Title: Consumer response to maize market liberalization in urban Kenya

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Abstract:

The elimination of consumer food subsidies associated with structural adjustment in Africa has been widely thought to exacerbate food insecurity for low-income consumers. This article determines how urban maize consumption and expenditure patterns have responded to liberalization of the maize and maize meal markets in Kenya. The article decomposes changes in maize meal prices attributable to changes in maize grain prices and maize milling margins. Results are obtained through two random household surveys in Nairobi, the first before liberalization and the other afterward. The main finding of the study is that maize market liberalization has conferred substantial benefits to urban consumers. The combined saving to Nairobi consumers from lower maize milling costs has been roughly US$10.1 million each year, about the same amount that the Government of Kenya allocates annually to agricultural research. Results also indicate that the former consumer subsidies conferred through the official marketing channel were untargeted and actually inversely related to household income. The subsidies on sifted meal also served to entrench a non-competitive market structure that inhibited the development of a lower-cost informal milling system. These findings are consistent with research results from other Eastern and Southern African countries showing that the negative effects of eliminating food subsidies in the state marketing system have been largely compensated by relaxing controls on private grain trade, which has raised consumers' access to less expensive grain products distributed through informal markets.

Consumer Response to Maize Market Liberalization in Kenya

Introduction

Virtually all governments are confronted with the conflicting goals of maintaining food prices that are profitable for producers and affordable to consumers. In Eastern and Southern Africa, this classic food-price dilemma historically has been dealt with through controlled marketing systems, in which food prices could be artificially raised for producers and lowered for consumers through subsidies. However, this practice became fiscally unsustainable in many countries, and has recently led to food market reform in over 20 African countries (Jayne and Jones 1997; Donovan 1996; World Bank 1994). In Kenya, the grain marketing agency, the National Cereals and Marketing Board (NCPB), had frequently amassed trading deficits as high as 20% of the public sector budget deficit and continuing business as usual was becoming financially unsustainable (Bates 1989; Argwings-Kodhek et al. 1993).

However, the process of food market liberalization has often proceeded without the full confidence of key policy makers. Serious concerns have been raised in Kenya and throughout Africa over the effects of liberalization and the elimination of food subsidies on low-income consumers' access to food (Lewa and Hubbard 1995). As a result, controls on food prices and trade have frequently been reimposed during drought years when fears of food shortages and high prices are heightened.[1]

Consumer behavior is a key determinant of the impact of market liberalization on household food security. By understanding how consumers respond to the elimination of subsidies on one product, their willingness to substitute between foodstuffs according to price, and how consumption patterns vary by income group, policy makers and analysts can gain insights into the effects of policy change on consumer welfare. However, the empirical database on consumer behavior is particularly sparse in Kenya, as in most countries in the region. While much research has been devoted to understanding how farmers and traders have responded to food market reform, relatively little is known about the potential or actual responses by consumers.

This article determines how urban maize consumption and expenditure patterns have responded to full liberalization of the maize and maize meal markets in Kenya. The article decomposes changes in maize meal prices attributable to changes in maize grain prices and maize milling margins. Results are obtained through two surveys of 344 and 549 randomly-sampled households in the capital city of Nairobi, the first in October 1993 before full market liberalization, and the second in October 1995 after liberalization. We then examine the implications of the results for food security policy in Kenya and the wider region.

Background

Kenya has been undertaking a process of maize market reform since the late 1980s. The process has been slow and marked by a series of advances and reversals, particularly regarding the amount of freedom the private sector was permitted in maize marketing. This reflected concern for maintaining the dominant position of the parastatal National Cereals Produce Board (NCPB) in the maize market. The NCPB attempted to maintain pan-territorial and pan-seasonal buying and selling prices for maize, the major food staple in the country. State food marketing was widely viewed as the key to protecting maize producers and consumers from the predatory practices and price uncertainty assumed to be associated with private sector grain marketing. Decades of suppression had resulted in a relatively underdeveloped private grain trade (Argwings-Kodhek et al. 1993; Mosley 1975).

Measuring consumer response to food market reform in Eastern and Southern Africa requires an understanding of the two basic types of maize meal in the region. For decades prior to the liberalization process, urban maize meal consumption was predominantly in the form of a refined sifted meal processed by a few large-scale urban roller milling firms. These registered milling firms were integrated into the state food marketing channel. Milling and retailing margins were fixed by the government based on millers' stated cost structure.

