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**AGRICULTURAL DEVELOPMENT SYSTEMS
EGYPT PROJECT**

UNIVERSITY OF CALIFORNIA, DAVIS

**ECONOMIC IMPLICATIONS OF THE POLICY FOR PRICING
AND ALLOCATING RICE IN EGYPT**


By

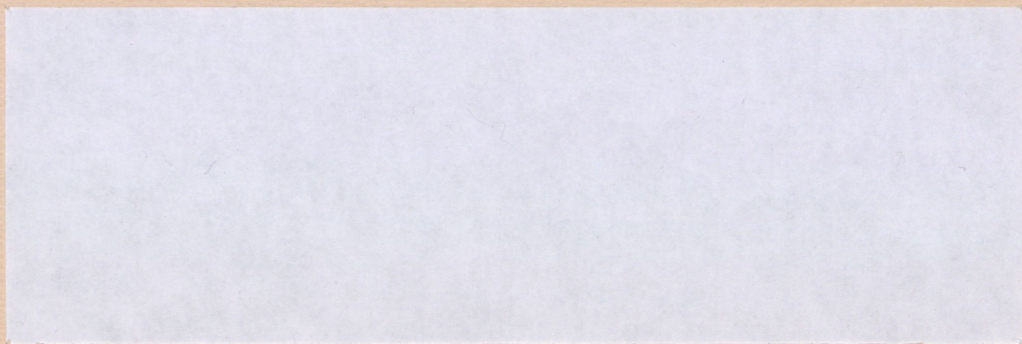
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**Agricultural Development Systems:
Egypt Project
University of California
Davis, Ca 95616**

Economic Implications of the Policy for Pricing
and Allocating Rice in Egypt

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Introduction

Rice is both heavily subsidized and rationed in Egypt. This policy has significant distributive effects and especially benefits low income consumers in both urban and rural areas of the country. In addition, the policy has important allocative effects in shifting scarce resources to inefficient uses. This paper attempts to measure the economic inefficiency associated with this policy in order that the policy makers may judge better whether or not the distributive benefits are worth the efficiency costs.

Rice is not only a staple food item to most Egyptian consumers, but it is one of the most important agricultural crops in the country and thus many producers are affected by policies that influence the profitability of growing rice. Most of the land area is planted to the cereal crops, of which 37 percent is in maize (corn), 29 percent in wheat, and 22 percent in rice, followed by sorghum and barley. Approximately 10 percent of the total crop area in the country grows rice.

The northern part of the Nile Delta is the primary rice-growing area, but it is consumed throughout Egypt. Almost all of the crop is produced in the summer season but consumption occurs throughout the year. Approximately 98 percent of the total production is consumed as food with the remainder used in starch, glucose and soap production.

Government policy in the 1950's and 60's encouraged rice exports. For many years, in value terms, rice ranked next to cotton as an export crop. In

1980/81, however, it had fallen to fourth place. In 1981/82, the export target for rice has been reduced to 25,000 tons in accord with the current policy to meet local consumption requirements first and to export any surplus that remains (see Table 1). It seems to be clear that unless the export policy is changed, Egypt will soon become a rice importer. One estimate is that by the year 2000 imports of rice could reach over 1,000,000 metric tons or about 25 percent of expected consumption (Arab League).

Because rice is consumed in large quantities in both urban and rural areas, Egyptian policy affecting its price and availability will be of significance to the majority of the Egyptian population. Since rice is available to consumers at prices below government procurement costs, its consumption is subsidized and the subsidy is an important component of the governmental budget. The retail price of rice is fixed in absolute terms and because inflation is driving up the prices of most other commodities, the real price of rice is falling. The result is a dramatic increase in consumption and even sometimes the utilization of rice for "unintended" uses.

Since the subsidy is growing through time, pressures on the government budget from this source are increasing. Consequently, the government attempts to mitigate this effect by keeping the procurement cost relatively low. This in turn, keeps the price received by rice farmers lower than those received for competing crops. It is alleged that the ultimate effect is to create disincentives for rice production and cause misallocation of resources. In other words, because relative prices are distorted by government policy, Egyptian farmers receive inefficient market signals and the country produces a different mix of commodities than it otherwise would have. This means that output is produced at higher real resource costs than would be required if prices were market determined.

