	1.16	H	X	70.84	60.62	295.92	0.00	0.00	0.10
1973	388.9	0.29	0.45	0.00	12.14	X	X	80.28	87.49	358.02	-0.08	-0.08	0.04
1974	464.3	0.24	0.44	0.04	3.34	X	X	113.95	141.48	384.62	-0.26	-0.26	-0.14
1975	697.9	0.18	0.35	0.02	6.16	X	X	113.15	131.92	134.45	0.03	0.03	0.18
1976	765.9	0.19	0.36	0.00	4.36	X	X	118.65	125.28	625.00	0.07	0.07	0.22
1977	888.9	0.19	0.35	0.00	0.32	X	H	196.17	117.96	656.25	-0.61	-0.64	-0.59
1978	774.7	0.23	0.47	0.00	1.08	X	H	79.17	119.86	612.50	-0.59	-0.64	-0.57
1979	888.9	0.21	0.45	0.00	6.86	X	H	118.46	127.42	n.a.	0.24	1.02	0.49
1980	953.7	0.21	0.47	16.66	0.00	M	H	550.00	169.78	207.53	-0.60	-0.65	-0.51
1981	1000	0.22	0.50	4.20	0.06	M	H	152.37	156.30	168.46	-0.42	-0.65	-0.29
1982	1077.4	0.23	0.56	3.44	0.04	M	H	149.63	136.38	241.58	-0.67	-0.81	-0.58
1983	1540	0.18	0.44	0.00	5.33	X	H	148.86	134.12	n.a.	-0.24	0.48	-0.07
1984	1750	0.18	0.43	22.78	3.34	M	H	174.94	136.30	186.65	-0.39	-0.60	-0.27
1985	1870	0.18	0.45	4.98	1.42	M	H	88.02	140.07	131.72	-0.10	-0.46	0.11
1986	1980	0.18	0.44	0.03	7.88	X	H	80.36	101.40	n.a.	0.23	2.06	0.49
1987	2090	0.18	0.45	0.00	11.59	X	H	91.66	95.95	n.a.	0.18	1.63	0.45
1988	2142.3	0.19	0.49	0.00	6.05	X	H	144.38	140.20	n.a.	-0.24	0.81	-0.05
1989	2230	0.20	0.36	0.00	4.20	X	H	140.09	131.63	n.a.	-0.14	0.41	-0.03
1990	2646.7	0.19	0.36	0.00	6.98	X	H	113.76	128.01	n.a.	0.00	0.85	0.14
1991	2870.1	0.19	0.39	0.00	0.78	H	H	184.68	141.46	n.a.	-0.32	-0.32	-0.21
1992	2396.5	0.28	0.60	14.78	1.42	M	M	140.78	186.65	167.95	-0.82	-0.82	-0.77
1993	8100	0.10	0.26	3.77	2.21	M	M	n.a.	201.51	171.17	-0.51	-0.51	-0.44
1994	9500	0.10	0.19	17.96	2.96	M	M	n.a.	133.38	164.38	-0.08	-0.08	-0.01
1995	8000	0.14	0.23	1.54	5.17	X	M	n.a.	123.47	162.50	-0.16	1.06	-0.09
1996	10550	0.15	0.19	0.34	9.26	X	M	n.a.	203.46	188.49	-0.11	0.33	-0.08
1997	13732	0.12	0.16	33.24	0.12	M	M	n.a.	160.69	194.82	0.09	0.09	0.13
1998	12844.2	0.14	0.14	13.06	0.37	M	M	n.a.	153.34	245.14	-0.20	-0.20	-0.20

Table A2 (continued)

1999	13859	0.14	0.14	3.11	1.31	M	M	164.03	155.66	172.43	0.12	0.12	0.12
2000	14494	0.14	0.14	15.95	0.09	M	M	235.67	132.03	187.81	-0.01	-0.01	-0.01
2001	13308	0.15	0.15	10.13	0.02	M	M	n.a.	144.04	133.21	0.24	0.24	0.24
2002	10340	0.20	0.20	0.68	1.25	H	M	212.81	194.94	178.62	-0.10	-0.09	-0.10
2003	11895	0.19	0.19	3.57	0.30	M	M	n.a.	190.75	160.18	-0.05	-0.05	-0.05
2004	15342	0.15	0.15	10.22	0.68	M	M	215.99	265.60	242.96	-0.05	-0.05	-0.05

Note: M= importable, X=exportable, H=nontradable. a) Percentage mark-up on producer price. b) Based on fob South Africa reported in FAOSTAT.