A second form of maize meal, whole or "posho" meal, was consumed primarily by rural households. This whole meal was processed primarily by small-scale private hammer mills. Cross-country studies in Eastern and Southern Africa indicate that unit processing costs for hammer-milled meal are typically less than one-third those of the refined roller-milled meal (Stewart 1977; Bagachwa 1992; Rubey 1995). Other factors constant, this would have given hammer millers a major cost advantage over the sifted millers. Yet government subsidies were applied to sifted meal marketed through the official marketing channel, thereby reducing its price relative to whole meal. It was widely believed that urban consumers strongly preferred the highly refined maize meal distributed and often subsidized through the official marketing channel in contrast to less expensive whole maize meal. Indeed, prior to the reforms, over 90% of the maize meal consumed in urban areas was in the form of refined meal. The perception of low demand for whole maize meal made many policy makers reluctant to eliminate the subsidies on refined maize meal or to jeopardize the controlled marketing system that ensured its availability.

Notwithstanding the accuracy of these perceptions, the dominance of sifted maize meal marketed through the official marketing system was ensured by controls on private sector maize movement into urban areas. Maize moved into urban areas by the NCPB was almost exclusively reserved for the registered large-scale sifted millers in the official marketing channel. This system ensured the registered millers of a protected urban market by suppressing the availability of grain for processing by non-registered millers. From the government's standpoint, the existence of only a few regulated, large processing firms created a convenient and easily-managed system to link the state marketing board with downstream processing and retailing activities and supply the urban population with staple food at prices easily controlled by the state. Subsidization of the NCPB's trading account was the vehicle for maintaining low sifted meal prices.

Much of the uncertainty over market reform within government arose from the concern that sifted maize meal prices would no longer be controllable in an unregulated market, which, especially in a drought year, could adversely affect household food security (Pinckney 1988). Moreover, many studies have contributed to the widespread perception that the elimination of food subsidies undertaken as part of structural adjustment policies in Africa had often hurt poor consumers and exacerbated their access to food (see e.g., Pinstrup-Anderson 1988; Stewart 1991; Cornia and Helleiner 1994).

In spite of these concerns and under pressure from international lenders, the Government of Kenya in December 1993 deregulated maize meal prices and eliminated the direct subsidy on maize sold to registered millers. As a result, sifted meal prices soared 53% within one month. The government also eliminated controls on private grain trading.[2] The price of maize grain, now readily available in informal markets, remained relatively constant, in contrast to the formerly subsidized sifted meal (Figure 1). Contrary to initial concerns, after an initial dramatic increase in the price of sifted meal, the price of both sifted and whole meal declined substantially in 1994 and 1995, both good weather years.

METHOD AND DATA

Changes in maize meal prices can be conceptually disaggregrated into two components: changes in the wholesale price of maize grain (reflecting changes in the supply and demand for grain) and changes in the margin charged in the milling and retailing of maize meal. This article focuses on the impact of liberalization on the latter margin. Milling margins for whole meal are defined as the custom-milling fee charged by hammer mills for processing grain into meal. Milling margins for sifted meal are defined as the difference between the retail price of sifted meal and the price at which millers purchased maize grain, after adjusting for extraction rates and the value of by-product. Milling margins *(MM)* are computed as:

$$MM = PMEAL - PGR*er + PBY\ (er-1)$$

where *PMEAL* is the retail price of maize meal per kg, *PGR* is millers' procurement price of maize grain per kg, *er* is the grain-to-meal extraction rate (1.25 for sifted meal; 1.02 for whole meal), and

PBY is the value of the milling byproduct per kg (primarily bran and germ, approximated as 40% the value of *PGR* based on miller interviews). Technically this margin is a miller/retail margin, since the consumer price of sifted meal includes the costs of distributing meal from the mill to retail shops as well as a retail mark-up. The margins for sifted and whole meal are not strictly comparable because the latter does not include the cost of the packaging bag (which is provided for sifted meal) nor does it account for the opportunity cost of peoples' time waiting in the milling queue.

Information on urban maize consumption and expenditure patterns, are drawn from two random household-level surveys. The first random sample of 344 households was surveyed in Nairobi in October 1993, several months before subsidy elimination and market deregulation in December 1993. The sample was derived from the Central Bureau of Statistics Income and Expenditure sampling frame, which is designed to be representative with respect to population and average household income for each of Nairobi's 30 estate areas. Questions about household purchase and consumption behavior over the past month were addressed to family members primarily responsible for such decisions within the household.

