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THE IMPLICATION OF STATE PROCUREMENT AND MARKETING OF AGRICULTURAL PRODUCTS TO MARKET PRICES: ETHIOPIA'S CASE

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ABSTRACT. This paper analyzes the food grain marketing and pricing practices in Ethiopia and establishes the following result: (a) Due to the behaviour of agents in the marketing chain, there is a seemingly perverse relationship between the urban and rural open market prices (b) Raising the price paid by AMC while maintaining the current institutional set-up and quota delivery system in fact will raise open market prices in rural markets but will have an adverse effect on marketed output. On the other side, raising the margin paid to grain merchants will have positive effect on both quantities and prices (c) Liberalization of the grain trade will affect farmers in different regions in different directions. Farmers in outlying regions will stand to benefit from liberalization while those around major urban grain markets (including Addis Abeba) are bound to lose.

1. INTRODUCTION

The purpose of this study is to formulate a short-term post-harvest pricing model. Production is fixed and originates mainly from small scale individual farmers and to a much lesser extent from state farms and co-operatives. Urban households are supplied from the marketable supplies of the small farms. State farms and co-operatives supply the food industry. Farmers make quota delivery to a state marketing corporation

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which pays them a fixed price determined by the government, but they are 'free' to sell the rest of their supplies to grain dealers within the confines of their region. Dealers on their part are required to deliver a pre-determined percentage of their purchase to the same marketing corporation which pays them 4 to 5 Birr over and above what it pays to farmers. The flow of grain between regions is controlled and as a result neither farmers nor dealers operating in out-lying areas are capable of selling their grain in the major urban areas. Farmers within the region of Addis Ababa — the major urban market — however receive higher prices for their products mainly due to their direct access to this market. Urban dwellers, on the other side, obtain part of their grain supplies from the state corporation at a fixed price and buy the rest at relatively higher prices from the open market which is supplied by farmers in the Addis Ababa region.

Agricultural production and marketing in Ethiopia involves a complex set of institutional arrangements, quotas and price control. The operation of the markets is further complicated by the regional disparity in the application of the rules of the marketing system and the stringency with which such rules are applied.

This paper presents a consistent set of equations to aid in the understanding of the operation of the grain marketing and pricing system in Ethiopia and to capture the impact of the different measures mentioned above in the determination of prices in urban and rural areas. It also serves as a means to assess qualitatively the direction of changes in prices of individual grains following changes in the independent variables. An interesting outcome of the model is the seemingly perverse direction in the movement of prices in urban and rural markets for the same product due to the behaviour of major institutions in the marketing chain. It is also shown that policies intended

to stabilize prices by grain procurement and disposal could actually contribute to escalate price changes.

In this exercise, section 2 presents recent developments in the agricultural sector as they relate to the market for products. Section 3 presents the working mechanism of the agricultural market which will be modelled in section 4. Section 5 raises some policy issues. Then the paper ends with brief concluding remarks in section 6.

2. STATE INTERVENTION IN AGRICULTURE AND ITS IMPACT ON THE PRODUCT MARKET

Since the transfer of power in 1974, the new government in Ethiopia has intervened in agriculture in three major ways. The first is intervention made on the asset side through the land reform proclamation enacted in 1975. In Ethiopia over 85% of the population is rural and depends directly or indirectly on the land for its livelihood. Prior to 1975, there were two forms of tenancy arrangements. In Northern Ethiopia, land had been owned in a traditional form of communal ownership called 'rist' which entitled descendants of a distant owner to have the right of use to a plot. Super-imposed on 'rist' was a 'gult' right which granted the nobility, the church and the clergy the right to collect dues tithes and fees mainly in kind. Farming, however, was dominated by small scale joint-owner cultivators. In Southern Ethiopia, the 'gult' system was the primary form of tenure. Here, holdings were larger and ownership was concentrated. It had been estimated that towards the beginning of the revolution about 46% of the farmers were tenants. On the other side, about 50% of the land in some regions was owned and controlled by absentee land-owners. In the south, introduction of seed and fertilizer followed by tractors in the late 1960's and early 1970's provided the incentive for modern

agriculture geared partly towards the domestic and partly to the export market.

In both regions, the land ownership structure had the capacity to generate substantial amounts of surplus to the benefit of landlords and individuals who had links to the rural areas. The structure of land-ownership and utilization, although differentiated regionally, had significant similarities in determining the volume of marketable surplus and its disposal in the urban markets. To the extent that these surpluses were ultimately extracted in the form of grain, the practice assured of urban areas a dependable source of supply for their grain consumption. The system, in spite of the accompanying inequities, when looked at from the point of view of the farmer, had some inherent advantages in feeding the urban population.

The land reform, however, ended the existing relationship by nationalizing all rural land. It therefore affected the market for grain in two major ways. In the first place, it distributed current income and the capacity to generate future income in favor of low income farm households. Given the relatively higher MPC of food of such households, the program reduced the amount of marketed grain from domestic sources. In the second place, the primary motive for saving in rural areas had been the desire to purchase land. With the advent of the land reform program, this motive for savings was eliminated thereby further increasing consumption on the farm. It is crudely estimated that the marketable surplus in the aftermath of the revolution had been 20% below the level of previous years [6].

