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Interest Groups and the Price of Cereals in Kenya

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Interest Groups and the Price of Cereals in Kenya

Benjamin Onyango^a & Rigoberto A. Lopez^a

Abstract - This article examines Kenya's post-independence cereals pricing policy (maize, wheat, and rice) within a political economy framework. The model posits commodity pricing policy decisions in terms of balancing the conflicting interests of consumers, producers, and the government's budget. Empirical results confirm that policy outcomes are influenced by urban consumers, farmers, and, more recently, by structural adjustment programs. Furthermore, perpetual deficits by the marketing board handling cereals can be explained by the simultaneous subsidies to producers and consumers. In fact, structural adjustment programs have moved prices closer to free market levels by disengaging government involvement, reducing the cost of operating the marketing boards but increasing the political cost to the Kenyan government.

*The Politics of Food Pricing Decisions:
The Case of Cereals in Kenya*

I. INTRODUCTION

Government intervention in African food markets has been pervasive (e.g., Bates, 1981), especially through the use of marketing boards and other forms of state-owned enterprises (Jackson, 1982; Niskanen, 1971). Evidence suggest that although the stated goals of intervention have often been self-sufficiency, addressing missing credit markets, or promoting cheap food policies, intervention has often resulted in substantial redistribution of wealth that benefits some groups at the expense of others as well as in perpetual budget deficits incurred by marketing boards that have been subsidized out of general funds or international aid (Buccola and McCandish, 1999; Toye, 1992).¹

In the 1980s, African along with other developing countries adopted programs to liberalize agricultural policies and to implement macroeconomic reforms under pressure of the World Bank and the International Monetary Fund. These changes meant the targeting of marketing boards for extinction or reform, elimination of input subsidies and credit programs, and hopefully, better incentives to producers under macroeconomic reform.² The design of food policy reform, however, requires an understanding of the role played by consumer and producer interests in the pre-

reform period and the implications of the proposed reform for producer and consumer prices.

The Kenyan cereal market provides a useful case study typical of food markets in Africa. First, the issue of interest group influence has been at the core of cereal pricing decisions by the Kenyan marketing board. Second, the extent of government intervention in the market has been significant, especially in the form of regulating prices and providing fertilizer and guarantee minimum returns to farmers. Third, market has been a subject to reform under the Structural Adjustment Programs (SAPs) signed by the Kenyan government in 1979. Fourth, cereals represent the staple diet of the increasingly urban population and plays a prominent role in the agricultural economy of the country.

The objectives of this paper are to (1) examine the pricing decisions of the marketing board for cereals (maize, wheat, and rice) in post-independence Kenya and (2) assess the impact of SAPs and domestic interest groups on consumer and producers prices for cereals. A political economy model is presented which posits the pricing problem as trade-offs of the conflicting special interests of consumers, producers, and the government's budget. Empirical results show that the board's pricing decisions are importantly influenced by consumer and producer interests with an urban bias, and that they have been reshaped by SAP reforms. In fact, SAPs have moved cereal prices closer to free markets by lowering producer prices and increasing consumer prices.

II. THE CASE OF CEREALS IN KENYA

Cereals (maize, wheat and rice) constitute the staple diet in Kenya. Maize alone, for instance, provides 40% of the population's caloric requirements. Wheat and rice, although far less important than maize in terms of consumption, have experienced demand growth at twice the population growth. Maize is grown in the Rift Valley and Western Province by a mixture of large and small to medium scale farmers. Wheat is grown predominately by large-scale farmers in the Rift Valley while rice is grown largely by small-scale farmers in the area of the Mwea irrigation district in the Central Province.

A major policy goal of cereal pricing decisions has been to maintain broad domestic self-sufficiency in the basic foodstuffs. On the other hand, the government attempts to remunerate farmers adequately to elicit

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enough production while ensuring affordable prices to consumers at (Republic of Kenya, Session Paper No. 1, 1981). To meet these ends, a Marketing Board regulates all prices and marketing.³ This degree of cereal market regulation has opened avenues for the proliferation of rent seeking activities (Mosley, 1991).