The second random sample of 549 Nairobi households was surveyed in October 1995, about 20 months after the full liberalization of the maize and maize meal markets. This sample was also based on the Central Bureau of Statistics Income and Expenditure sampling framework.

RESULTS

Virtually all the households in both the 1993 and 1995 surveys purchased maize meal. Maize accounted for roughly 60% of the staple grain diet. On average, households spent Ksh 125 per AE per month on maize meal in 1993, compared with only Ksh 88 per AE per month in 1995, despite the fact that maize meal consumption actually increased by 2% in the two periods (from 6.78 to 6.90 kgs per adult equivalent (AE)).

The percentage of household income spent on maize meal varied widely across income groups in both samples. In 1995, the poorest 20% of the sample spent 16.6% of household income on maize meal, while the wealthiest 20% spent less than 1%. Less than 7% of the Nairobi sample planted maize on urban plots in either 1993 or 1995.

Maize Meal Preferences and Household Income

Almost all households typically consume only one type of maize flour; only 4% of the respondents across both surveys indicated they purchase both sifted and whole flour. Figure 2 presents the variation in maize meal consumption patterns by income group in 1995. Three points stand out clearly. First, consumption of maize meal per AE declines as income rises. Maize meal consumption ranged from 8.33 kg per AE among those in the lower income quintile, declining to 5.32 kg per AE among the highest income quintile.

Second, the quantity of whole meal consumed is inversely related to household income while the quantity of sifted maize meal consumed increases with income. While whole meal accounted for 46% of maize meal consumption for the sample as a whole, it accounted for 67% of the maize meal consumed by the poorest income quintile (Figure 2).[3] By contrast, only 14% of households in the highest income quintile consumed whole meal. This indicates that whole maize meal may be used to "self-target" benefits to the poor, *i.e.,* conferring transfers to the poor through careful selection of commodities that are purchased primarily by the poor, thereby avoiding costly administrative mechanisms to exclude benefits to non-needy households. These results also indicate that the former government subsidies that encouraged the production and consumption of the more expensive refined maize meal were not only untargeted but actually regressive in terms of income distribution. In 1993 when sifted meal was being subsidized, 62 percent of the maize meal consumed by households in the bottom income quintile was in the form of whole meal (Mukumbu and Jayne 1994). This figure rose to 67 percent after liberalization.

A third conclusion from examining the 1993 and 1995 data is that sifted maize meal continues to be the predominant form of maize meal consumed in Nairobi. However, there has been a significant shift toward whole meal since the beginning of the liberalization process (Table 1). The market share of whole meal rose from unknown but reportedly negligible amounts prior to the reform process in the late 1980s, to 33% in 1993, to 46% in 1995. The reasons for the rapid rise in whole meal consumption, and implications for food security and urban welfare, are examined below.

Policy and Maize Consumption Patterns

The survey results indicate that maize sectoral policies have had an important role in the formation of maize consumption patterns in Nairobi. Respondents were asked to specify the most important attributes guiding their choice of maize meal. Price and convenience, both of which are affected by policy, emerged as the two most important factors determining consumer choice for a given type of maize meal (Table 2). Of all the households that considered convenience as their main consideration, more than 95% consumed sifted maize meal. Because sifted meal is readily available in packaged form at most urban retail stores, it is convenient to procure compared to whole meal.

Over 95% of households consuming whole meal custom mill the grain themselves. For 72% of these households, the job of buying grain, taking it to the mill, waiting in the queue, getting the grain milled and taking it home is done by the wife.[4] Given that more than 80% of the women in the sample had full-time jobs (in addition to homemaking), the opportunity cost of time spent procuring a given food product becomes a major determinant of whether or not it is consumed.

However, signs are emerging that whole meal is becoming more convenient to procure in the post-liberalization environment. There has been rapid investment in small-scale hammer mills in the Nairobi area since the initiation of the reforms. Survey respondents report that the number of small-scale hammer mills within 15 minutes walk of their home has doubled since 1992 and tripled since 1990. Investment in hammer mills has risen rapidly especially in areas inhabited by the poor. These findings are corroborated by census data indicating that the number of hammer mills operating in the Nairobi area has increased by 80% between 1987 and 1994 (Mukumbu 1994). In addition, the average amount of time spent by households in grain procurement and custom-milling declined from 56.5 minutes to 26.4 minutes per trip between the 1993 and 1995 surveys, reflecting the increased number of hammer mills operating in the city. The rising importance of small hammer mills in urban areas, noted throughout Eastern and Southern Africa in response to grain market liberalization, has clearly increased the convenience of procuring relatively cheap whole meal (Bagachwa 1992; Tschirley and Santos 1994; Mukumbu 1995; Rubey 1995).