The immediate responses on the part of the government has been to introduce the second type of intervention aimed directly at the market for grain. It is noted that African governments often prefer to keep the price of agricultural products low and,

if desired, compensate the farmer through subsidy on purchased inputs. In extreme cases, preference for direct involvement in production has been observed [2]. In the context of Ethiopia, a more effective mechanism to maintain the marketed surplus at par with the level in previous years would have been to supplement the land reform program with a policy of adequate price to the farmer. The policy adopted has actually been to the contrary. When prices of food in urban areas started to rise following the decline in supplies, the government intervened by setting-up a grain marketing agency and by introducing various forms of grain procurement and price control schemes both on the farm and urban market sides.

The Agricultural Marketing Corp. (AMC) was set-up to procure grain from domestic sources and from abroad and to supply major consumers such as urban dwellers and public food industries. It was also charged with the responsibility of stabilizing food prices in major urban areas. Its procurement and disposal prices were fixed but at different levels to cover marketing costs. On the other side, grain delivery quota was imposed upon each farmer and rural grain dealer. Their delivery prices were also fixed.

Although this practice allowed grain to a maximum level of nearly half a million ton to pass in the hands of AMC in 1981/82, it was not successful in arresting the rise in the price of food in urban areas. In these areas, AMC distributes its grain through urban dwellers associations (UDA) depending upon their size in terms of population. UDA's in turn have a registry of the number and size of households in their locality and further redistribute their acquisition to their members in accordance with family size. The price at which households buy their supplies differs from that charged by AMC only by the margin of handling and distribution. Since the grain procured and

Table 1

AMC's Purchase and Selling Prices of Major Grains During 1982/83 and 1984/85
(Birr per Quintal; US $ 1=Birr 2.07)

	Purchase Price		
	Co-op's & traders	State Farms	Selling Price
Teff	43	-	59.92
Barley	30	-	45.73
Maize	24	31	44.11
Wheat	35	47	51.18
Sorghum	27	40	49.76
Millet	21	-	35.91

NB : AMC's purchase prices from Co-op's and traders are Birr 4 to 5 above price offered to farmers.

Source: AMC

distributed through AMC does not meet the whole requirement of each urban household, consumers had to resort to the open (or black or parallel) market to purchase additional grain at exhorbitant prices. For instance, the Addis Abeba retail price index increased by 169.5% between 1973 and 1982 due to the increase in the index for food which in the same period rose by 201.9%. Although initially implemented to arrest the increase in the price of food, one observes that the actual effect of the intervention scheme on the market side has been to increase prices even higher.

The apparent failure to achieve the objective of lower prices for food in urban areas through market control led to the intro-

duction of the third form of intervention. At the same time as the new marketing system was being laid down, agricultural production through state farms was initiated with the objective to buttress the shortage in supplies from small farms. The latter farmers were also organized into peasant associations with the aim of improving their productivity and more importantly to raise their supplies to the market. This practice has been partly in the tradition of a few African countries such as Ghana [2] and in most respects has its parallels in the Soviet Union of the late 1920's and early 1930's [8]. At that time, Stalin faced with a declining marketable surplus and exports of grain started a program of agricultural collectivization which was subsequently followed by state operated large mechanized farms.

In the context of Ethiopia, the peasant associations, which are at a lower stage of collectivization process serve as channels through which the quota levied upon each farmer is passed to AMC. Associations at higher stages, together with the state farms, have recently become major sources of food and other agricultural inputs to the manufacturing industry. In 1982 the output arising from these sources, i.e. state farms and advanced associations or co-ops. accounted for 6.8% of the total national production. As most of their output is destined to the market, these farms have increasingly become an important source of supply to the urban areas. It is however important to note that state farms, which are by far the major sources of this additional supply, are high cost producers. State farms are semi-mechanized large farms. Their high cost of production results from the cost of fuel, repairs and maintenance, labor cost and poor management. As a result the government sets their prices comparatively higher than the price to small farmers in order to compensate for their high cost. At present, these farms do not directly cater to households.

In summary, it should be stated that although the original motive for land reform, apart from equity considerations, has been to increase agricultural production through higher investment by the farmers, the result however has not been upto expectation. It was hoped that land reform will assure the farmer of continued occupancy of his plot and thereby increase the capacity of reaping the returns to his investment. On the other side, the fact that prices were controlled and quota delivery had to be made signalled a contradictory message. To compound the problem, the intervention in the productive sphere inhibited production in agriculture by acting as a disincentive to use modern inputs. Furthermore, land under cultivation declined. The net effect of all these factors has been to reduce the per capita production of cereals, pulses and oilseeds.