The cereal price-setting process starts with a technical paper that gives recommendations on producer prices issued by the Ministry of Agriculture. This technical paper is then forwarded to a Price Review Committee composed of the Permanent Secretaries from the Ministries of Agriculture and Finance. Then a revised recommendation is forwarded to the Kenyan Cabinet for final discussion and approval. Once approved, the Minister of Agriculture announces the floor prices for the following crop year. In June of the same year, the Minister of Finance announces the consumer and producer prices for the relevant commodities during the official Budget Speech (Agricultural Act cap. 317). These prices are then administered by the Marketing Board.

Consumer interests are well represented in the cereal pricing decision-making. Because cereals are considered a wage good; therefore, it is in the interest of the government and industrialists to have lower food prices for the urban dwellers. From a political organization cost point of view, the urban group is highly enlightened and able to forcefully register its demands (Bates, 1989). It should be noted that rapid urban expansion and urbanite taste for bread have been the main factors responsible for the rapid growth in demand for wheat and rice. Finally, Cabinet members from food deficit regions (e.g., Nairobi, Eastern and Northeastern provinces) formed a coalition to ensure food availability and affordable cereal prices to their constituencies (Himbara, 1994).

Producer interests are also well represented in the pricing decision process. In the post independence period (after 1963), policies favorable to producers have resulted from the stake senior political elite hold in farming enterprises, especially in the large operations of wheat. In 1963, for instance, the key Ministries of Agriculture and Finance were under the control of Central Province representatives, and policies initially favored cash crops in that area. In 1978, the incoming President shifted responsibility to the new Ministry of Agriculture from the Western Province. He also created three cabinet positions in the Office of the President that were aimed at influencing agricultural policies to benefit the Rift Valley and Western Kenya, thus creating a favorable policy atmosphere for maize and wheat producers (Loftchie, 1989; Bates 1991).

In addition to geo-political representation and rent seeking by the political elite, cereal producers have exerted influence through their main lobby group--the Kenya National Farmers Union (KNFU), whose mission is to promote the well-being of its members, largely

comprised of commercial farmers.⁴ A major policy instrument sought before the implementation of SAPs to influence the level and defend the existence of a price floor to farmers, namely a guarantee minimum return (GMR) which applied mostly to maize and wheat farmers. In fact, much of the budget of the marketing board was devoted to subsidize the GMR (Policy Framework Paper, 1995).

External factors have also shaped cereal pricing decisions in Kenya. Like many developing countries, the cereal markets were also subject to Structural Adjustment Programs (SAPs). In 1979, Kenya signed an agreement with the World Bank and the International Monetary Fund (IMF) to undertake policy reforms (Cassen, 1995). By 1982, Kenya initiated a number of agricultural reforms, including dismantling of the state-sponsored pricing and marketing arrangements, cost recovery for government services, privatization of state enterprises, and removal of input and output subsidies (Bigsten and Ndung'u, 1995). For cereals, in particular, a major piece of reform involved the dismantling of the GMR program. The impact of SAPs, however, goes beyond sector policy reform into exchange rate devaluation which also affects incentives to agricultural producers.

Overall, one can assert that cereal price outcomes in post-independence Kenya has been a result of interest group competition for political influence as well as a result of external constraints binding the cereal market since the 1980s, i.e., conditions demanded by the World Bank and the IMF. The following section formalizes this premise through a political economic model to explain the government's decisions in setting producer and consumer prices for cereals in Kenya and the situations in which the marketing board can run into budget deficits in spite of its monopolistic and monopsonistic position.