Price is also a major consideration in determining maize meal consumption, especially among low-income households. Of those identifying price as the major determinant affecting their purchase choice, 97% chose whole meal. At the time of the 1995 survey, whole meal was about 60% the price of sifted meal. However, as mentioned above, the price of sifted meal during the control period was artificially reduced relative to whole meal by subsidies administered on sifted meal through the official marketing system and by controls on private grain movement into urban areas. At the time of the 1993 survey, whole meal was roughly 80% the price of sifted meal.

The survey results provide only mixed support for the commonly-held view during the pre-reform period that urban households consumed sifted maize meal because of strong taste preferences over whole meal. Of those households identifying taste as the major factor determining their choice of meal, 81% chose sifted meal. This supports the perception that sifted meal is more preferred than whole meal on the basis of taste alone (other attributes held constant) but refutes it in that only a small percentage of households make their consumption choice on this criterion. Only 20% of the households purchasing sifted meal identified taste preference as the main criterion determining which maize meal to purchase. As shown in Table 2, convenience in procurement and price are the most important determinants. Surveys of urban households undertaken in other countries in the region also indicate that once the policy controls favoring the large-scale manufacturers of sifted meal were dismantled (thereby reducing the cost and time involved in procuring whole meal), consumption of whole meal increased substantially within one or two seasons (Jayne et al 1996; Chisvo 1996). These studies also note that, as in Kenya, the shift in urban consumption from sifted meal to whole maize meal may have been accelerated by the decline in per capita incomes in recent years, causing households to seek cheaper staple products.

Effects of maize market liberalization on consumer expenditures

Table 3 presents the changes in maize grain prices, maize meal prices, and milling margins during the time of the two surveys. All prices are reported in constant 1995 Ksh. The average price of maize meal, weighted by the share of sifted and whole meal in total maize meal consumption, declined from Ksh 18.58 per kg in 1993 to Ksh 12.74 per kg in 1995. Of this decline in the average maize meal price to consumers (Ksh 5.84 per kg of meal), Ksh 3.52 per kg (60%) was accounted for by a reduction in the average price of maize grain in 1995 (the cost of maize grain to produce one kg of meal declined from Ksh 12.95 in 1993 to Ksh 9.43 in 1995), while Ksh 2.32 per kg (40%)was due to a decline in average milling margins.[5] The latter part of the reduction in maize meal costs, Ksh 2.32 per kg, is due to two factors: (a) the reduction in milling margins on sifted meal (the average milling margin for sifted meal declined from Ksh 9.01 per kg in 1993 to to Ksh 5.85 per kg in 1995); and (b) the shift in consumption to whole meal, which has a considerably lower milling margin than sifted meal. It would seem reasonable to conclude that both factors are clearly associated with the new entry and increased competition in the milling sector due to market reform.[6]

Calculation of the magnitude of cost savings to Nairobi consumers is presented in Table 4. When multiplying the processing cost savings per kg by the average amount consumed per person across the population of Nairobi, it is shown that the market liberalization process has conferred benefits to consumers of roughly Ksh 525 million, or US$10.08 million, each year. To put this figure in perspective, Ksh 525 million is roughly equal to Kenya's annual public expenditures on agricultural research over the 1990-1994 period, and is about 5% of the value of Kenya's annual coffee production over the same period (both in constant 1995 Ksh, Ministry of Agriculture, Livestock Development and Marketing 1995).

The benefits of lower maize milling margins to Nairobi consumers as reported here do not count the other urban consumers in Kenya (roughly 3 million) who have likely enjoyed similar benefits from market liberalization, as well as the millions of rural households in maize deficit areas who were formerly compelled to buy sifted meal after exhausting local maize supplies due to the former controls on private grain movement prior to liberalization. Therefore, the benefits of lower maize milling margins reported here are clearly a low-end estimate.[7]

CONCLUSIONS AND POLICY IMPLICATIONS

About half of the cost of maize meal paid by Kenya's urban consumers over the past decade has been accounted for in the milling and retailing of maize meal. This implies that cost reduction in the downstream stages of the food system could have potentially large effects on food security in urban areas as well as grain-deficit rural areas. While the quest for productivity gains in the food system have typically focused on farm technology and related adoption factors, this paper emphasizes the importance of reducing per unit costs (productivity improvements) at critical stages in the marketing system to promote household food security and production incentives.