It has been observed that land under cultivation declined by about 50% from 9.4 million hectares in 1971/72 to 4.9 million hectares in 1979/80. In the same period, per capita production of major food crops dropped by 14% from 2.76 quintals to 2.37 quintals respectively. Looking at the gross production (without making an allowance for population growth), the output in the later year has actually been slightly above the level in early 1970's. Volume of output can increase (or remain the same) while the cultivated land declines only as a result of improvements in yield. Unless it is assumed that the level of yield has increased substantially to more than offset for the decline in acreage, it is difficult to explain the discrepancy in output and land cultivated. Actually in view of the fact that the use of modern inputs had declined, yield increases cannot be a sufficient explanation. The situation could be a reflection of the poor status of the statistical data. But, regardless of the magnitude, it is true that both per capita production and land under cultivation have witnessed a decline in their values. It may be suggested that given the limited supplies of

manufactured goods to rural areas and the difficulties in marketing, once the farmer meets his immediate needs for grains (including for domestic beer) and has saved enough grain to take him until next harvest, the need to grow more will be reduced. Under this circumstance, it may be postulated that the farmer will prefer to consume more leisure; and as a result, land that would otherwise be cultivated will remain fallow. Given that production in agriculture is a function of land and labor inputs, it is possible for output to decline following the decline in the use of these inputs.

The level of agricultural production has a direct bearing on the marketed surplus. A reduction in per capita production, other things remaining the same, reduces the availability of grain to the market. As it was indicated earlier, other factors also worked to affect the marketable surplus adversely. The overall impact has therefore been a significant decline in the supply of grain to the urban areas and a corresponding rise in the price of food, in spite of the price control and delivery schemes put into effect.

3. OPERATION OF THE GRAIN MARKET

The grain market in Ethiopia is segmented into two. These are the rural markets & the urban markets. In this study rural markets will be represented by markets in the regions of Gojjam, which is one of the grain surplus regions. Urban markets will be represented by the market in Addis Abeba, which is located in the Shoa region — another grain surplus region. Addis Abeba is singled-out as a focal point due to its large population (estimated at 1.2 million in 1982) and due to the fact that it is the center of highest monetary income. On the other side it is the center where about 70% of AMC's operation is concentrated [9], [14].

In the rural areas, the volume of grain transacted in what is referred as the open market is the quantity that is left over after deliveries have been made to AMC. There are two forms of grain delivery schemes implemented in rural areas. The first form requires each farmer to make delivery of a predetermined volume of each crop harvested to the peasant association which in turn passes over its collection to AMC. Once the farmer meets this quota requirement he is free to sell his grain in the rural market within the confines of the region. Each region however is sealed-off from others by the requirement to have a permit to transport grain between regions and by the existence of various check-points between regions. This in effect means neither farmers nor dealers are allowed to transport grain between regions to benefit from any price differences. Within a particular region however the flow of grain is relatively free.

The volume of grain supplied to the market in excess of the quota, however, depends upon the price of the grain in the rural market, the demand of farmers for manufactured goods (incentive goods), the price of such goods in rural areas and, furthermore, on the availability of other cash generating goods and activities such as the sale of chicken, goats or home woven cloth. Rural wage employment, if any, is limited due to prohibition of such employment by the land reform act and due to the peasant associations' (PA) role in monitoring its implementation. The demand for grains in rural markets arises from rural non-farm households and grain merchants. It is also true that farmers themselves demand grain in the period before harvest. In rural areas of Gojjam, the number of non-farm households is limited and since the study considers the post-harvest situation, it is assumed that the only agents on the side of demand are grain dealers. The objective of grain dealers in taking part in the market is of course the desire to maximize their returns. Grain dealers are not specialized in grain trade

alone. They in fact involve in a multitude of operation that includes trade in other agricultural produce and by-products like hides and skins. In addition, they own and operate retail shops and run grain milling or oil-seed pressing ventures. Moreover, they act as sources of credit to the farmer. Therefore, they allocate their working capital to each operation depending upon the return they expect and riskiness of the operation. Taking these factors into account, it is assumed that their demand for a particular type of grain depends upon the price of the grain itself and the working capital devoted to its purchase.

The interaction of the supply and demand determines the price and the quantity traded in each rural market. Once the quantity the grain dealer purchases has been determined, he is required to make a delivery ranging from 50% to 100% of his purchases to AMC at a price Birr 4 to 5 above the price AMC pays to quota delivery by farmers. It is possible that the grain dealer could be making a loss on the delivery he makes to AMC. The dealer however will continue to purchase the particular grain if the returns to the grain left-over after delivery more than offsets the losses, and assures him of a reasonable net positive return. He will furthermore compare net returns of other operations in his portfolio, thereby varies his allocation of working capital to each operation.

Quota delivery to AMC in rural areas, as explained above, comes from both farmers and grain dealers. The government, in spite of the fact that farmers are the cheapest sources, maintains the two channels open in order to spread the risk of failure to collect the quota from either of the two sources. Administration of the quota from farmers has actually been efficient since the volume is determined jointly by a representative of the government and the PA, and delivery is handled through the latter. But, in the event that individual farmers or their

PA tries to circumvent the delivery scheme, the government assures itself of sufficient grain for urban supplies by raising the delivery from the dealers, if indeed the latter is an easy prey. In the second place, since either AMC or farmers might not have a warehouse in the town, it would be difficult to synchronize delivery by farmers to the availability of trucks. Therefore, dividing the source between farmers and dealers might have an advantage in handling the allocation and transporting it to the consuming area. Similarly, when the delivery from grain dealers falls short of the expected volume, the fact that there are two sources makes it possible to switch to the other to meet overall quantity requirements.