III. A CONCEPTUAL PRICE REGULATION FOR CEREALS

For the purpose of this article, interest groups are aggregated into three broad categories, namely producers, consumers, and the marketing board. To characterize the domestic market for cereals, their demand and supply equations are presented by:

$$Q_i^s = f(p_i^s, Z_i^s), \quad (1)$$

$$Q_i^d = g(p_i^d, Z_i^d), \quad (2)$$

where i denotes maize, wheat or rice respectively. The factors that determine domestic production (Q_i^s) are the farm level price (p_i^s) and a vector of shifter factors (Z_i^s) such as the prices of competing crops and weather.

The factors determining domestic consumption (Q_i^d) are the wholesale price (p_i^d) and a vector of shifter factors (Z_i^d) such as the price of substitutes and consumer income. Thus, the demand function of interest is the derived demand function at wholesale level. Following Just, Hueth and Schmitz (1982), let the producer surplus (PS) and consumer surplus (CS) be defined by

$$PS_i = \sum_i \int_{a_i}^{p_i^s} f(p_i^s | Z_i^s) dp_i^s, \quad (3)$$

$$CS_i = \sum_i \int_{p_i^d}^{b_i} g(p_i^d | Z_i^d) dp_i^d, \quad (4)$$

where a_i is the supply price $Q_i^s = 0$ and b_i is the demand price when $Q_i^d \rightarrow 0$. The board buys cereals at P_i^s and sells them to wholesalers at p_i^d . Assume the per unit cost for assembling and distribution each cereal is α_i and β_i , respectively. Thus, the net marketing cost is incurred by the board is $c_i = \alpha_i + \beta_i$. The board's surplus (MBS) is thus given by

$$MBS = \sum_i (p_i^d - \alpha_i) Q_i^d - (p_i^s + \beta_i) Q_i^s \quad (5)$$

Following Gardner (1987) and Lopez (1989), let the political preference function be represented by a linear welfare function of the consumers, producers and the board's surpluses. Setting the coefficient for the board surplus weight to one, define the political preference function as

$$W = \theta CS + \delta PS + MBS, \quad (6)$$

where θ and δ are consumer and producer welfare weights. Substituting (3), (4), and (5) into (6) and maximizing it with respect to the price policy instruments, and solving for the producer and consumer prices, one obtains:

Consumer Price Equation

$$p_i^d = \frac{\alpha_i}{1 + \left(\frac{\theta_i - 1}{\eta_i} \right)}, \quad (7)$$

Producer Price Equation:

$$p_i^s = \frac{\beta_i}{1 + \left(\frac{\delta_i - 1}{\varepsilon_i} \right)}, \quad (8)$$

where the terms ε_i and η_i are the price elasticities of supply and demand of the i th cereal in absolute values. From equations (7) and (8), $\theta, \delta = 1$ results in competitive producer and consumer prices (i.e., they are charged the cost of distribution and assembly, respectively. Note that $\theta, \delta > 1$ results in favorable prices to both consumers and producers. On the other hand, when $\theta, \delta < 1$, the marketing board pays unfavorable prices to consumers and producers by exerting monopoly and monopsony power, respectively. In fact, $\theta, \delta = 0$ leads to a pure monopolistic/monopsonistic situation. Thus a wide range of outcomes can be explained based on the relative political weights attached to the welfare of consumers and producers vis-à-vis the budget of the marketing board.

To gain a further insight, equations (7) and (8) are rearranged to obtain a net marketing margin for the pricing decisions:

$$p_i^d - p_i^s - c_i = \alpha_i \left(\frac{1}{1 - \frac{1}{\eta_i} (1 - \theta_i)} \right) + \beta_i \left(\frac{1}{1 + \frac{1}{\varepsilon_i} (\delta_i - 1)} - 1 \right) \quad (9)$$

From equation (9), a balanced budget outcome will emerge in the situation $\theta_1, \theta_2 = 1$. However, other situations may arise, for example where the board could extract rents from consumers to subsidize the producers ($\theta = 0, \delta > 1$) or vice versa ($\theta > 1, \delta = 0$).