Appendix Table 2: Wheat trade and production data, Kenya, 1960 to 2004

	Import Unit Values ($/kg)			Import Volumes (MT)			Production Volumes (MT)		
	FAO	Comtrade	GOK	FAO	Comtrade	GOK	FAO	GOK	FAO/GOK
1960			0.079			1426		84200	1
1961	0.074		0.074	13000		13004	110400	110400	1
1962	0.077		0.077	52500		52470	134700	134700	1
1963	0.079		0.077	12101		8523	172200	172200	1
1964	0.040			50			128400	128400	1
1965	0.073		0.072	5999		5999	162200	162200	1
1966	0.073		0.073	24966		24965	216300	216300	1
1967	0.096		0.096	4544		4512	241600	241600	1
1968	0.091			274			221486	221486	1
1969	0.156			45			205743	192900	1.066579
1970							164383	153000	1.074399
1971	0.064		0.064	13000		13000	136284	124600	1.093772
1972	0.069		0.065	65821		68421	172332	159500	1.080451
1973	0.133		0.133	77083		77083	158059	145500	1.086316
1974	0.202		0.199	13103		13744	200274	186800	1.072131
1975	0.137		0.138	81940		82917	178160	169900	1.048617
1976	0.300		0.287	50		50	175121	165900	1.055582
1977	0.144		0.144	33035		33035	207268	201000	1.031184
1978	0.169		0.168	90888		90888	215674	204600	1.054125
1979	0.309		0.309	21152		21152	214400	214400	1
1980	0.276	0.416	0.278	48462	32462	48462	247500	234700	1.054538
1981	0.203	0.203	0.201	49239	49239	49239	253000	242300	1.04416
1982	0.184	0.178	0.183	139326	139326	139326	144590	135400	1.067873
1983	0.170	0.170	0.170	81946	81946	81946	250735	193500	1.295788
1984	0.194	0.193	0.193	149906	149906	149906	258840	224700	1.151936
1985	0.162	0.162	0.161	143793	143793	143793	233645	148300	1.575489
1986	0.130	0.129	0.129	115282	115282	115281	244525	220200	1.110468
1987	0.100	0.098	0.098	217857	217857	217857	243000		
1988	0.148	0.149	0.149	75578	75578	75578	249411	78500	3.17721
1989	0.181		0.179	123535		123535	264457	199000	1.32893
1990	0.171	0.182	0.170	322632	97800	322632	297000	175800	1.68942
1991	0.146	0.148	0.146	257823	257823	242612	212776	73000	2.91474
1992	0.180	0.181	0.031	132568	132568	100808	297000	105200	2.823194
1993	0.174	0.169		366651	366650	314410	312644	125500	2.491187
1994	0.128	0.169	0.127	353076	311492	353076	315000	130000	2.423077
1995	0.187	0.218	0.183	249134	206434	249134	252000	124200	2.028986
1996	0.229	0.213	0.229	486917	486917	486917	270810	176700	1.532598
1997	0.184	0.186	0.184	388138	388138	388138	211788	52900	4.003554
1998	0.190	0.166	0.166	478865	478865	478865	204232	70500	2.896908
1999	0.141	0.144	0.145	583818	583818	578543	256997	77700	3.307555
2000	0.199	0.144	0.144	632145	632145	636045	307215		
2001	0.157	0.156	0.155	637953	641253	617542	378665		
2002	0.117	0.141	0.137	539486	448976	515179	379425		
2003	0.164	0.164		480268	480268		380000		
2004	0.211	0.225		404068	373128				

Appendix Table 3: Coffee producer NRA, assuming excess cooperative pulping charges, Kenya, 1956 to 2004

(percent)

	1956-1959	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
Smallholders	-0.19	-0.09	-0.21	-0.27	-0.12	-0.23	-0.22	-0.29	-0.15	-0.13
Estates	-0.11	-0.00	-0.13	-0.19	-0.04	-0.15	-0.15	-0.22	-0.05	-0.03

Appendix Table 4: Prices for refined sugar, Kenya, 1963 to 2004

	Import Unit Value GOK (US$/KG)	Import Unit Value FAOSTAT (US$/KG)	Free Market Price World Bank (US$/KG)	Excise Tax Collected Ksh/KG consumed
1963	0.141	0.139	0.187	0.268
1964	0.162	0.159	0.129	0.167
1965	0.081	0.081	0.047	0.128
1966	0.078	0.078	0.041	0.312
1967	0.894	0.081	0.045	0.383
1968	0.072	0.072	0.044	0.397
1969	0.106	0.106	0.074	0.409
1970	0.123	0.123	0.083	0.288
1971	0.147	0.147	0.100	0.226
1972	0.190	0.190	0.164	0.264
1973	0.248	0.248	0.212	0.317
1974	0.352	0.351	0.661	0.372
1975	0.557	0.552	0.452	0.724
1976	0.392	0.391	0.255	0.886
1977	0.265	0.266	0.179	1.016
1978	0.255	0.257	0.172	na
1979	0.297	0.297	0.213	na
1980	0.676	0.672	0.632	na
1981	0.690	0.699	0.372	na
1982	0.412	0.414	0.186	1.395
1983	0.338	0.338	0.187	0.847
1984	0.344	0.347	0.115	0.771
1985	0.178	0.178	0.090	0.576
1986	0.250	0.252	0.133	0.828
1987	0.248	0.253	0.149	0.873
1988	0.323	0.321	0.225	0.954
1989	0.454	0.393	0.282	0.892
1990	0.529	0.533	0.277	na
1991	7.669	0.450	0.198	0.616
1992	5.251	0.402	0.200	0.649
1993	0.244	0.271	0.220	na
1994	0.406	0.407	0.267	0.032
1995	0.393	0.396	0.293	0.001
1996	0.322	0.443	0.264	na
1997	0.415	0.415	0.251	0.006
1998	0.330	0.378	0.197	0.000
1999	0.294	0.285	0.138	0.002
2000	0.287	0.437	0.180	0.074
2001	0.326	0.460	0.190	0.000
2002	0.312	0.316	0.152	0.000
2003		0.310	0.156	0.000
2004		0.310	0.158	0.000

Free market price from Global Economic Monitor Database.