Table 1 - Area Planted, Yield, Production, Exports, Consumption and Price Data for Rice in Egypt 1965-81

Year	(1) Area Feddan	(1) Yield ton/ feddan	(1) Production tons (paddy)	(2) Government quota in paddy tons	(3) Quantity exported in milled tons	(1) Total Quantity consumed milled	(2) Quantity auto-consumed and free traded	(2) Quantity distributed locally by the Government	(1) Real farm price paddy
						1,000 ton	mill and summer paddy ton	milled ton	LE/ton
1965	848,088	2.11	1,788,790	835,890	343,821	749	952,900	..	18.1
1966	843,960	1.99	1,678,634	968,006	386,461	549	710,628	..	21.1
1967	1,074,659	2.12	2,278,932	1,156,033	523,983	835	1,122,899	61,395	23.3
1968	1,204,367	2.15	2,586,237	1,321,781	662,892	875	1,264,456	122,910	24.0
1969	1,139,521	2.24	2,556,765	1,342,080	696,124	972	1,214,685	205,680	23.1
1970	1,142,318	2.28	2,604,675	1,154,058	590,524	1,065	1,450,617	204,736	20.4
1971	1,137,101	2.23	2,533,797	1,068,215	539,662	1,075	1,465,582	260,038	18.5
1972	1,145,553	2.19	2,507,303	1,020,638	46,393	1,226	1,486,665	342,733	18.4
1973	995,302	2.29	2,274,311	925,547	294,528	1,226	1,348,764	425,180	17.4
1974	1,052,987	2.13	2,241,688	866,014	136,116	1,227	1,375,674	439,615	20.1
1975	1,047,471	2.31	2,423,446	1,165,541	104,111	1,243	1,257,905	527,321	20.8
1976	1,078,437	2.13	2,300,032	1,085,943	209,239	1,256	1,214,089	539,740	23.9
1977	1,037,490	2.19	2,272,309	1,053,876	204,243	1,172	1,218,433	557,273	23.9
1978	1,030,572	2.28	2,350,675	1,107,314	143,853	1,231	1,243,361	567,201	25.1
1979	1,040,094	2.41	2,510,754	1,311,692 (1)	94,878	1,324	1,199,062	604,602	..
1980	972,000	2.45	2,384,102	1,181,615 (1)	105,000	1,318*	1,202,487	598,482	..
1981	956,000	2.34	2,236,000	1,157,475	25,000	1,305*	1,078,525

Source: (1) Ministry of Agriculture (2) Ministry of Supply (3) CAPMAS
 Farm prices deflated by the index number of wholesale prices of all commodities (1959/1960 = 100)
 *Preliminary

This paper is composed of five sections. The first describes the marketing system for rice coupled with the production quota system. The next section discusses patterns of rice consumption in rural and urban areas. The third section is concerned with pricing, shows how producer prices are influenced by the utilization of a cost-of-production index, and points out theoretical and empirical difficulties in using this approach. The fourth section presents an analysis of retail prices and the effects of the consumer subsidy. The fifth section presents a welfare analysis of Egypt's price and quota policy for rice. The paper concludes with a brief discussion of the policy implications and what changes need to be made to reduce the economic misallocation of resources.

The Marketing System

The Egyptian government has been involved to some degree in marketing rice since World War II. Many administrative arrangements and government agencies have been involved at one time or another--the Ministry of Defense, the Ministry of Supply, and the Ministry of Trade and Industry. Presently, the Ministry of Supply supervises the marketing of rice. The government regulates the marketing system for rice as a part of an integrated policy to meet consumption, foreign trade, financial and industrial objectives.

From 1944 through 1954 one-third of the rice production of the country was marketed through government institutions. The remaining two-thirds was marketed privately in free markets. Much of this private marketing, however, was supervised by the government which assigned each wholesaler a share of the market according to his past average sales and the size of the distribution area. Also, quotas of milled rice were assigned by the government to specified retailers who received deliveries from the wholesalers.

In 1954, government cooperatives became involved in marketing of rice. These agencies are not cooperatives in the British or American tradition but are local stations of the national ministries. At first, marketing through the cooperatives was not mandatory. After the nationalization of the country's principal industries in 1962, however, the General Egyptian Association for Milling Rice and Wheat and Bakeries in the Ministry of Supply supervised the marketing of rice with the aid of the Agricultural Credit and Cooperative Association in the Ministry of Agriculture. (Now these agencies are called the Rice Marketing Company and the Agricultural Credit and Development Bank).