The elimination of consumer subsidies associated with structural adjustment in Africa has been widely thought to exacerbate food insecurity for low-income consumers. This view assumed that the former subsidies were targeted to the poor. The findings of this study indicate that the subsidies on sifted maize meal in urban Kenya were disproportionately captured by the more well-off strata of the urban population, and that they served to entrench a non-competitive market structure that inhibited the development of a lower-cost informal marketing system.

Maize market liberalization has conferred substantial benefits to urban consumers. The combined saving to Nairobi consumers from lower maize milling costs has been roughly Ksh 525 million each year, about the same amount that the Government of Kenya allocates to its agricultural research system. Since the full liberalization of the market for maize meal in December 1993, average maize meal prices paid by consumers have declined in real terms by 31%. Of this decline, 40% is attributable to a decline in milling margins, due to stiffer competition in the processing sector since liberalization, while the other 60% is due to lower maize grain prices in 1995 in response to a favorable harvest and possibly lower distribution costs in the marketing system. These findings are consistent with research results from other Eastern and Southern

African countries showing that the negative effects of eliminating subsidies on refined maize meal have been largely compensated by relaxing controls on private grain trade, which has raised consumers' access to less expensive whole maize meal distributed through the emerging informal markets (Jayne et al. 1996; Rubey 1995).

These findings indicate that strategies to improve the functioning of the food marketing system may be a more cost-effective way to ensure affordable access to food for most consumers than untargeted price controls on goods consumed disproportionately by non-needy households. When the next drought brings a return to high food prices, pressures are likely to mount once again to subsidize maize meal prices. It is unclear how private investment in grain trading, milling, and retailing would respond to such a policy, and to what extent this would inhibit or reverse the flow of investment into the industry that has benefitted the majority of consumers in the country since the liberalization process began. The finding of this study emphasize that the design of safety net programs to protect households against price surges caused by drought and other crises should take care not to disrupt the functioning of the informal marketing channel, which now is the dominant means by which low-income households purchase their staple maize meal. It is noteworthy that the Government of Kenya did not resort to re-imposing price controls and subsidies on maize meal during the recent 1996/97 drought in Kenya. This is in sharp contrast to the previous major drought in 1992, when the Government re-imposed controls on private maize movement and substantially increased subsidies on sifted maize meal, which impeded the development of Kenya’s informal grain marketing system.

This emerging situation may have been very different if the informal maize market had not had the years to develop between 1988 and complete liberalization in 1993. Sifted millers showed their inclination to dramatically raise prices after maize meal prices were deregulated. This behavior was curbed only as the informal market developed to supply maize in sufficient volumes in urban areas to allow small-scale unregistered mills to effectively compete with the large registered sifted millers. Liberalization also had allowed time for a expanded network of hammer mills to develop in residential areas of the city. Census data indicates that the number of hammer mills has increased 80% between 1987 and 1994. Investment in hammer mills has risen especially fast in areas inhabited by the poor. The problem of occasional lack of supplies in the market also no longer exists. As a result of the liberalization process, Nairobi consumers are faced with a wider range of price-differentiated and quality-differentiated maize meal products.

The reduction of food marketing costs does more than reduce food prices for consumers. Lower marketing costs are partially passed along to producers, stimulating production incentives that generate dynamic changes in farm investment, technology adoption, and cropping patterns. Lower food costs in rural grain-deficit areas release resources for reallocation to other crops or non-farm activities with higher expected payoffs. The Ricardian argument that food costs may be an important determinant of the supply and price of labor, and hence the cost of production in industrial and exportable cash-crop sectors, has been empirically supported from recent research in the Sahel (Delgado 1992). The relationships between food costs and the development of viable cash-cropping and off-farm opportunities have been highlighted extensively (e.g., Dione 1991; Goetz 1993; Jayne 1994; Barrett and Carter 1994; Fafchamps 1992). The findings of this study suggest that efforts to reduce costs in the food marketing system may yield high payoffs in terms of simultaneously promoting household food security and farm productivity growth.

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Table 1. Changes in maize meal consumption patterns after maize market reform and elimination of subsidies on sifted meal.

	------ kgs consumed per adult equivalent per month --------		
	Total maize meal	sifted meal	whole meal
1993 (average)	6.78	4.54 (67%)	2.24 (33%)
1995 (average)	6.90	3.71 (54%)	3.19 (46%)

Source: 1993 and 1995 Egerton University/Michigan State University Urban Household Surveys.