Equation (9) can also be instructive in terms of pointing out the case where a marketing board incurs budget deficits, i.e., when the marketing margin is less than the marketing cost c_i . This case arises when producers and consumers of the cereal in question are simultaneously powerful relative to those financing the marketing board; that is, when θ_i and δ_i are greater than one (recall that the weight attached to the budget surplus of the marketing board is one in equation (6)). In such a case, the deficits are financed out of taxpayers or international aid funds as pointed out by Buccola and McCandish, 1999).⁶

IV. EMPIRICAL PROCEDURES

Equations (7) and (8) are the basis for the empirical analysis. Those equations involve political-economic equilibria prices that are a function of the assembly and collection costs incurred by the marketing board, the price elasticities of supply and demand, as well as the relative political power of producers and consumers. To empirically operationalize the regulation model, annual data for the 1963-74 period post-independence Kenya were collected. These data sources are summarized in Table 1 and their descriptive statistics are given in Table 2.

Data for the dependent variables (p_i^d and p_i^s), the wholesale (i.e., consumer) and producer prices for maize, wheat, and rice were collected from the Kenyan Ministry of Agriculture Annual Reports. Per unit cost for assembling and distribution each cereal (α_i and β_i) came from the Annual Reports of the National Cereals and Produce Board, the institution handling pricing and marketing of cereals.⁵ The price elasticities demand (η_i) were estimated using a linear approximation to the Almost Ideal Demand System (Deaton and Muellbauer, 1980). The price elasticities of supply (ε_i) for each cereal were estimated using using a normalized, quadratic dual profit function approach (Shumway, 1983).⁶

It is assumed that the relative political weights of consumers (θ) and producers (δ) vary according to the factors discussed below:

The degree of Urbanization (*URB*), the first explanatory variable assumed to determine the welfare weights, is measured by proportion of urban population to the total population. Following the reasoning of Peltzman (1976), as the number of urban dwellers increases, lobbying cost increases while the per capita benefits of subsidizing producers decreases suggesting a negative impact of *URB* on θ (and hence, a positive effect on consumer prices) and a positive impact on δ (and hence, on producer prices). On the other hand, many scholars argue that there is an urban bias with regard to food policies in Africa (Iyegha, 1988) since politicians are more sensitive to the urban poor. This situation suggests a positive impact of *URB* on θ (leading to lower consumer prices) and possibly a negative impact on δ (and hence on producer prices).

Another consumer-related factor, as discussed in section 2, is Cabinet representation from food deficit regions (*CAB*), measured by a Herfindahl index constructed using the shares of cabinet positions of each food deficit province. Besides representing the interest of consumers from those provinces, this variable attempts to partially capture ethnic- or tribal- based representation as well, an important factor in Kenyan food politics. A region with more cabinet members from food deficit regions will favor lower cereal prices, with less regard for producer prices. Thus, *CAB* is expected

to be positively related to θ (and hence a lowering effect on consumer prices) and negatively related to δ .

Next, we turn to a producer-related variable to explain the political weights: the geographic concentration of production (*GEO*), measured by the proportion of production accounted for by two major producing areas. Following Peltzman (1976) and Becker (1983), as production becomes more geographically concentrated, lobbying cost decreases although geopolitical representation diminishes. Nonetheless, this factor is expected to be negatively related to consumers' political power and positively related to producer's political muscle.

Two event variables are used to capture the effects of Structural Adjustment Programs on cereal prices. One is the official signing of the agreement to SAP conditions in 1979 which dealt mostly with macroeconomic reforms and the second is the removal of cereal-specific price floors (Guarantee Minimum Returns) which dealt mostly with market reforms.

The first SAP-related variable (*SAP1*) is introduced to explain changes in the welfare weights after SAP conditions were agreed upon. This variable is equal to 1 for the post-1980 period (after Kenya's endorsement of SAPs), and zero otherwise. Thus, *SAP1* is expected to be positively related to θ and negatively related to δ as it was obvious that a simultaneous subsidies to both consumers and producers was prevalent before the introduction of reforms (Onyango, 1998).