In 1962/63 it became obligatory for farmers to market their rice at the cooperatives in seven of the primary-producing rice governorates.¹ Later the mandate to market through the cooperatives was extended to the other governorates as well.² This made it possible for all of the other rice marketing institutions to be abolished. The government did not require the marketing of the entire rice crop, however, and it was assumed that rice produced, but not marketed, would be consumed at home by the rice farmer and his family. What has occurred in practice, however, is that much of the production not delivered to the cooperatives is traded in an unregulated market on a freely competitive basis. The reasons that this market arose are not difficult to find and are tied up in the complex web of fixed prices, rationing, and production quotas that will be discussed more fully later on in the paper.

The Development and Administration of the Quota

From 1944 until 1964 the obligatory quota which every rice producer sold to the government cooperative was determined by the area planted to rice on the farm. Farmers planting over two feddans of rice were required to sell

between one-fourth and three-fourths dariba³ (0.24-0.71 metric tons) per feddan, with those planting more required to deliver more per feddan. Farmers who planted less than two feddans of rice were allowed to keep all of their rice production.

Over the period 1965 until 1970 the quota was increased but still varied depending on the area planted to rice by each farmer. In addition, the quota varied according to land productivity from about 1.17 to 1.65 metric tons per feddan. Not only was the quota raised from its 1964 level, but farmers growing less than two feddans of rice were also obligated to deliver an assigned portion of their production to the cooperative.

In 1970, the policy was changed again, and quotas were varied according to land productivity only. This policy remains in effect today. Recently, quantities of rice which are delivered to the Ministry of Agriculture to be used as seed may be deducted from the government quota. Another feature which has been added in recent years is that rice producers who choose to deliver more than their quota to the government cooperatives have received a slightly higher price on the quantity above the quota as the Rice Marketing Company pays the farmer's share of the marketing costs.

In the period of the 60's and the 70's from 39 to 58 percent of the annual total production of rice has been delivered to the government. (See Table 1.) The quota was set at 1.5 tons of paddy rice per feddan, but only about 1.3 tons per feddan is the average delivered amount. Either enforcement of the quota has been lax, or the farmers choose to pay the fines associated with nondelivery. In any case, nonquota rice is available for home consumption and for trade in the open market.

Marketing Channels

Rice is distributed to consumers in two markets. One of them is completely controlled by the government whereas the other is free but technically illegal. It appears that each market handles about half of the production of paddy rice.

The Rice Marketing Company in the Ministry of Supply ultimately receives the government quota. Farmers submit their assigned quotas to assembly centers supervised either by the cooperatives described above or by the village banks. The unmilled paddy rice is processed in modern mills owned by the Company. The milled rice is then distributed through government as well as private retail stores for local consumption. Part of this rice is available only through a ration book and is sold at a "low" fixed price. Rice is also sold unrationed, and at a higher price, but sometimes supplies are not available. (Further discussion of pricing is presented later.) Milled rice is also distributed by the company to public sector export companies which then send it abroad.

By contrast, rice which is not delivered under the quota is mostly milled in semi-electric, primitive mills belonging to the private sector. Generally, this rice is of somewhat lower quality and is available to rice producers for their own consumption as well as for trade in the open market. Even though it is of lower quality, the price of rice in the free market tends to be higher than that which is rationed. Thus, rural consumers obtain rice either by producing it directly, by using ration books to purchase rice from private stores, or via the open market.

Figure 1 presents a schematic diagram of the distribution system for rice in Egypt.