Appendix Table 5: Gross marketed production of farm products, Kenya, 1962 to 2004
(current prices, million Kenya shillings)

	Maize	Wheat	Coffee	Tea	Sugar Cane	Horticulture	Cattle & Calves	Dairy	Other	Total
1962	66.5	42.7	189.6	133.9	23.5	22.0	114.0	96.5	264.1	952.9
1963	57.5	65.6	203.2	134.7	23.9	23.4	107.2	99.1	326.1	1040.7
1964	38.0	73.0	299.8	154.3	23.5	19.6	188.6	88.0	321.5	1206.4
1965	37.0	86.3	262.1	146.6	30.9	25.9	187.4	94.6	273.7	1144.5
1966	53.9	69.6	372.4	198.1	19.8	36.1	218.4	113.2	295.0	1376.6
1967	104.4	91.5	279.9	178.5	32.0	36.7	226.5	127.6	269.1	1346.2
1968	108.1	132.7	245.3	186.7	43.6	40.9	233.4	142.5	292.9	1426.1
1969	77.2	131.7	323.3	223.2	58.8	38.3	244.4	122.0	269.6	1488.4
1970	56.6	99.9	362.9	276.8	65.7	75.4	262.0	136.1	291.1	1626.3
1971	85.5	104.1	378.4	236.1	69.1	95.9	266.6	186.0	312.1	1733.9
1972	145.0	83.2	483.3	320.7	60.8	111.0	330.2	217.8	366.7	2118.6
1973	171.4	77.3	655.4	335.3	89.1	97.3	327.1	226.1	487.1	2466.1
1974	169.6	140.2	689.5	390.5	118.3	115.8	352.2	202.0	755.1	2933.3
1975	340.4	165.5	706.9	458.3	164.6	172.5	396.5	215.6	619.0	3239.3
1976	432.6	240.9	2026.7	655.1	192.4	206.5	381.1	241.0	624.6	5000.9
1977	376.9	237.5	3998.4	1854.6	267.3	198.1	468.7	376.7	513.5	8291.7
1978	210.0	233.5	2376.4	1478.3	347.8	200.8	698.8	391.7	730.3	6667.8
1979	187.3	297.7	2113.7	1346.9	466.0	231.3	581.8	349.3	701.1	6275.1
1980	207.8	353.4	2377.1	1430.3	590.4	227.5	678.2	300.1	901.3	7066.2
1981	472.9	357.4	2049.4	1611.8	617.5	270.7	958.9	456.0	939.1	7733.8
1982	615.5	441.4	2457.3	1863.8	588.2	286.9	1045.2	570.2	1110.0	8978.5
1983	979.0	538.4	3325.0	2606.2	686.8	319.2	1036.2	656.0	961.8	11108.6
1984	981.0	356.8	4553.4	6022.4	819.8	311.4	1179.0	515.6	1036.4	15775.8
1985	1091.2	525.2	3837.8	4952.0	935.0	445.4	1407.2	724.8	1200.2	15118.8
1986	1330.0	657.6	5766.4	4846.6	1055.8	1076.2	1685.2	1130.2	1218.4	18766.4
1987	1361.8	437.6	3843.2	3895.2	1109.4	1016.6	2077.4	1241.6	1384.4	16367.2
1988	1083.6	702.4	5562.2	4074.4	1400.4	438.0	2777.6	1213.4	1603.0	18855.0
1989	1397.8	799.2	4878.0	4906.4	1568.2	701.0	2979.6	1324.2	1509.6	20064.0
1990	1381.0	372.6	4067.2	6936.4	2078.2	570.2	5382.0	1686.6	2052.0	24526.2
1991	927.4	998.6	4053.2	7801.0	2147.2	484.4	3876.0	1578.0	2691.8	24557.6
1992	1538.6	705.0	4365.0	8933.4	2303.6	459.0	4142.4	3825.0	171.8	26443.8
1993	1959.2	412.6	7695.8	19867.0	3171.4	460.4	4704.0	1943.0	3009.4	43222.8
1994	3001.6	1261.8	11758.2	18300.2	5177.6	660.2	5054.2	3229.0	3909.6	52352.4
1995	3207.6	1632.0	15289.2	16595.8	6824.2	690.2	6051.6	5075.0	5365.2	60730.8
1996	3118.8	2113.2	14357.8	20336.4	7125.2	780.0	7261.8	3863.8	5960.6	64917.6
1997	2809.2	2198.4	16545.6	23635.0	6644.2	1111.8	8714.6	2862.4	6612.6	71133.8
1998	2776.6	2986.0	13197.8	39137.2	7967.2	1480.2	8878.8	1946.6	6397.8	84768.2
1999	3098.0	1006.0	10050.4	31087.6	7639.4	1149.3	8886.4	2693.6	8121.7	73732.4
2000	2915.4	1132.9	11282.0	35969.8	7942.2	6563.0	8039.8	2051.2	9195.6	85091.9
2001	6141.6	1429.4	6424.2	38564.5	7154.8	9595.0	9078.6	1919.6	8556.4	88864.1
2002	4451.4	987.5	5441.1	33414.7	9070.2	11931.0	11823.8	2468.9	8593.2	88181.8
2003	3336.5	1375.3	5956.7	34631.1	7567.3	12344.0	11476.1	2846.1	8339.6	87872.7
2004	6880.5	1864.0	7284.5	41212.2	8389.8	13871.0	11284.8	4385.0	27110.1	122281.9

From Government of Kenya, *Statistical Abstract of Kenya*

Horticulture is treated inconsistently and incompletely through the period.