Grain dealers in the Addis Abeba region however are not required to make deliveries due to the following two reasons. On the one hand, since intra-regional grain movement is free, it makes it difficult to administer delivery program. Secondly, due to the proximity to the major urban market, farmers themselves bring their grain, usually using non-conventional means of transportation, to benefit from the higher prices in Addis Abeba. Due to the above factors and as a simplifying assumption, delivery to AMC from grain dealers around Addis Abeba is assumed to be nil.

In the Addis Abeba market, there are two sources of supply. First, AMC collects the deliveries from farmers and grain dealers and supplies this market at a fixed price. Actually, AMC is the only link between the production and the markets in rural areas and the market in Addis Abeba. The rest of the supply comes from individual farmers in the Addis Abeba region whose excess supply (after quota), in essence resembles those of their counterparts in rural areas. The demand comes from the requirements of households for direct consumption and the requirements of the food industry. The latter is mainly supplied direct from the

production of state farms and imports channelled through AMC to the industrial sector. This source of grain does not directly enter the grain market. It affects the grain market however through its effect on the production of substitute processed food items. The demand by households net of the ration they receive is determined by the price level of the particular grain, prices of other grains, the level of disposable income, and supplies of food items from the industrial sector. Demand and supply conditions determine the open market price and quantity in Addis Abeba.

In the previous section, two open markets — rural and urban — have been identified. If markets were not segmented and if there was a free movement of grain between regions, it is expected that open market prices will differ among regions only by the cost of transportation and handling. But, actual price differentials observed between the two markets are much higher than could be explained by transportation cost alone.

As can be figured out from the table, price of teff has been 248 to 266% higher in Addis Abeba compared to the two towns in Gojjam. Prices for the other crops also show similar differences. In more recent years, although data are not available, prices in rural areas are said to have stagnated or declined in some cases, while prices for the same crops have continued to rise in Addis Abeba.

The situation is peculiar to the monopoly or monopsony conditions in micro-analysis. In the first place, AMC's purchase or sale is not voluntary and is not determined with the market. Secondly, if we assume that its operation is market determined, AMC will not qualify to be a monopsonist since there are a significant number of small grain dealers in the rural markets. Again, it is difficult to characterize AMC as a monopsonist

Table 2

Yearly Average Retail Prices for Major Grains
(Price in Birr/Kilo — 1981)

	Teff	Wheat	Sorghum	Cost of transport to A.. kilo(1979/
Addis Abeba	1.12	0.83	0.84	-
Debre Markos, Gojjam	0.45	0.36	0.28	0.03
Bahr Dar, Gojjam	0.42	0.47	0.34	n.a

Source: Central Statistics Office (CSO), A Report on Retail Price of Go and Services in Selected Towns, January 1981.
CSO, Ethiopia: Statistical Abstract, 1980.

since in a monopsony increase in demand for grain in url areas will subsquently shift the demand for the same prod out-wards in rural areas to result in higher prices there as w Therefore, an explanation for the situation should be fou outside the sphere of market organization. In the follow section, an attempt is made to model the grain marketing syst described above in order to capture its basic features and exa ine the implication of changes in exogenous variables.

4. THE MODEL AND AMC's BEHAVIOUR

4.1 The Model

The market for grains can be divided into three for ana tical purposes; namely, (i) determination of the farmer's d sion on marketable surplus (ii) determination of the fa gate price and quantity and (iii) the urban grain market.

4.1.1 The Farmer's Decision

Considering the time after harvest as the time of reference, production, after deduction for quota delivery to AMC and basic minimum consumption by the farm household, will yield the total excess supply of grain to the market. The farmers, as consuming units, determine their consumption of grain, over and above the minimum level, taking into account the following factors:

a) the price offered for the product at the farm gate
b) the price of other grains that go into the consumption of the farmer
c) the supply (availability) of manufactured goods
d) the price of manufactured goods

The behavioural form for on farm consumption takes the following form:

$$(1) \quad XDF(i) = f(PR(1), \ldots, PR(n); XI, PI, OC) \text{ for } XR(i) < XR(i) - QR(i)$$
$$= XR(i) - QR(i) \quad \text{Otherwise}$$

$$(2) \quad XR(i,ms) = XR(i) - XDF(i,r)$$

where:

XDF(i,r) = on-farm consumption over and above the basic minimum in rural areas. Subscript i stands for the type of grain under consideration while r stands for rural areas

PR(i) = price of grain type i in rural areas (deflated at an appropriate index of consumer goods for rural areas)

$$\frac{pd(XDF(i,r)}{Pd(PR(i)} < 0$$

pd = partial derivative

PR(j≠i) = deflated prices of other grains in the rural areas

$$\frac{pd(XDF(i,r))}{PD(PR(j\neq i))} \begin{matrix} > \\ 0 \\ < \end{matrix} \begin{matrix} \text{gross substitutes} \\ \\ \text{gross complements} \end{matrix}$$

XI = manufactured good (incentive goods) supplied to rural areas

$$\frac{pd(XDF(i,r)}{pd(XI)} < 0$$

XR(i) = annual production of grain type i

QR(i) = fixed delivery to AMC of grain type i

XR(i,ms) = marketable surplus of grain type i from rural areas

PI = index of price of manufactured goods

$$\frac{pd(XDF(i,r))}{pd(PI)} > 0$$

OC = other sources of cash

$$\frac{pd(XDF(i,r))}{pd(OC)} > 0$$

(refer to graphs i and ii in Annex I)

Graph i represents the farmer's decision about its on-the-farm consumption and the determination of the marketable surplus as a function of the price of the grain, other variables held constant. Before the farmer comes to the market, he already has made a sale through the quota system and has collected cash from AMC. The demand curve for his on-farm consumption will shift outwards from XDF(i,r)* to XDF(i,r). Once he is in the market, changes in the other variables will shift the demand curve inwards or outwards with the magnitude and direction depending upon the respective elasticities. Since the supply of grain to the market is determined as a difference between the fixed level of production (net of quota) and the level of demand by farmers at a given price, this analysis helps to determine the position of the supply curve.