Figure 1

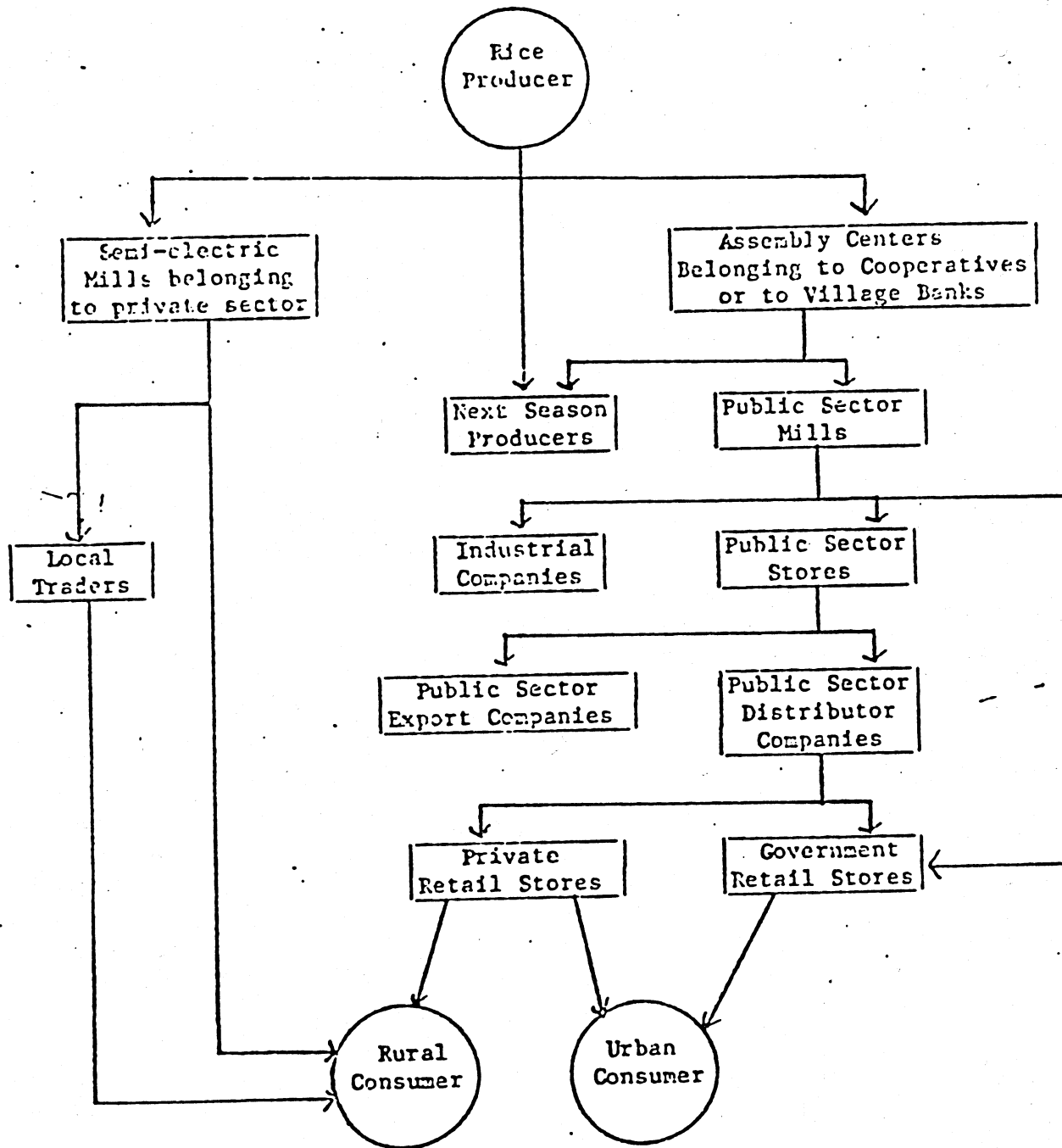


Figure (1) Distribution System for Rice in Egypt

Consumption of Rice

The total domestic consumption of milled rice can be estimated as a residual by subtracting the quantity exported, wasted⁴, used for seed⁵, and processed in industrial products from the quantity produced in milled-rice equivalent. But since the marketing system is quite different in urban and rural areas, demand for and supply of rice in rural locations must be analyzed separately from that in urban areas.

Based on the Family Budget Survey of 1964/65 it was estimated that per capita consumption among governorates of milled rice in the urban sector varied from 10-50 kilograms per year while the variation was 10-101 kilos in rural areas. This large variation in quantity consumed seems to be due to different tastes and preferences for rice and to highly disparate availabilities of rice among governorates. The high boundary represents consumers in the rice-producing belt of Lower Egypt, while the low boundary represents new consumers of rice in Upper Egypt, where lentils, pre-matured wheat (freek) and millet were also consumed in large quantities.