Appendix Table 6: Prices for primary products, Kenya, 1960 to 2004

	Maize		(DP-BP)/	Wheat		(DP-BP)/	Coffee		(DP-BP)/
	DP	BP	BP	DP	BP	BP	DP	BP	BP
1960	480.36	288.41	0.67	532.39	464.62	0.15	6710.44	7133.99	-0.06
1961	514.24	587.21	-0.12	645.34	641.09	0.01	6809.51	6712.01	0.01
1962	446.90	245.14	0.82	649.19	666.59	-0.03	5830.62	6641.33	-0.12
1963	456.89	271.34	0.68	660.98	684.54	-0.03	7114.87	5849.47	0.22
1964	490.26	858.69	0.41	651.06	499.94	0.30	6787.17	7123.98	-0.05
1965	488.25	776.26	-0.37	652.85	502.31	0.30	6665.51	7334.61	-0.09
1966	540.32	748.14	-0.28	680.42	718.27	-0.05	5951.90	7567.16	-0.21
1967	494.67	304.04	0.63	704.87	600.72	0.17	6528.34	6817.81	-0.04
1968	450.60	268.62	0.68	705.19	551.01	0.28	6526.82	7269.01	-0.10
1969	417.85	301.05	0.39	687.45	651.47	0.06	6429.36	7508.89	-0.14
1970	420.47	807.85	-0.25	596.46	610.27	-0.02	7601.95	9909.32	-0.23
1971	484.27	1000.80	-0.52	657.06	653.39	0.01	6499.19	7864.99	-0.17
1972	548.67	500.73	0.10	665.87	767.01	-0.13	7926.48	9774.01	-0.19
1973	563.50	542.17	0.04	741.80	1400.84	-0.47	9347.02	11670.48	-0.20
1974	669.99	778.46	-0.14	1009.29	1783.67	-0.43	10221.22	11793.58	-0.13
1975	942.92	796.67	0.18	1292.12	1128.51	0.14	10831.68	10612.84	0.02
1976	1038.97	850.36	0.22	1476.07	1369.24	0.08	25386.19	25349.55	0.00
1977	1202.45	2931.48	-0.59	1646.84	1389.61	0.19	39901.57	43293.74	-0.08
1978	1141.34	2635.84	-0.57	1699.93	1590.20	0.07	28335.60	30321.44	-0.07
1979	1284.79	863.68	0.49	1832.29	2873.05	-0.36	28506.69	29831.27	-0.04
1980	1404.45	2883.00	-0.51	2089.35	2659.76	-0.21	26508.84	30046.63	-0.12
1981	1503.06	2127.94	-0.29	2169.72	2410.86	-0.10	22748.06	28503.90	-0.20
1982	1684.42	4004.11	-0.58	2482.81	2744.93	-0.10	27967.34	33214.64	-0.16
1983	2216.21	2380.56	-0.07	2898.20	2871.50	0.01	35050.69	38233.61	-0.08
1984	2495.75	3401.70	-0.27	3435.74	3508.65	-0.02	38614.10	45854.05	-0.16
1985	2712.75	2449.17	0.11	3552.74	3137.27	0.13	39897.58	44474.88	-0.10
1986	2844.10	1902.61	0.49	3794.10	2503.23	0.52	50381.14	62980.04	-0.20
1987	3028.74	2092.33	0.45	3888.73	2133.79	0.82	36804.76	43467.84	-0.15
1988	3196.18	3349.73	-0.05	4510.87	3222.49	0.40	44838.45	58170.46	-0.23
1989	3029.47	3113.90	-0.03	4227.46	4392.83	-0.04	43312.22	43819.55	-0.01
1990	3588.33	3152.97	0.14	5441.62	4453.90	0.22	36556.07	38185.16	-0.04
1991	4000.85	5034.50	-0.21	6130.74	4781.72	0.28	46739.99	52452.37	-0.11
1992	3836.31	16809.27	-0.77	5296.49	8667.70	-0.39	41663.99	60605.34	-0.31
1993	10201.81	18149.73	-0.44	7751.80	15993.53	-0.52	99068.07	165763.16	-0.40
1994	11304.96	11374.66	-0.01	13804.94	10325.02	0.34	144490.23	178114.21	-0.19
1995	9833.01	10841.40	-0.09	14833.00	10471.80	0.42	159876.47	169145.01	-0.05
1996	12545.49	13624.54	-0.08	17625.48	14910.01	0.18	139356.80	141455.23	-0.01
1997	15954.22	14135.94	0.13	19922.20	12401.71	0.61	251725.22	249582.61	0.01
1998	14679.17	18463.54	-0.20	18735.95	13776.72	0.36	257409.72	302076.69	-0.15
1999	15771.33	14067.38	0.12	20062.31	14149.55	0.42	156556.32	161599.29	-0.03
2000	16522.60	16635.09	-0.01	18545.58	12508.62	0.48	115326.01	126013.86	-0.08
2001	15368.07	12382.25	0.24	20468.06	13849.55	0.48	118004.79	111996.66	0.05
2002	12417.65	13535.27	-0.09	19320.63	12600.65	0.53	119877.66	154698.39	-0.23
2003	14117.22	14957.63	-0.06	21310.20	14124.54	0.51	97545.63	99538.33	-0.02