Table 2: Primary reasons for consuming alternative forms of maize meal, 1995.

Type of Meal	------ Primary reason for consuming a given type of meal -----					
	relatively inexpensive	*convenient to procure and cook*	*more nutritious*	*more hygienic*	*tastes better*	*habit*
	---------------------------------- number (%) of respondents ----------------------------------					
Sifted (n=296)	6	172	2	22	60	34
Whole (n=253)	169	9	33	3	14	25
Total (n=549)	175 (32%)	181 (33%)	35 (6%)	25 (5%)	74 (13%)	59 (11%)

Source: 1993 and 1995 Egerton University/Michigan State University Urban Household Surveys.
Note: percentages in the bottom row add up horizontally to 100.

Table 3. Maize grain prices, maize meal prices, and maize milling margins before and after market liberalization.

	1993	1995	change	% change
	---- Constant 1995 Ksh per kg ----			
Maize content of 1 kg of meal (weighted average[a] Ksh per kg of meal):	12.95	9.43	3.52	-27%
for sifted millers[b]	12.71	10.30		-19%
for whole meal[c]	13.44	8.40		-38%
Weighted average[a] milling margin (Ksh per kg of meal):	6.40	3.76	2.64 (2.32)[d]	-41%
sifted meal margin	9.01	5.85		-35%
whole meal margin	1.10	1.32		+20%
Weighted average[a] maize meal retail price (Ksh per kg of meal):	18.58	12.74	5.84	-31%
sifted meal price	20.70	15.33		-26%
whole meal price	14.46	9.71		-33%

Sources: Market Information Bureau data files, Ministry of Agriculture, Livestock and Marketing (for maize grain prices and sifted meal prices); Egerton University/Tegemeo Institute/Policy Analysis Matrix data files (for whole meal milling margins).

Notes: [a]weights used to calculate average milling margins, average maize meal prices, and average wholesale prices were the proportion of sifted and whole meal consumed as revealed by the 1993 and 1995 consumer surveys. [b]Procurement price of maize grain for sifted millers was the NCPB maize selling price during 1993, and the Nairobi wholesale market price in 1995. [c]Procurement price of maize grain for consumers taking their grain for milling was the Nairobi market price in 1993 and 1995. [d] Change in milling margin directly felt by consumers of maize meal, i.e., after subtracting the 0.32 Ksh per kg change in the milling margin due to change in the value of maize by-product.

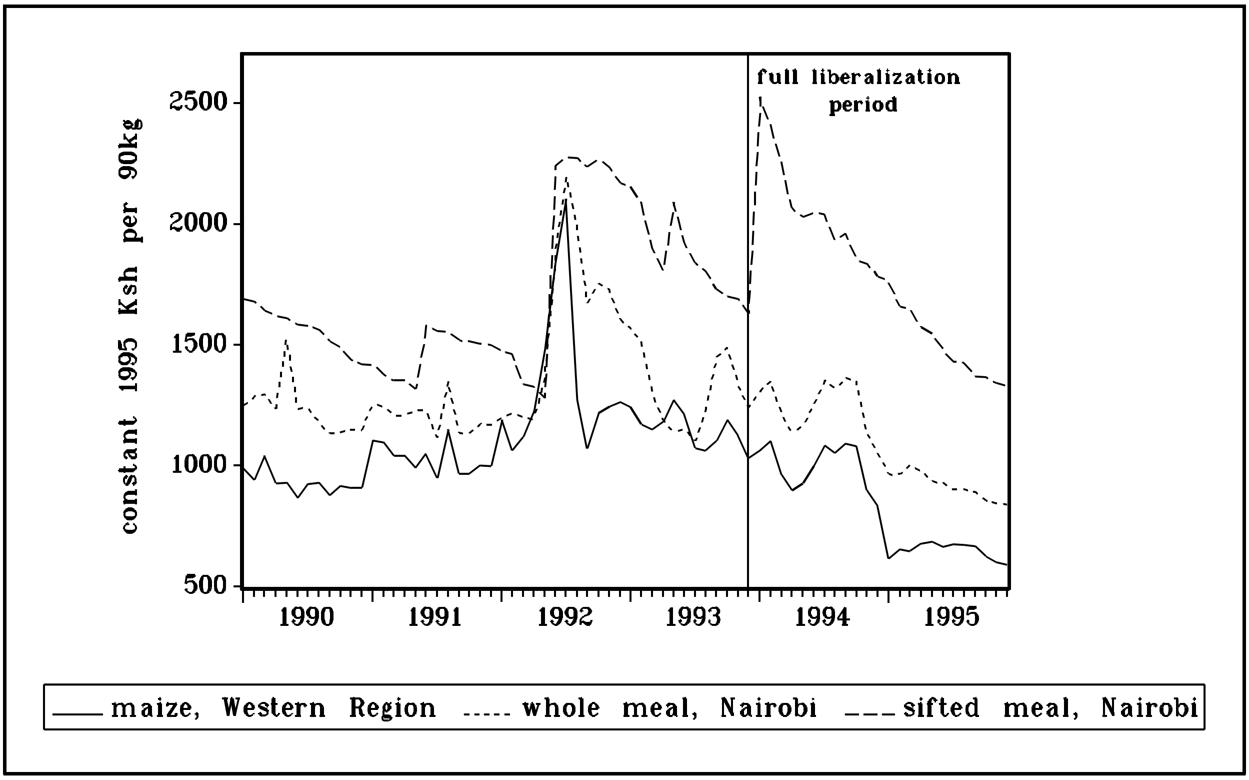
Table 4. Cost savings to Nairobi consumers from change in maize milling margins due to market liberalization.