The estimated per capita consumption of rice based on the 1974/75 survey, varied between 16-33 kilograms annually in urban areas, and 14-61 kilograms in rural areas. Lower boundaries were higher in both areas than in 1964/65, but upper boundaries were lower resulting in a reduction in the range. The reason probably is the more effective rationing and distribution system in place in the latter period.

A Chow test was employed to test statistically the significance of the regression coefficients in Engel curves for rice in rural and urban areas, based on data from the Family Budget Survey in 1974/75. It was found that calculated F statistics were 53.82, 59.05, and 101.69 for the linear, double log, and semi-log equations respectively. All are significant at the

1 percent probability level. This means that Engel curves in rural areas are significantly different from those in urban areas and may justify separate analyses.

The quantity of rice distributed to consumers through the ration books differs from one governorate to another according to historical consumption patterns and whether or not rice is produced in the governorate. The yearly average quantity of rice per consumer registered for the ration book in 1980 ranged between 4 and 44 kilograms of milled rice. The largest amounts were allocated to those governorates bordering on the Mediterranean Sea and the Suez Canal, while the smallest amounts were given to the rice-producing and Upper Egypt governorates. The average amount was 11.2 kilos per person per year. The number of persons registered in the ration books in 1980 were 18,604,021 in urban areas and 19,209,811 in rural areas. Roughly, about 208,365 and 215,150 tons of milled rice were consumed in the urban and rural areas respectively via the ration books. The quantity available through rationing also differs from one month to another according to the rice marketing season, the fasting month (Ramadan), and summer vacations.

The 1980/81 average monthly quantity distributed to registered consumers via the ration books was about 27,310 tons or about 327,720 tons of milled rice per year. The better quality rice sold at a higher price amounted to 278,580 tons in 1980/81. About 81,000 tons of this rice (29.1 percent) was assigned to the Cairo Metropolitan area. In addition, about 30 thousand tons were given to the armed forces. In 1981/82, it is anticipated that 408,000 tons of milled rice will be distributed to consumers via the ration books and about 276,000 tons of the better quality will be made available for purchase. About 75,000 tons will be kept as a reserve stock.

The official estimate of procurement obtained through the quota on producers in 1981 was about 1,157,475 tons of paddy rice or about 736,307 tons of milled rice. (The extraction rate applicable was one ton of milled rice for every 1.572 tons of paddy rice.) This represents 51.8 percent of the estimated total production. About 25,000 tons of milled rice will be available for export in 1981/82 and the rest will be consumed locally. Looked at another way, 54.5 percent of the total quantity consumed either as food or processed will be marketed and distributed locally by the government with the remainder left in the hands of the rice producers to be consumed at home or freely traded in the open market. One estimate of the quantity of home consumption is based on data from the Farm Management Survey in 1976/77. About 70 percent of the rice remaining with farmers after the quota was met was consumed by them and their families and the rest became the marketable surplus in the free market (see Goueli). It is expected, however, that greater quantities of rice have gone to the open market in recent years because prices have been attractive there. The government has increased the quantity distributed through the government shops in the rural areas, replacing home consumption of rice left in farmer hands which then was sold in the open market.

In urban areas, one way of estimating quantities consumed in 1980/81 is by taking the government quota (1,181,615 tons of paddy) and subtracting the quantities going to other outlets: 165,060 tons exported, 36,942 tons manufactured, 11,816 tons wasted, and 338,216 tons of paddy rationed in the rural areas. The result of the subtraction is 629,581 tons; i.e., 33.8 k.g. of paddy rice per registered person or about 21.5 k.g. of milled rice per year. The estimated milled rice going to urban areas is 400,496 tons. An alternative way of estimating urban consumption is to count the quantity distributed through the ration books in 1980/81 (208,365 tons of milled rice) plus the

quantity sold unrationed at the set price of 14 piasters per kilo (175,766 tons of milled rice) since most of it goes to urban consumers. The total is approximately the same result (384,131 tons) after subtracting out the waste.

In rural areas, the consumption of rice in 1980/81 can be estimated by subtracting the quota from the total production of 2,384,102 tons of paddy, accounting for waste of 1 percent, for seeds (62,000 tons) and adding back in the part of the quota that is rationed to rural residents (338,216 tons paddy). These figures will sum up to about 1,466,679 tons of paddy (933,002 tons of milled rice) i.e., 48.6 k.g. of milled rice per registered person per year.