4.1.2 The Farm Gate Market

Graph ii represents the operation of the market in the vicinity of the farm. The supply in this market arises from the marketable surplus derived on the basis of the farmer's decision. The demand curve is the sum of the demand for grain by dealers.

The functional form and the equilibrium condition in this market is represented by the following set of equations.

(3) (2 above) $XR(i,ms) = XR(i) - XDF(i,r)$

(4) $XDG(i,r) = g(PR(1), PR(2), ..., PR(n); WK(i))$

(5) $WK(i) = h(x(i), re(i))$

(6) $x(i) = \dfrac{XD(i)}{XE(i,f)}$

(7) XR(i,ms) = XDG(i,f) (equilibrium in rural market)

where:

PR(i) = the price in rural areas of grain type i (deflated at an appropriate index of consumer goods in rural areas)

$$\frac{pd(XDG(i,r))}{pd(PR(i)} < 0$$

PR(j=i) = the real price of grain types other than the one under consideration

$$\frac{pd(XDG(i,r))}{pd(PR(j=i)} \begin{matrix} > 0 & \text{gross substitutes} \\ < & \text{gross complements} \end{matrix}$$

XDG(i,r) = the demand for grain type i in rural areas by grain dealers

WK(i) = working capital devoted to the purchase of grain type i

$$\frac{pd(XDG(i,r))}{pd(WK(i)} > 0$$

XD(i) = grain delivered to AMC by grain dealers

x(i) = grain delivered to AMC as a proportion of purchase by grain dealers

$$\frac{pd(WK(i))}{pd(x(i)} < 0$$

re(i) = fixed margin paid by AMC to grain dealers

$$\frac{pd(WK(i))}{pd(re(i)} > 0$$

4.1.3 The Urban Grain Market

The graph in Annex II and the following set of equations present the condition of the grain market in Addis Abeba. (Note that in the graph the positively sloped portion of the supply curve is directly extended from the horizontal portion by assumption. It is possible that the positively sloped curve could start below or above the horizontal one.)

(8) $XSA(i) = \begin{matrix} X(i,a) - XDF(i,a) & \text{for } X(i) > XS(i,amc) \\ XS(i,amc) & \text{Otherwise} \end{matrix}$

(9) $XS(i,amc) = QR(i) + QA(i) + x(i)XE(i,f)$

(10) $XD(i,a) = u(PU(1), PU(2), ..., PU(n); YDU, POP, XIF)$

(11) $YDU = YW + YT$

(12) $YT = (PA(i,amc) - PS(i,amc))\ XS(i,amc)$ added over all i's

(13) $XS(i,a) = XD(i,a)$ (equilibrium in the Addis Abeba market)

where:

XS(i,a) = supply of grain type i to the Addis Abeba region

X(i,a) = production of grain type i in the Addis Abeba region

XDF(i,a) = on-the-farm consumption over and above the basic minimum in the Addis Abeba region

XS(i,amc) = total sales of grain type i obtained through the various quota schemes

QA(i) = quota delivery to AMC by farmers in Addis Abeba region

XD(i,a) = the demand function for grain type i in Addis Abeba

PU(i) = price of grain type i in Addis Abeba (deflated at the CPI for Addis Abeba)

$$\frac{pd(XD(i,a))}{pd(PU(i)} < 0$$

PU(j≠i) = price other grain types (deflated)

$$\frac{pd(XD(i,a))}{pd(PU(j\neq i))} \begin{matrix} < 0 \\ > \end{matrix}$$

gross complements

gross substitutes

YDU = total disposable income in Addis Abeba

$$\frac{pd(XD(i,a))}{pd(YDU)} \begin{matrix} > 0 \\ < \end{matrix}$$

normal good

inferior good

YW = disposable income in Addis Abeba received from work

YT = the sum of implicit income transfer to Addis Abeba residents through the grain pricing practices of AMC

PA(i,amc) = price of grain type i that would have ruled in Addis Abeba if total supply was limited to that of supplies from AMC

PE(i,amc) = the actual selling price of grain type i in Addis Abeba

POP = size of population in Addis Abeba

ZIF = availability of processed food products

$$\frac{pd(XD(i,a))}{pd(XIF)} < 0$$

XE(i,a) = open (black) market equilibrium quantity in Addis Abeba

A point of clarification is in order about the implicit income transfer arising from the pricing practices of AMC and about its implication for the operation of the open market. If a fixed quantity of XS(i,amc) had been supplied to the market and prices were determined accordingly, this quantity would have fetched a price PA(i,amc). However, due to the pricing practices of AMC, the price actually paid is PS(i,amc) which is lower than PA(i,amc). The difference between these two prices constitutes an implicit income transfer to residents of Addis Abeba on account of their quota receipts. But, since there are n types of such grains rationed, the total income transfer is the sum of such price differences times the respective quantities rationed. The overall effect of this income transfer is to shift the demand curve for commodity i outwards to the right, to XD(i,a)*, if the product is not inferior. The implication to the open market price is to raise it upwards compared to the situation that would have prevailed otherwise. At equilibrium both the quantity

XE(i,a) and the price PE(i,a) are determined by the interaction of the excess supply curve by farmers around Addis Abeba and by the new demand curve.