Derivation of cost reduction to Nairobi consumers	Amount
a. 1993 weighted average maize milling margin: sifted meal (9.01 Ksh/kg @ 67% market share) = 6.04 whole meal (1.10 Ksh/kg @ 33% market share) = 0.36	6.40 Ksh/kg of maize milled
b. 1995 weighted average maize milling margin: sifted meal (5.85 Ksh/kg @ 54% market share) = 3.16 whole meal (1.32 Ksh/kg @ 46% market share) = 0.60	3.76 Ksh/kg of maize milled
c. difference in average milling margin per kg (row a - row b)[a]	2.32 Ksh/kg of maize milled
d. maize meal consumed (per month per adult equivalent, 1995)	6.90 kgs per month
e. adult equivalent population in Nairobi (approximate): 3.1 million persons * .88 adult equivalents per person	2.73 million adult equiv.
f. total cost reduction in milling margins per year (row c * row d * row e * 12 months)	524.42 million Ksh per year (US$ 10.08 million per year at 52 Ksh/US$)

[a] While the change in the weighted average milling margin was 2.64 Ksh per kg, only 2.32 ksh per kg was directly felt by consumers of maize meal, as 0.32 Ksh per kg was due to a reduction in the cost of maize by-product.

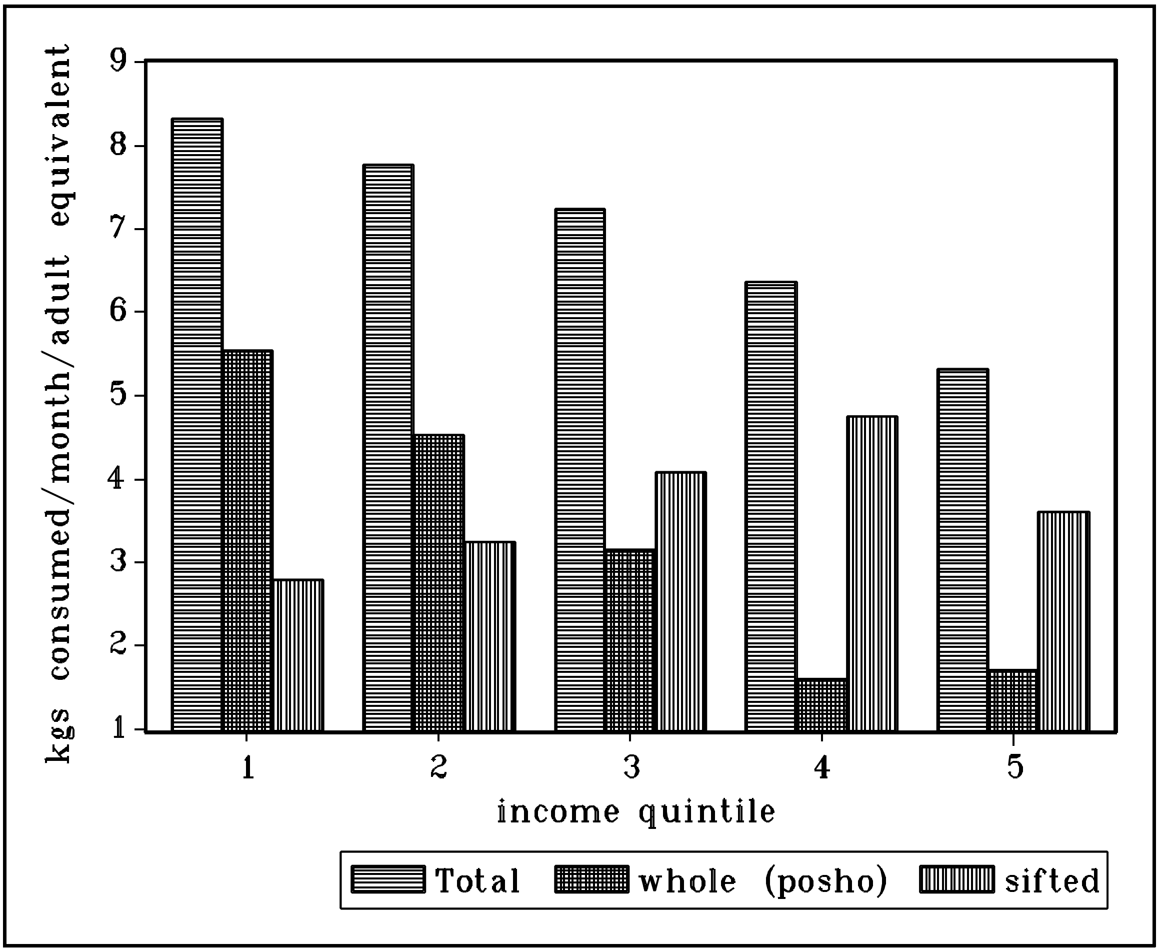
Sources: 1993 and 1995 Egerton University/Michigan State University urban household surveys.