The Pricing of Rice

Farm Prices

The Egyptian Government fixes the farm prices of some agricultural products, generally those which are marketed through the cooperatives. Designated committees representing several ministries decide what the prices will be and declare them before the crops are planted. The government has followed this practice on the quota for rice since the second World War.

The price committee has representatives from the Ministries of Supply, Agriculture and Economics. It sets the farm price by relying mainly on the cost of production for that crop. In addition, the profitability of growing other crops in the rotation is also considered in setting the price.

The farm price of the quota for paddy rice was L.E. 75 per ton in 1980, L.E. 85 per ton in 1981, and it may increase to L.E. 100 in 1982. The increases in the farm price are due primarily to the increase in agricultural wage rates and the prices of some other inputs raising the cost-of-production index. The farm price of quota rice varies according to grades

and varieties, but it does not vary among governorates unless the costs of production are different among them.

Using a cost-of-production criterion for fixing prices received by farmers for agricultural commodities has attractive features on equity grounds, but is likely to be quite inefficient in the allocation of resources. The rotation-profitability indicator referred to above is also essentially an equity criterion that may be even more inefficient than cost of production if prices are reduced if profitability is high. Let us see why setting prices by cost-of-production and profitability criteria creates such devastating consequences for economic efficiency, especially in the long run.

A theoretical problem arises in defining cost of production. To guide his production decisions, the farmer uses the concept of opportunity cost; i.e., the value of the resources available to him in their best alternative use. If he plants his land to rice, he cannot at the same time plant it to corn. The cost of land in producing rice is the foregone returns to land from producing corn. But since it is rice and not corn which is actually produced, opportunity cost is hypothetical and subjective and no one except the farmer himself can know what it is. Therefore, any attempt to objectively measure opportunity costs may be quite inaccurate, particularly for those resources owned by the farmer himself: his labor time and management, land, energy source, machinery and tools, etc. Only the farmer can accurately assess their value in his production options. The common practice of treating these farmer-owned resources as if they were market-purchased and valued at market prices may be far off the mark.

A second problem is a more practical: whose cost of production is being estimated and represented by a given index number? In the usual real world situation, costs of production vary significantly among farmers even within a

given production area. An average will understate costs for some and overstate them for others. If the price is set at the average cost of production, presumably some farmers will earn profits and some will incur losses. Because those incurring losses will complain that the price is too low, there will be pressure on the committee to raise prices so that a larger fraction of the producers will have their costs covered. This practice will encourage inefficiency by weakening competitive pressures on those who produce at higher costs. Perhaps most objectionable, the pricing policy tends to become politicized and influenced more by the political power of commodity groups than they are by comparative costs.

A third problem, and the most serious in terms of economic efficiency, is that setting prices on a cost-of-production basis prevents comparative advantage from conferring benefits on the whole economy over the long run. If prices are directly related to cost of production, those crops with the highest costs will receive the highest relative prices regardless of the basic conditions of demand and supply. If the country, for example, has a comparative advantage in producing rice, relative costs will be low compared to the world price. This should be a signal that rice production should be increased and probably exported. If prices are set at cost, however, resources may be encouraged to leave rice production and move to crops where costs (and fixed prices influenced by cost) are higher. This deprives the economy of the large economic gains that could be captured in rice production. The ultimate result is a lower standard of living for the nation as a whole.

An efficient pricing policy must consider both supply and demand. Cost-of-production pricing considers only the supply side, i.e., the cost of the productive inputs. How much the output is worth (the demand side) is omitted entirely.

An objection to the above reasoning may be raised to the effect that equity is more important than efficiency, and especially to the public decision makers. Therefore, since pricing at cost of production seems to be equitable, the country should be willing to bear some efficiency costs associated with the policy. The answer to this objection is that efficiency may not need to be sacrificed in order to achieve equity. An efficient economy is one of maximum value output; i.e., there is more output to distribute than if the economy is inefficient. There may be other ways to redistribute income than by fixing prices at cost of production; e.g., income grants, public services, input subsidies, etc., although it must be admitted that there are efficiency implications associated with some of these practices as well. This caveat notwithstanding, it will probably be possible to reach equity goals with redistribution techniques that are far less injurious to efficiency than pricing at cost of production.