2004	17718.00	18603.90	-0.05	24542.98	18737.54	0.31	149764.71	134682.09	0.11

Appendix Table 6 (cont'd): Prices for primary products, Kenya, 1960 to 2004

	Tea		(DP-BP)/	Sugar (cif price)		(DP-BP)/	Fruit & Veg (tradable)		(DP-BP)/
	DP	BP	BP	DP	BP	NRA	NRA	BP	BP
1960	7951.5	7483.231	0.06						
1961	7841.4	6805.808	0.15						
1962	8458.1	7102.147	0.19						
1963	7760	7204.253	0.08				2680.37	2736.13	-0.02
1964	7210	6689.789	0.08	49.59	69.99	-0.29147	2412.56	2428.43	-0.01
1965	7410	7193.689	0.03	59.65	30.92	0.929087	2789.89	2886.90	-0.03
1966	7800	8230.697	-0.05	42.10	31.79	0.324182	3415.61	3998.67	-0.15
1967	7830	8557.583	-0.09	42.20	33.60	0.256086	2784.46	3272.45	-0.15
1968	5850	7241.887	-0.19	46.00	27.38	0.679813	3266.46	3679.16	-0.11
1969	6189.1	7427.947	-0.17	45.20	47.72	-0.05272	2735.28	3345.33	-0.18
1970	6737.8	8369.445	-0.19	45.20	59.58	-0.24132	3425.54	4442.81	-0.23
1971	6504.7	7669.13	-0.15	45.20	70.10	-0.35519	2790.52	3412.89	-0.18
1972	6014	8301.17	-0.28	50.00	104.21	-0.52018	3915.80	5346.25	-0.27
1973	5926.8	7641.044	-0.22	51.80	135.97	-0.61903	3159.35	4219.51	-0.25
1974	7206.2	8418.411	-0.14	61.80	182.65	-0.66165	3385.51	3948.03	-0.14
1975	8078.4	8588.733	-0.06	89.80	287.79	-0.68796	7493.87	8002.28	-0.06
1976	10569.3	10978.03	-0.04	104.50	224.89	-0.53532	4704.37	5136.68	-0.08
1977	21492	20200.57	0.06	127.10	132.79	-0.04284	4734.01	4830.94	-0.02
1978	15832	15334.92	0.03	133.00	121.89	0.091147	4487.72	4832.66	-0.07
1979	13566.9	14180.07	-0.04	133.00	140.88	-0.05595	4696.11	5200.91	-0.10
1980	15911	17714.4	-0.10	133.00	384.16	-0.65379	5637.47	6641.05	-0.15
1981	17723.4	18635.88	-0.05	145.10	483.49	-0.69989	7038.47	8266.86	-0.15
1982	19407.8	23371.75	-0.17	170.00	333.91	-0.49088	8747.55	10852.75	-0.19
1983	21840	27523.38	-0.21	227.00	297.76	-0.23764	10358.32	11821.88	-0.12
1984	51840	46910.4	0.11	227.00	330.28	-0.31271	9735.13	11113.81	-0.12
1985	33660	31115.31	0.08	270.00	149.00	0.812115	10502.71	10974.63	-0.04
1986	33820	30651.4	0.10	297.00	231.03	0.285547	13163.83	13870.81	-0.05
1987	25000	27620.23	-0.09	300.00	253.99	0.181133	14183.10	16614.62	-0.15
1988	20371.9	28471.09	-0.28	358.30	349.65	0.024747	17248.87	19058.17	-0.09
1989	27170	33277.62	-0.18	368.00	488.20	-0.24621	13762.32	14227.48	-0.03
1990	35210	37211.08	-0.05	449.00	764.09	-0.41237	18867.83	19156.19	-0.02
1991	38480	45307.02	-0.15	521.00	778.74	-0.33097	15680.56	16902.33	-0.07
1992	29246.4	70763.64	-0.59	399.10	922.80	-0.56751	21687.20	28457.86	-0.24
1993	92417.5	140921	-0.34	826.00	1087.98	-0.2408	39517.50	57692.44	-0.32
1994	87475	93130.79	-0.06	1553.00	1297.28	0.197122	43869.08	43869.08	0.00
1995	67868	78797.59	-0.14	1553.00	1144.93	0.356414	41215.74	41215.74	0.00
1996	79080	87634.96	-0.10	1553.00	1488.61	0.043256	45378.65	46923.71	-0.03
1997	106800	122215.2	-0.13	1553.00	1414.12	0.098206	41447.37	43359.53	-0.04
1998	133000	132130.7	0.01	1730.00	1329.88	0.300873	55294.14	60285.98	-0.08
1999	125000	128892.8	-0.03	1730.00	998.42	0.732738	50488.72	50488.72	0.00
2000	152290	156777.1	-0.03	2015.00	1857.76	0.084642	73413.32	73413.33	0.00
2001	130890	122692.9	0.07	2015	2027.261	-0.00605	84106.59	84106.60	0.00
2002	116387	120640	-0.04	2015	1245.38	0.61798	53129.39	53129.39	0.00
2003	117925	119476	-0.01	1800	1163.88	0.546552	113308.23	113308.23	0.00

2004	126960	124358.6	0.02	1900	1202.543	0.579985	91137.02	91137.02	0.00

Source: Author's calculations

Note: DP= Domestic price in Kenya Shillings per MT. BP= Border Price in Kenya shillings per MT.
(DP-BP)/BP data include post farm activities bringing commodity to wholesale market.