Figure 1. Trends in maize producer prices (Western Region) and maize meal prices, January 1988 to December 1995.



Sources: Market Information Bureau/Ministry of Agriculture, Livestock and Marketing data files (for maize and sifted meal prices); Egerton University/Tegemeo Institute/Policy Analysis Matrix data files (for whole meal milling margins).
Note: whole meal prices derived as Nairobi wholesale maize price plus hammer milling margins.

Figure 2. Maize meal consumption patterns in Nairobi Kenya, 1995



source: Egerton University/Michigan State University urban household survey, October 1995.

Endnotes

1.Politicians in Eastern and Southern Africa have often publicly cited the urban riots that occurred after the elimination of subsidies on maize meal (e.g., Zambia in 1986). Assurances by some advocates of food market reform that private trade would fill the void left by the state's retreat from the market were often unconvincing to policy makers in the region because (a) there was disagreement between the "experts" as to how fast the private sector could develop low-cost food trading channels in a less regulated trading environment (this view emphasized the numerous non-policy related barriers to private investment in grain marketing), (b) most people in the region had never witnessed a truly deregulated private food trading system in their lifetimes, the history of controls dating back to the 1930s in countries such as Kenya, Zimbabwe, Zambia, and South Africa; and (c) major uncertainties remained as to how urban consumers, a potentially politically volatile group, would respond to subsidy elimination on staple foods.

2. Limits on the percentage of grain sifted millers could procure from the private sector were raised from 30 % in 1989 to 100 % after 1993. Private grain movement across district boundaries was also deregulated.

3.This is somewhat lower than the findings of Lewa (1995), who reported that whole meal accounted for as much as 75% of total maize meal consumption in Nairobi based on a small non-random survey in 1994.

4.Maids and children were found to undertake this task in 14% of the households; adult males in only 8% of the households.

5. While the change in average milling margin was 2.64 Ksh per kg, only 2.32 Ksh per kg was directly felt by consumers of maize meal, as 0.32 Ksh per kg was due to a reduction in the cost of maize by-product.

6. Data is not available to assess the extent to which changes in sifted meal margins reflect changes in costs and/or profits. However, since the primary components of sifted miller costs (labor, machinery and plant facilities, electricity, packaging, transport, retailing, and advertising) are

independent of the price of grain (see Argwings-Kodhek et al 1993), it is unlikely that the cost structure for sifted meal production has been greatly influenced by the decline in maize prices over the two survey periods.

7. These results can also be regarded as a conservative estimate of the impact of maize market liberalization on maize meal prices, since other evidence indicates that liberalization has resulted in lower spatial transfer costs between major wholesale markets in Kenya (e.g., Sasaki 1995). This study has not attempted to measure the portion of changes in the price of maize grain attributable to market liberalization.