Quite apart from these somewhat theoretical objections to cost-of-production pricing, is a continuous complaint from producers that the cost of production declared by the Ministry of Agriculture (MOA) understates their true costs [see Ali]. On an area basis the cost of production estimated by the MOA per feddan of summer rice was about L.E. 162.54 and L.E. 197 in 1980 and 1981, respectively. The Rice Producer's Cooperative, on the other hand, estimated the total cost of production per feddan at about L.E. 217 in 1980. This is not to argue that the producers' estimates are more typical of the real situation. It would seem to be in their interest to overstate costs if doing so would strengthen their arguments for higher prices. Also, there is a belief on the part of producers that the Agricultural Credit and

Development Bank (village banks) overestimates the cost of marketing which the committee deducts from the total price to arrive at the price received by farmers.

By comparison with quota prices of L.E. 75 in 1980 and L.E. 85 in 1981 the net price received by farmers for quantities of paddy rice sold in the free market was about L.E. 90-110 per ton in 1980/81 and it is currently about L.E. 150 in 1981/82. At the average yields reported in Table 1, the per feddan revenues in 1980 for quota rice would have been about 184 L.E. in 1980 and 199 L.E. in 1981. These compare to MOA per feddan costs of 163 and 197 L.E., respectively.

Rice Consumer Subsidies

There are three retail prices of milled rice; two are controlled by the government and one is established in the free market. The ration book price is presently fixed at 5.00 p.t. per kilogram (4.6 p.t. to retailers). The quality of this rice is almost uniformly low and it is sold unpacked in assigned private retail shops. Additional quantities of rice, packed in bags of 5 kilograms, are sold at 14 p.t. per kilogram (12.00 p.t. to retailers). This type of rice is sold in both government and private retail shops. It was first introduced in the market in 1975/76. It was priced initially at 15 p.t., later at 18 p.t. but recently has been fixed at 14 p.t. It appears that the price covered the production, processing, and other marketing costs until 1978/79, but since that time even this rice has been subsidized.

The free market for rice exists only in the rural areas, and the free retail price varied during the marketing season between 15-25 p.t. per kilogram in 1980/81. As in any other open market the price is influenced by competitive forces of supply and demand. But since this market is technically

illegal, it is expected that there is some risk in selling the commodity. This implies that the price paid by consumers is higher than would be the case if the market were legal and therefore represents the upper boundary of what would be a competitive seller price. If there is also risk to the consumer, the price which she/he is willing to pay might be less than the marginal valuation of rice to the consumer and therefore, represents the lower boundary of a consumer offer price.

If the processing and marketing costs are added to the free farm-gate price of paddy, it appears that the sum on average is quite close to the export border price FOB, which is about L.E. 150 per ton. Of course, the opportunity cost to the economy of domestic consumption is the value of foregone exports.

Rice is sold to Egyptian consumers, however, at prices below government procurement costs. Because rice is sold at two different levels of retail prices in the controlled market for rice, its subsidy differs from one level to another. Figures from the Ministry of Supply indicate that the direct subsidy to rice consumers was about L.E. 44 million in 1980/81, and is expected to reach L.E. 63 million in 1981/82. These figures are nominal values, uncorrected for inflation, so the difference represents a biased estimate of increases in real subsidies since the rate of inflation in Egypt is quite substantial and increasing.

To calculate the subsidy per ton in 1980/81, let us start with the price paid to producers of L.E. 75/ton. Let us add the total marketing and milling cost claimed to have been paid by the Company of L.E. 27.603 per ton and subtract the total value of by-products of L.E. 8.773 per ton. The result is net costs per paddy ton of L.E. 93.83. When converting to milled rice at the rate of 1.572 tons of paddy per ton of milled rice, let us deduct 16.5 percent broken kernels and add the industrial profit of 5 percent. This results in an

estimate of cost per ton of milled rice of L.E. 154.91. Since the percentage of broken kernels differs according to the quality of rice sold, it is of producing a ton of whole kernels (L.E. 164.97) separately from the cost of producing a ton of broken kernels (L.E. 104.00). Rice which is distributed via the ration books has 80 percent whole kernels, while the rice of better quality varies between 88 and 94 percent whole kernels. Consequently, the total costs of procurement, milling, and distributing rice to the retailers are about L.E. 153.97, 158.85, and 162.51 for the three qualities of rice, (80% whole kernels, 88-94% whole kernels, and 100% whole kernels), respectively, after adding L.E. 1.200 to each for distribution costs. Thus, the subsidy per ton of milled rice is about L.E. 107.98, 42.51, and 38.85 for the three grades, or between 4 and 11 p.t. per kilo. These may not be the actual costs, but they represent the standardized costs as calculated by the Rice Marketing Company.