Appendix Table 7: Exchange rate, Shillings per US dollar, Kenya, 1960 to 2004

	Official Rate	Parallel Rate	Retention Rate	Estimated Equilibrium
1960	7.14	7.20	0.25	7.18
1961	7.14	7.29	0.25	7.23
1962	7.14	7.22	0.25	7.19
1963	7.14	7.33	0.25	7.26
1964	7.14	7.20	0.25	7.18
1965	7.14	7.45	0.25	7.33
1966	7.14	8.64	0.25	8.08
1967	7.14	8.68	0.25	8.11
1968	7.14	8.25	0.25	7.84
1969	7.14	9.10	0.25	8.37
1970	7.14	9.75	0.25	8.77
1971	7.14	9.10	0.25	8.37
1972	7.14	10.35	0.25	9.15
1973	7.02	9.92	0.25	8.83
1974	7.13	8.59	0.25	8.05
1975	7.34	7.96	0.25	7.73
1976	8.37	9.31	0.25	8.96
1977	8.28	8.49	0.25	8.41
1978	7.73	8.46	0.25	8.19
1979	7.48	8.46	0.25	8.09
1980	7.42	9.05	0.25	8.44
1981	9.05	10.99	0.25	10.26
1982	10.92	14.16	0.25	12.94
1983	13.31	15.63	0.25	14.76
1984	14.41	16.93	0.25	15.98
1985	16.43	17.34	0.25	17.00
1986	16.23	17.30	0.25	16.90
1987	16.45	19.93	0.25	18.62
1988	17.75	20.04	0.25	19.18
1989	20.57	21.43	0.25	21.11
1990	22.91	23.35	0.25	23.18
1991	27.51	30.15	0.25	29.16
1992	32.22	44.60	0.25	39.95
1993	58.00	90.83	0.25	78.52
1994	56.05	56.05	0.25	56.05
1995	51.43	51.43	0.25	51.43
1996	57.11	59.51	0.25	58.61
1997	58.73	62.07	0.25	60.82
1998	60.37	67.07	0.25	64.56
1999	70.33	70.33	0.25	70.33
2000	76.18	76.18	0.25	76.18
2001	78.56	78.56	0.25	78.56
2002	78.75	78.75	0.25	78.75
2003	75.94	75.94	0.25	75.94

2004	79.17	79.17	0.25	79.17
2005	75.55	75.55	0.25	75.55

Sources: Easterly, World Development Indicators Online, authors calculations
See Anderson et al. (2008) for methodology used to estimate the equilibrium rate.

Appendix Table 8: Production and trade of covered farm products, Kenya. 1961 to 2004

	1961-1970	1971-1980	1981-1990	1991-2000	1999-2004
Maize					
Production Share (a)	0.29	0.27	0.25	0.29	0.26
Consumption Share (a)	0.38	0.40	0.40	0.45	0.39
% Production Exported (b)	5.10	3.54	4.69	2.37	0.61
% Consumption Imported (b)	3.24	1.88	3.54	10.37	7.28
Best Practice Margin	0.34	0.23	0.19	0.15	0.16
Estimated Margin	0.41	0.42	0.45	0.24	0.16
Wheat					
Production Share (a)	0.05	0.04	0.03	0.03	0.03
Consumption Share (a)	0.05	0.07	0.08	0.10	0.11
% Production Exported (b)	23.44	7.42	0.53	5.62	0.16
% Consumption Imported (b)	10.00	20.45	36.04	59.09	65.28
Best Practice Margin	0.21	0.15	0.12	0.11	0.11
Estimated Margin	0.26	0.27	0.29	0.19	0.11
Coffee					
Production Share (a)	0.17	0.22	0.19	0.11	0.06
Consumption Share (a)	0.00	0.00	0.00	0.00	0.00
% Production Exported (b)	96.36	100.27	96.35	99.76	93.10
% Consumption Imported (b)	41.89	2.32	0.33	5.52	5.64
Best Practice Margin	-0.08	-0.12	-0.14	-0.14	-0.05
Estimated Margin	0.05	0.03	0.03	0.05	0.07
Tea					
Production Share (a)	0.09	0.12	0.18	0.21	0.23
Consumption Share (a)	0.02	0.02	0.05	0.02	0.02
% Production Exported (b)	108.98	99.98	91.97	93.51	93.07
% Consumption Imported (b) (c)	n.a.	n.a.	n.a.	n.a.	n.a.
Best Practice Margin	0.11	0.08	0.03	0.04	0.04
Estimated Margin	0.11	0.09	0.10	0.12	0.04

Appendix Table 8 (cont'd): Production and trade of covered farm products, Kenya, 1961 to 2004