The second SAP-related variable reflects the dismantling of Guaranteed Minimum Returns (*SAP2*) program. This variable is defined as zero during its existence for a particular cereal and one thereafter. The GMR program was the main goal of the producers' lobby group--the KNUF. The levels of GRM in the pre-reform period varied widely across commodities, with maize and wheat generally getting higher levels of subsidies than those received by rice producers. Therefore, *SAP2* is expected to have a negative impact on political weight of producers (δ , resulting in lower producer prices after the reform) and a weak but positive effect on the political weight of consumers (θ , resulting in unchanged or lower consumer prices).

Assume the political weights are linear functions of the factors discussed above. Substituting in (7) and (8), the resultant estimating cereal price equations are:

$$p_{it}^d = \frac{\alpha_{it}}{1 + \left(\frac{\theta_{i0} + \theta_{i1}URB_t + \theta_{i2}CAB_t + \theta_{i3}GEO_{it} + \theta_{i4}SAP1_t + \theta_{i5}SAP2_{it} - 1}{\eta_i} \right)} + U_{it}, \quad (10)$$

$$p_{it}^s = \frac{\beta_{it}}{1 + \left(\frac{\delta_{i0} + \delta_{i1}URB_t + \delta_{i2}CAB_t + \delta_{i3}GEO_{it} + \delta_{i4}SAP1_t + \delta_{i5}SAP2_{it} - 1}{\varepsilon_{it}} \right)} + V_{it} \quad (11)$$

The terms θ_{ij} and δ_{ij} are parameters to be estimated, i is a cereal, t is a year subscript ($t=1963, \dots, 1994$), and U_{it} and V_{it} are random errors.

As the price elasticities and the marketing (assembly and distribution) costs are part of the data, the parameters of the determinants of the welfare weights in (10) and (11) are the only ones to be estimated.

As setting consumer and producer prices for cereals in Kenya are certainly not independent decisions, it seems plausible that the pricing equations for all three cereals are joined in a system of equations. This was done using Zellner's seemingly unrelated techniques with time-series data covering the 1963-1994 period. All calculations were implemented using the SHAZAM 7.0 software. The results are presented in the following section.

V. EMPIRICAL RESULTS

Table 2 presents the parameter estimates for the determinants of δ , for the producers prices of maize, wheat, and rice. All the parameters have the expected sign and most are significant at the 5% level.

The results indicate that the *SAP1* dummy played a minimal role in producer outcomes. In interpreting the insignificant impacts of signing SAPs one should take into consideration the fact that Kenya's SAPs is a recent policy undertaking which was gradually implemented and has been riddled with backtracking problems coming into operation fully only in 1993.

The most significant policy move by the government was the removal the use of GMR. This policy instrument (*SAP2*) seemed to have played a greater role in determining the producer price outcomes than other aspects of structural adjustment programs. The parameters associated with the production subsidy were all significant, with maize and wheat being significant at the 5% level and rice at the 1% level. As argued earlier, the maize and wheat producers took full advantage of this interest-free credit and price subsidy. However, this is a subtle result, relevant to the top bureaucrats and ruling elite who are responsible for crafting policies while being part of the wheat-farming group. From a self-interest point of view, their main objective is to obtain high producer prices through a production subsidy that provided direct income benefits (Loftchie, 1989; Bates, 1991; Widner, 1994).

The parameter associated with urban population pressure (*URB*) turned out to be significant for maize and rice, but was insignificant for wheat. Maize is the main staple food of both urban and rural populations. The signs for wheat and rice are unexpected, a result that may be supported by the rural bias food price policies in that with rising urban population their prices correspondingly increase. The budgetary implications for such support minimal given

that wheat and rice farmer are few (Bates, 1989; Pearson, 1995; Gow and Parton 1996; Loftchie, 1989).