4.2 Behaviour of AMC

AMC, as indicated earlier, has the responsibility to stabilize prices particularly in Addis Abeba through its grain procurement and disposal scheme. To achieve this objective, it acts in the following manner.

(14) if $PD(i,a)t - PE(i,a)t > 0$, reduce x(i) or don't change

(15) if $PD(i,t) - PE(i,a)t < 0$, increase x(i)

(16) $x(i,t) < x(i) < 1$

(17) $PD(i,t) = PE(i,a)t - 1$

where:

PD(i,a) = the desired market price of grain type i at time t in Addis Abeba

PE(i,a) = equilibrium market price of grain type i at time t in Addis Abeba

t = time

AMC tries to keep the price of grain type i at some desired level which in this case is assumed to be the price that ruled at time (t—1). If the actual current price exceeds this level, AMC will increase its delivery requirement from grain dealers x(i). If the price is actually below the desired level, it will either reduce x(i) or keeps it at the same level.

4.3 Comparative Statics of the System

The government is a major consumer of food. Its sources of supply are primarily domestic food industries in the public sector. These enterprises obtain their supplies of inputs from the operation of the state farms and imports. As it might be remembered the government's demand and the supplies of state farms and imports have been considered to be independent of the open market operation. The latter however is influenced by the former through the demand for grain by urban residents where availability of processed food has been included as a shifter.

Now, consider that the government increases its purchase of processed food from the industrial sector thereby reducing supplies available to urban residents. Since unprocessed and processed food are close substitute, demand for grain type i is inversely related to the supplies of processed food. Thus the demand curve for grain type i will shift to the right (to XD(i,a)** in the graph in Annex II) to result in higher prices. The magnitude of change in price however depends partly on the elasticity of supply. Note that the higher price is accompanied by an increase in quantity. Given that prices have risen, AMC will now act by raising the proportion of grain delivery x(i) by dealers. This leads to a contraction of working capital allocated to grain type i by dealers since they will now divert their funds to other operations. The reduction in working capital will shift the demand curve to purchase grain in rural areas to the left (graph 2, to XDG* in Annex I). Price in the rural grain market will decline and farmers will react by reducing their marketable surplus.

Whether AMC will be able to increase its collection of grain, however, depends upon the elasticity of demand by grain dealers

with respect to the proportion of grain delivery to AMC x(i). If the demand is very inelastic, AMC will be able to achieve its desired aim of increased grain collection from dealers and thereby arrest the price rise in Addis Abeba. If the demand happens to be elastic, AMC will collect a lower volume of grain in spite of the fact that the proportion x(i) has been raised. The lower collection will contract XS(i,amc) and thereby shift the supply curve from the open market to the left (to XS* in annex ii) resulting in a price P(i) max) which is even higher than what has been started with originally.

There is however a dampening effect coming from the market for grains, other than grain type i, that benefit from the reallocation of working capital. When working capital is diverted from grain type i, the fund so released is distributed to different operations some of which could be grains that are substitute with grain type i. Increased supplies of such grains to the urban grain market will have a dampening effect on the price increase of grain type i depending upon their cross elasticities.

To summarize, it should be emphasized tha due to the behaviour of agents like AMC and grain dealers in r ral markets, the price difference between the urban and rural open grain markets can continue to widen. Furthermore, it is to be noted that this situation is consistent with the operation of the grain market in Ethiopia. Prices in the rural grain markets stay constant or decline while prices for the same grain rise in Addis Abeba. The latter happens in spite of AMC's attempt to stabilize prices. When faced with such a dilemma, the government actually resorts to revising the quota on farmers upwards.

5. POLICY SIMULATION

In the foregoing analysis, several variables have been introduced to explain demand or supply in the different markets. Most of these variables are within the control of the government. The government therefore can influence the grain market by manipulating these variables. The variables are:

A. volume of supplies of manufactured goods to rural areas
B. price paid to farmers by AMC for their quota delivery
C. price paid by urban households to the grain they receive through the ration system
D. volume of grain ration to urban households
E. supplies of processed food to urban areas
F. return to grain dealers on their delivery to AMC
G. proportion of purchases of grain delivered to AMC by grain merchants
H. price paid by farmers for their manufactured supplies

The effect of (E) and (G) has been explored in the comparative statics. In this section, we will examine the effect of (A), the relative effect of (B) and (F), the effect of (C) and an exogenous factor such as change in weather condition.