	1961-1970	1971-1980	1981-1990	1991-2000	1999-2004
Sugar					
Production Share (a)	0.02	0.05	0.06	0.05	0.04
Consumption Share (a)	0.06	0.12	0.13	0.11	0.11
% Production Exported (b)	1.06	2.98	3.17	12.82	4.47
% Consumption Imported (b)	49.37	26.56	10.97	26.94	29.66
Estimated Margin	0.50	0.46	0.44	0.50	0.47
Export Fruits and Vegetables					
Production Share (a)	0.03	0.04	0.06	0.07	0.10
Consumption Share (a)	0.00	0.00	0.00	0.00	0.00
% Production Exported (b)	100.00	100.00	100.00	100.00	100.00
% Consumption Imported (b)	n.a.	n.a.	n.a.	n.a.	n.a.
Estimated Margin	3.00	3.00	3.00	3.00	3.00
Non-Tradable Fruits and Vegetables					
Production Share (a)	0.05	0.03	0.04	0.05	0.08
Consumption Share (a)	0.07	0.05	0.06	0.08	0.12
% Production Exported (b)	n.a.	n.a.	n.a.	n.a.	n.a.
% Consumption Imported (b)	n.a.	n.a.	n.a.	n.a.	n.a.
Estimated Margin	1.00	1.00	1.00	1.00	1.00
Other Exportable Agriculture					
Production Share (a)	0.06	0.04	0.00	0.02	0.02
Consumption Share (a)	0.07	0.05	0.00	0.00	0.00
NRA	-0.09	-0.13	-0.10	-0.08	0.00
Other Importable Agriculture					
Production Share (a)	0.00	0.00	0.04	0.03	0.03
Consumption Share (a)	0.00	0.01	0.06	0.04	0.04
NRA	0.31	0.31	0.31	0.26	0.31
Other Non-Tradable Agriculture					
Production Share (a)	0.25	0.18	0.15	0.14	0.15
Consumption Share (a)	0.34	0.27	0.24	0.20	0.21
NRA	0.00	0.00	0.00	0.00	0.00

(a) Based on value at undistorted prices.
(b) Based on volume.
(c) Consumption data for tea appeared unreliable.
Source: Authors' calculations.

Appendix Table 9: Annual distortion estimates, Kenya, 1956 to 2004
(a) Nominal rates of assistance to covered products
(percent)

	Coffee	Maize	Sugar	Tea	Vegetables and fruits	Wheat	All covered
1956	-13	54	na	na	na	3	18
1957	-17	64	na	2	na	5	24
1958	-4	72	na	2	na	22	33
1959	-10	48	na	6	na	19	20
1960	-6	63	na	6	na	13	26
1961	1	-16	na	16	-1	-2	-7
1962	-12	76	na	19	-1	-5	18
1963	20	62	na	8	-2	-7	29
1964	-6	36	-29	8	-1	27	13
1965	-10	-40	93	4	-3	26	-22
1966	-22	-32	32	-2	-12	-10	-21
1967	-5	53	26	-5	-12	12	16
1968	-11	56	68	-17	-9	22	15
1969	-15	28	-5	-13	-15	1	1
1970	-24	-31	-24	-15	-19	-8	-23
1971	-18	-56	-36	-11	-15	-6	-36
1972	-20	0	-52	-22	-22	-20	-15
1973	-21	-8	-62	-18	-21	-52	-21
1974	-14	-26	-66	-11	-11	-49	-26
1975	1	3	-69	-5	-5	4	-9
1976	-1	7	-54	-3	-7	-2	-2
1977	-9	-61	-4	6	-2	8	-30
1978	-7	-59	9	3	-6	-5	-29
1979	-5	24	-6	-6	-8	-44	-3
1980	-13	-60	-65	-12	-12	-31	-38
1981	-21	-42	-70	-7	-12	-22	-33
1982	-17	-67	-49	-19	-16	-23	-45
1983	-9	-24	-24	-24	-10	-13	-19
1984	-17	-39	-31	10	-10	-15	-14
1985	-11	-10	81	3	-3	-3	-3
1986	-21	23	29	6	-4	32	1
1987	-16	18	18	-14	-12	56	-1
1988	-24	-24	2	-35	-7	20	-22
1989	-2	-14	-25	-25	-3	-12	-15
1990	-5	0	-41	-13	-1	12	-10
1991	-12	-32	-33	-22	-6	16	-22
1992	-32	-82	-57	-63	-19	-48	-67
1993	-41	-51	-24	-34	-26	-59	-41
1994	-20	-8	20	-15	0	26	-9
1995	-6	-16	36	-25	0	34	-11
1996	-1	-11	4	-20	-3	15	-9
1997	1	9	10	-20	-3	57	-1
1998	-15	-20	30	-6	-6	36	-9
1999	-3	12	73	-3	0	42	8
2000	-8	-1	8	-3	0	48	-1
2001	5	24	-1	7	0	48	12
2002	-23	-10	62	-4	0	53	-1
2003	-2	-6	55	-1	0	51	3
2004	11	-5	58	2	0	31	5

Appendix Table 9 (continued): Annual distortion estimates, Kenya, 1956 to 2004
(b) Nominal and relative rates of assistance to all[a] agricultural products, to exportable[b] and import-competing [b] agricultural industries, and relative[c] to non-agricultural industries
(percent)