The geographic concentration of production (*GEO*) was significant at the 1% level for maize producing areas but it turned out insignificant for wheat and rice, it had the expected sign. Producer concentration in a given area was assumed to work to the producers' advantage, as demonstrated in the case of maize. However, in the case of rice, one may argue that although rice farmers are concentrated, they are largely small-scale poor farmers with fewer resources for political organization.

Cabinet concentration (*CAB*) for the food deficit regions had the expected sign and was significant at the 5% level for all three cereals producer prices. Its negative association with producer prices reflects the strength of the lobby of ministers from the food deficit regions pushing for lower consumer prices in Cabinet decisions. As pointed out by Loftchie (1986, 1989), the President sought to strengthen his hold on power by forging a coalition of the food deficit regions with his home area. Thus, food deficit (in this case maize) area representatives in cabinet decisions support higher producer prices in return for assurance that the subsidized maize distribution from the government will reach their people. The losses of course have to be covered by general government funds.

Table 3 presents the parameter estimates for the determinants of θ for the wholesale prices of maize, wheat, and rice. Most parameters had the expected sign and were significant at the 5% level.

SAP1 is associated with higher prices for maize and rice, indicating that previously the consumer prices were artificially low and that they have increased with policy reforms. It should be noted that international donors, notably the World Bank, the European Union, and the IMF have been persistently pushing for liberalization of the cereals market, given the board's deficits, especially maize prices. Overall, the results indicate that SAPs had a negative impact on consumer prices, which hitherto have remained low. Thus, the implementation of SAPs is to bring the consumer prices in line with competitive levels.

The coefficients associated with food deficit area cabinet concentration (*CAB*) had the expected sign in all three cereal equations and were significant at the 10% and 1% levels for maize and wheat respectively, insignificant for rice. The greater the cabinet representation for food deficit areas, the lower the consumer prices. The strong representation from these areas has been in fact a significant political factor responsible for delays in the full implementation of economic reforms (Lewa and Hubbard, 1996). On the other hand, urban pressure is positively associated with rising consumer prices across the board, lending further support to Kenya's rural biasedness as opposed to an urban bias found in other African countries (ref.).

The predicted weights θ and δ for maize (from equation (10), not reported here) were larger than one and much larger than the corresponding weights for wheat and rice. This result is not surprising, since maize is widely consumed by most Kenyan households and accounts for the lion share of the board's transactions. Pickney (1987) observes that "absence or shortage of maize is equated to government failure." Thus the greater political weight attached to maize production and consumption is a direct result of the more politicized nature of maize pricing. Maize comes first, while wheat and rice are treated secondarily and almost equally.

VI. CONCLUDING REMARKS

Cereal price policy outcomes in Kenya can be viewed as dependent on the relative political weight attached to particular interest groups, conditional on the elasticities of demand and supply, and the assembly and distribution costs of cereals. The cereals marketing board incur account deficits or surpluses reflecting the political strength of the interests groups and its own objectives.

The results for producer prices show that while the geographic concentration of producers significantly increased influenced pricing decisions in the case of maize, Cabinet representation from food deficit regions had a negative influence on all cereal producer price outcomes. Furthermore, the degree of urbanization had a positive effect on cereal producer prices, thus supporting a rural bias hypothesis in the case of Kenya. In fact, the results for consumer prices further supported the findings for producer prices in that Cabinet representation from food deficit areas lowered all consumer prices and that urbanization resulted in higher maize prices, further supporting Kenya's rural bias hypothesis. These domestic factors have a significant political influence and are a challenge for policy reform.

The signing of SAPs had both a decreasing effect on producer prices and an increasing effect on consumer prices as both producer and consumer interest groups were simultaneously politically powerful, resulting in both higher producer and lower consumer prices relative to a free market in the pre-reform period. As a result, the marketing board incurred perpetual deficits that had to be paid by taxpayers. However, this pre-existing political structure is being depoliticized due to the implementation of structural adjustment programs imposed externally by the World Bank and IMF.