5.1 Supply of Industrial Goods to Rural Areas

Availability of industrial goods in rural areas has been considered as a shifter for the demand of the farmer to consume his produce over and above the absolute minimum. At the moment, there is a critical shortage of basic manufactured goods in both the rural and urban areas; but, comparatively rural areas are by far poorly supplied. The primary cause for the deficiency in supply is the inavailability of industrial capacity to bring into

use and push the demand curve of farmers outwards and will increase their consumption on the farm, hence, reduce the open market supplies. The excess supply curve to the rural market will shift inwards to the left to result both in higher price and reduced marketed surplus in this market.

On the other side, if the margin paid by AMC to grain dealers is raised from the current 4 to 5 Birr, this will induce grain merchants to divert their working capital in favor of the grain business. Thus results in an outward shift in their demand curve to purchase grain. Rural grain prices will rise and bring about increased marketable surplus. The magnitude of change depends upon the elasticity of grain purchase by dealers with respect to the return they receive from their grain deal with AMC re(i) and the elasticity of supply by farmers with respect to price. The first elasticity in turn depends on the product of the elasticity of grain demand to working capital allocation and the elasticity of working capital with respect to the return to the dealers.

It is to be emphasized that increasing the price offered to the farmers on their delivery to AMC and the increase in price operating through the higher margin to dealers have different implication for prices and quantities in rural markets. The former price increase holds on a pre-determined and fixed quantity of delivery to AMC. It results in an increase in 'other' sources of each (OC) included in the model as an explanatory variable in the demand function of the farmer. It has a pure income effect and as such, given the higher cash receipt, the farmer distributes his additional cash to the various commodities he consumes. Considering grain type i to be a normal good, the higher cash income will shift the demand curve outwards and will stimulate consumption on the farm. As a result, the excess supply curve in the rural grain market will shift inwards to the left. Given the demand curve, higher price will therefore be observed in the rural grain market.

On the other side, the higher margin paid to grain dealers leads to a higher price in the rural grain market through a shift in the demand curve of grain dealers. In Annex I graph ii the excess supply curve of farmers is positively sloped and is drawn with the implicit assumption that the substitution effect of higher prices outweighs the income effect within the range of prices under consideration. As price rises the opportunity cost of consuming grain type i by the farmer will rise, thus the farmer will reduce his consumption of grain type i and will substitute other goods in his consumption. The reduction in the consumption of grain type i, given the level of production net of quota delivery and basic minimum consumption on the farm, yields higher marketable surplus. In effect, the higher return to grain dealers involves a shift in demand but a movement along the same supply curve.

In summary, the net effect of increased price by AMC to the quota will result in lower marketable surplus and higher price in the rural grain market. On the other side, higher margin to dealers will involve both a higher price and increased marketable surplus.

Finally, in most discussions of agricultural pricing in Africa, the world price is recommended to serve as a reference point to measure the adequacy of the domestic pricing policy. It is further suggested that domestic prices should be moved closer to the world price to remove any distortions to resource allocation.

In the context of Ethiopia, the efficacy of such a program will depend on whether AMC will persist and on the rules of operation it will adopt. Given that AMC will continue to operate along its traditional behaviour and given the world price, the following will be expected to happen (refer to the graph in

Annex II). Consumption in urban areas will increase to XW(i,c) to be supplied partly by AMC's domestic operation, and the other part divided between supplies from Addis Abeba region farmers and the rest from imports. Additional foreign exchange to an amount of PW(XW(i,c) − XE(i,a)) will be spent on the imports of grain.

The effect of equating domestic open market prices on farmers depends on the regional location of the farmers. Due to the lower world price compared to the previous equilibrium domestic price, farmers around Addis Abeba will suffer a loss due to both a quantity and a price effect. In rural areas due to the lower urban prices, AMC will act by lowering its procurement ratio from rural grain dealers, additional working capital will be devoted for grain purchase. Their demand curve, thus shifts outwards and prices will rise in the rural market. Farmers will then respond by increasing their supplies. It should be recalled that this operation is the reverse of what has been discussed in section 4(c). Here, it is observed that lower grain prices in Addis Abeba, due to the policy of price equalization with that of the world market, leads to higher prices in rural areas and a higher volume of marketed surplus.

5.2 Revision of the Urban Grain Ration Price

The price at which AMC sells grain type i to residents of Addis Abeba through their UDA's is fixed at PS(i,amc). The difference between this price and the price that would prevail under market clearing conditions, PA(i,amc), involves income transfer in favor of residents of Addis Abeba to an amount equal to the price difference times the quantity of grain rationed through AMC in Addis Abeba XS(i,amc). Raising the price at which this grain is rationed reduces the amount of income transfer. Since the urban demand for grain type i is dependent

upon income, among other factors, the decline in income will shift the demand curve inwards. The magnitude of shift will of course depend upon the elasticity of demand with respect to income. Depending on the elasticity of supply of farmers around Addis Abeba both the equilibrium quantity and price in the open market will drop.

Raising price of the ration quantity is a policy tool at the disposal of the government in the event that the price in the open market in Addis Abeba rises. Compared to the option of raising the value of x(i), raising the ration price results in lower price but also in a lower quantity in the open market. It is also possible to cause some political repurcussions.