	Total ag NRA				Ag tradables NRA				
	Covered products		Non-covered products	All products (incl NPS)	Export-ables	Import-competing	All	Non-ag tradables NRA	RRA
	Inputs	Outputs							
1956	0	18	0	23	21	3	36	18	15
1957	0	24	0	26	27	5	41	18	19
1958	0	33	0	32	35	22	51	21	25
1959	0	20	0	25	20	19	38	23	12
1960	0	26	0	29	26	30	45	21	20
1961	0	-7	0	4	5	-16	6	16	-9
1962	0	18	0	22	21	-5	35	26	7
1963	0	29	0	34	31	31	57	24	27
1964	0	13	0	26	2	-29	45	22	18
1965	0	-22	0	-4	-1	-37	-5	28	-26
1966	0	-21	0	-6	-15	-30	-9	31	-30
1967	0	16	0	22	17	26	36	29	5
1968	0	15	0	23	15	68	37	28	8
1969	0	1	0	13	1	-5	19	30	-8
1970	0	-23	0	-10	-19	-24	-4	32	-27
1971	0	-36	0	-23	-14	-54	-29	28	-44
1972	0	-15	0	-3	-13	-36	-5	21	-21
1973	0	-21	0	-10	-15	-57	-12	22	-28
1974	0	-26	0	-13	-19	-58	-17	19	-30
1975	0	-9	0	4	1	-51	6	19	-11
1976	0	-2	0	10	2	-54	13	20	-6
1977	0	-30	0	-21	-5	2	8	20	-10
1978	0	-29	0	-15	-4	3	18	21	-2
1979	0	-3	0	13	-6	-26	14	20	-5
1980	0	-38	0	-23	-12	-57	-8	31	-30
1981	0	-33	0	-19	-16	-60	-14	32	-35
1982	0	-45	0	-30	-18	-39	1	39	-27
1983	0	-19	0	-16	-16	-19	-17	32	-37
1984	0	-14	0	-5	-3	-27	5	32	-21
1985	0	-3	0	11	-3	33	25	28	-2
1986	0	1	0	13	-10	30	14	30	-13
1987	0	-1	0	21	-15	30	31	30	1
1988	0	-22	0	-9	-27	8	-5	29	-26
1989	0	-15	0	17	-14	-21	36	25	9
1990	0	-10	0	2	-10	-29	4	21	-15
1991	0	-22	0	-8	-18	-20	2	15	-12
1992	0	-67	-2	7	-53	-78	8	17	-8
1993	0	-41	-3	-31	-36	-49	-35	21	-46
1994	0	-9	0	1	-15	-2	1	15	-13
1995	0	-11	0	-2	-16	-4	-2	16	-16
1996	0	-9	0	-1	-12	-6	-1	13	-13
1997	0	-1	0	4	-12	13	5	13	-7
1998	0	-9	-1	-3	-8	-10	-3	14	-16
1999	0	8	0	13	-3	22	17	12	4
2000	0	-1	0	5	-4	4	7	13	-5
2001	0	12	0	16	6	22	21	11	9
2002	0	-1	0	7	-6	7	9	11	-2
2003	0	3	0	9	-1	7	12	9	3
2004	0	5	0	10	3	7	13	9	4

a. NRAs including assistance to nontradables and non-product specific assistance.
b. NRAs including products specific input subsidies.
c. The Relative Rate of Assistance (RRA) is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Appendix Table 9 (continued): Annual distortion estimates, Kenya, 1956 to 2004
(c) Value shares of primary production of covered[a] and non-covered products (percent)

	Coffee	Maize	Sugar	Tea	Veg. and fruit	Wheat	Non-covered
1956	28	28	na	na	na	10	35
1957	18	27	na	9	na	9	36
1958	18	28	na	11	na	6	38
1959	20	27	na	12	na	7	35
1960	18	26	na	14	na	6	36
1961	16	38	na	7	3	5	30
1962	29	18	na	10	4	4	35
1963	20	22	na	11	5	5	37
1964	21	24	3	10	4	4	34
1965	16	42	1	8	4	4	26
1966	22	33	1	10	4	4	26
1967	21	22	2	12	4	5	34
1968	18	21	2	13	5	6	34
1969	21	20	3	14	4	7	31
1970	25	25	4	14	4	5	24
1971	18	41	4	10	3	4	19
1972	24	25	4	16	5	4	23
1973	26	25	7	13	3	5	20
1974	22	30	8	12	3	7	17
1975	17	32	11	11	5	4	20
1976	30	28	6	10	3	4	20
1977	30	39	2	12	2	1	15
1978	25	39	3	14	2	2	15
1979	29	16	6	19	3	7	20
1980	23	32	12	13	2	4	14
1981	24	25	15	14	3	4	14
1982	17	46	6	13	3	3	12
1983	20	28	6	21	4	4	17
1984	26	20	6	26	3	2	18
1985	21	26	3	24	3	4	20
1986	31	20	3	20	3	2	21
1987	23	22	5	23	5	2	20
1988	26	27	5	18	4	2	17
1989	19	25	8	24	4	3	18
1990	14	21	11	27	5	3	19
1991	12	28	9	27	4	3	17
1992	8	50	5	23	4	3	7
1993	13	35	4	30	5	3	10
1994	15	32	4	22	5	3	19
1995	17	27	5	23	5	3	19
1996	14	26	6	26	6	4	19
1997	15	25	5	26	5	3	21
1998	11	28	4	29	5	2	20
1999	10	26	4	29	6	2	22
2000	10	25	6	29	8	2	21
2001	5	25	6	30	9	3	23
2002	7	25	5	31	7	3	21
2003	4	27	4	28	11	4	21
2004	5	27	4	28	9	5	22

Source: Authors' spreadsheet
a. At farmgate undistorted prices