In terms of policy implications, marketed based resource allocation is an ideal that all economies should strive to reach. From this study, we demonstrated the gradual erosion of the producer and consumer political powers as a result of espousing economic reforms. It will be an uphill task for the government to justify use of the board to regulate cereals prices to meet the self-sufficiency objective. The policy reform in the cereal

sector has helped in reducing the rent seeking avenues and possibly reducing or eliminating the marketing board fiscal deficits. Market based cereal prices will herald better resource allocation in this sector, a result corroborating the findings on earlier studies on fertilizer and maize market liberalization (Omamo and Mose, 2001; Nyoro et al, 1999). However, one should stress the importance of cultivating an enabling environment for the private sector to thrive as liberalization without development of infastructural and financial facilities to facilitate trade will be futile.

VII. NOTES

¹It has also been argued that in most African cases, policies that benefit farmers are not instituted as a result of legislators' response to electoral incentives, but rather by decision makers who have property rights in agriculture and who can themselves capture the benefits of a favorable policy environment (Widner, 1994).

²Omamo et. al. (2001) and Nyoro et. al. (1999) have analyzed the Kenyan reform process focusing on the agricultural sector. The studies indicate that removal of controls in the inputs (fertilizer) and output markets (maize) has been beneficial to producers and consumers with positive resource allocation efficiency gains. However, both of these studies emphasize the importance of development and existence of supportive infrastructure (road networks, financial institutions, etc) for a successive market liberalization process.

³The Board buys all of the supply and is responsible for the entire distribution. To defend domestic prices, the Board handles all external trade, with restrictions of inter-district and across-the-border trade. However, external trade is rarely used unless it is an exceptional year (Schluter, 1984).

⁴This organization historically has been articulate in presenting commercial farmers' issues to the government. This is a united group whose common interest is to improve and protect their incomes by pushing for favorable prices (Bates, 1989). Their small numbers and massive resource base make it cheaper to organize themselves (Peltzman, 1976; Gardner, 1987). This factor will capture the commercial wheat and maize growing of the Rift Valley and Western regions, and the concentrated small-irrigated schemes in the Central Province.

⁵It should be noted that possible efficiency increases reflected in the decreases of c_i are not considered in this article.

⁶The estimated price elasticities were plausible and in the range of previous estimates. The mean price elasticities of demand were estimated at -0.995 for maize, -0.475 for wheat, and -0.256 for rice. The mean price elasticities of supply were estimated at 1.50 for maize, 1.76 for wheat, and 0.45 for rice. See Onyango (1998) for more estimation details.

Table 1 : Parameter Estimates for Explaining Prices to Cereal Producers in Kenya, 1963-94

Variable	Notation	Maize	Wheat	Rice
Producer Prices (shillings/ton)	P_t^s			
Urbanization	URB_t	0.007 (1.300)	0.002* (1.814)	-0.0002 (-1.240)
Concentration of Producers	GEO_t	9.163 (0.836)	4.693 (0.382)	-40.978*** (-4.001)
Food Deficit Represents	$FDCAP_t$	-539.100 (-1.183)	-1596.1** (-1.984)	153.790 (0.884)
Signing of SAPs	SAP_1	-0.132 (-0.027)	-3.347 (-0.162)	-1.775 (-0.422)
Elimination of GMR	SAP_2	-222.33 (-4.787)	-203.93 (-2.507)	-27.827 (-1.140)
Intercept		-14.157 (-1.033)	-30.228 (-0.873)	37.100*** (3.452)

Note : The number in parentheses are the t-ratios. One, two and three asterisks are used for significance at the 10, 5, and 1 percent levels.

Table 2 : Parameter Estimates for Cereal Prices at the Wholesale Level in Kenya, 1963-94

Variable	Notation	Maize	Wheat	Rice
Producer Prices (shillings/ton)	P_t^s			
Urbanization	URB_t	0.007 (1.300)	0.002* (1.814)	-0.0002 (-1.240)
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