5.3 Deterioration in the National Weather Condition

Agricultural production in Ethiopia depends significantly on weather conditions. Adverse weather condition reduces production below XR(i). Given the same volume of quota delivery by farmers, their excess supply curve will shift upwards to the left. Price in the rural grain market will rise and the quantity transacted will fall. On the demand side, since the grain dealer receive a fixed return of Birr 4 to 5 per quintal regardless of how much he paid for his purchase, the rise in price will increase his losses (reduce net return). It is therefore possible for the demand curve to shift inwards. The net effect is a higher price accompanied by a much lower quantity of transactions.

Grain available for distribution in Addis Abeba through the quota on grain dealers in rural areas is reduced. Since the bad weather condition is considered nation-wide, the open market supplies of farmers around Addis Abeba will also shift inwards. The open market supply in Addis Abeba is therefore

adversely affected by a drop in acquisition from grain dealers in rural areas and an inward shift in supplies from around Addis Abeba will result. Given these effects, price will rise both in rural areas and in Addis Abeba.

6. CONCLUSION

The model presented above provides with an insight into the working mechanism of the grain marketing and pricing system in Ethiopia. The model serves to assess qualitatively the direction of changes in the quantities and prices in the respective markets due to changes in the exogenous variables. It is not however possible to estimate the parameters of the model and compute the corresponding elasticities due to the inavailability of data. Time series data is not available on most of the variables that have been entered in the model. The data problem is particularly inescapable in the case of prices. For variables other than prices, it might be possible to use cross-section data. The problem with using cross-section data for price is the low variance in price at a particular moment in time.

The model also serves as an indication of the importance of institutions particularly in policy implementation. Well-intended policy measures could yield unintended results or vis-versa due to the lack of a proper understanding as to how and through what institutions these policies are going to be implemented. In a food system, there are various agents that come into the scene from the time the product is produced until it reaches the consumer. It is therefore important to understand the operational behaviour of at least the major agents and make policies compatible with the implementation capability.

In the case of Ethiopia, the institutional arrangements in the production and marketing of agricultural products is very complicated and is ridden with both price and quantitative controls. Grain from outlying provinces passes to major urban centers through AMC and for all practical purposes, no grain moves through unofficial channels. As a result of the effective segmentation of the grain market into an urban and rural portions, with agents of different behaviour, price in the rural markets decline (or remain the same) while urban price rises. If however farmers or grain dealers in rural areas and consumers in urban areas are issued a permission to move grain freely, such a widening gap between the prices in the two areas will not exist. If any price difference does persist, it will only be due to transportation and other marketing expenses.

In the current system, it has been shown that in spite of the efforts of AMC to stabilize urban food prices, the price could actually continue to escalate depending upon the magnitude of the reaction by grain merchants in rural areas. This is therefore a warning to the effect that as long as producers and consumers are separated, it is necessary to put in place institutions that properly relay, back and forth, the signal from the consumer to the producer.

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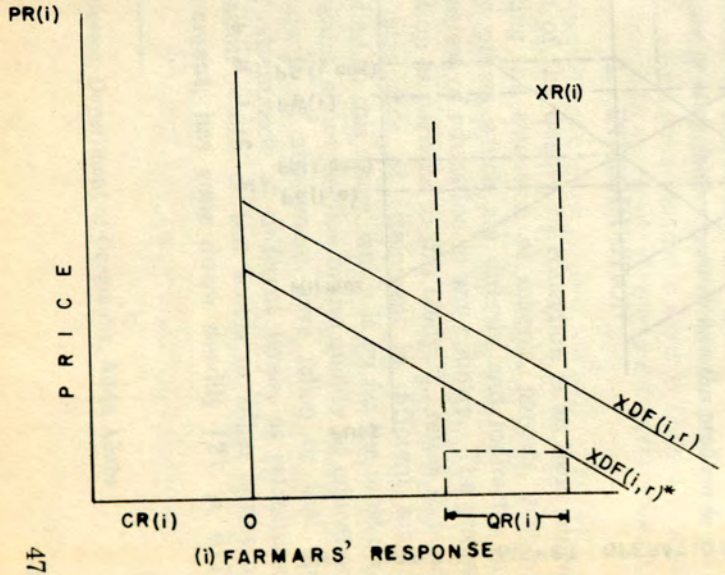
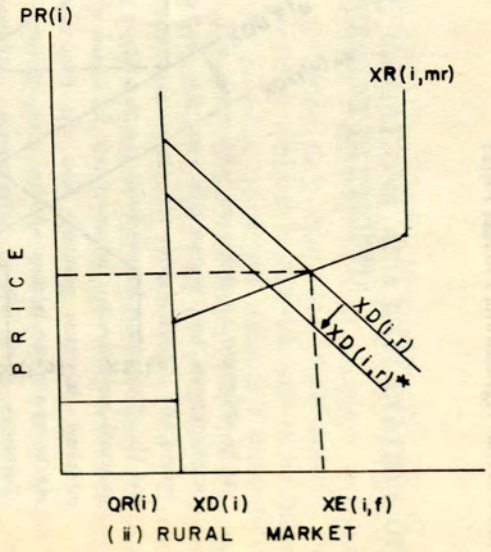
Annex I

THE RURAL MARKET OPERATION



(i) FARMARS' RESPONSE



(ii) RURAL MARKET

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Annex II

THE URBAN MARKET OPERATION