Another yet higher quality rice has been introduced to the market since 1976/77 and is sold to big restaurant and hotels at a price of L.E. 400 - 500 per ton. Its quantity was about two thousand tons at the beginning, but has increased until it reached about 153 thousand tons in 1979/80. Of course, these sales are not subsidized, but instead yield profits for the company.

As was mentioned earlier, Egypt continues to export some rice, although quantities are declining. The total cost of producing a ton of rice for export is about L.E. 167.06 for whole kernels and L.E. 104.00 for a ton of broken kernels. The cost for export, therefore, differs according to the percentage of whole to broken kernels. Egypt exports different grades that vary between 3 and 40 percent broken kernels. Also, it exports enriched grades containing only 3 to 6 percent of broken kernels. The additional enrichment costs vary between L.E. 2.39 and 5.15 per ton. Therefore, total

costs vary between L.E. 141.84 - 170.32 per ton. The government also exports husked rice (unmilled) containing 3 to 6 percent broken kernels at a cost of about L.E. 138.48 - 137.41 per ton. The exported rice is usually packed in sacks at costs of about L.E. 6.939 per ton if it is packed in two sacks (one old and one new). Other costs are transportation to the port, averaged at L.E. 2.174 to Port Said and 5.400 to Alexandria. In addition, there may be minor costs connected with the customs.

Let us turn next to the revenue side of the export situation. In 1980/81, the total value of exports was L.E. 20.3 million after subtracting the banking costs, the exporting company commission (3 percent of the total export value), export costs, and costs in the customs area. This value assumes a currency exchange rate of 70 p.t. per dollar. In reality, this estimate understates the value of exports since the parallel exchange rate during the period was about 82 p.t. per dollar. If the parallel rate is used, the net value of exports would be L.E. 23.78 million.

Net export value covered about half of the subsidy in 1980/81. Part of the revenues go to the government budget in the form of export taxes. Another part covers the salaries of government employees working in institutions involved in the marketing and milling of rice. These outlays are about L.E. 36.18 per ton and represent about one-fourth of the actual (unsubsidized retail price).

The Ministry of Supply requests more budget to cover its losses from supplying rationed rice at the low prices. This is the understandable view of the Ministry of Supply since it must cover its costs. To the Ministry the relevant subsidy is the difference between its costs and the revenues collected from subsidized consumers.

From the viewpoint of the economy as a whole and efficient resource allocation, however, subsidies and exports may be looked at differently. Suppose the world market price is 25 p.t. per k.g. of milled rice at Egypt's border. Thus, the real opportunity cost to the Egyptian economy of domestic consumption of rice is the border price. Egypt foregoes foreign exchange earnings of 25 p.t. per k.g. if the rice is consumed by Egyptians. Therefore, from the viewpoint of the economy as a whole the subsidy resulting from the price policy is 20 p.t. to the consumers of rationed rice (25 p.t. border price minus 5 p.t. ration book price) and 11 p.t. for nonrationed purchases by domestic consumer (25 p.t. border price minus 14 p.t. price to consumers). This reasoning is valid only if the border price exceeds the value of real resources expended by the exporting agency in acquiring rice and supplying it to foreign buyers at the border.

A Welfare Analysis of Egypt's Price
and Quota Policy for Rice

Because the institutional arrangements for marketing rice in Egypt are quite different in urban from rural areas, it was deemed desirable to segregate the market into two segments. A Chow test was used to demonstrate that consumption patterns are significantly different in rural than in urban areas.

The implications for efficient allocation of resources of the subsidy and rationing policies for rice will be explored in a demand-supply partial equilibrium framework. Figure 2 is a schematic representation of the entire market for rice where D_u represents the demand for rice in urban areas and D_r the demand in rural areas. D_t is the horizontal summation of these demands and represents the marginal valuation for alternative quantities of rice consumed in the domestic economy as a whole.

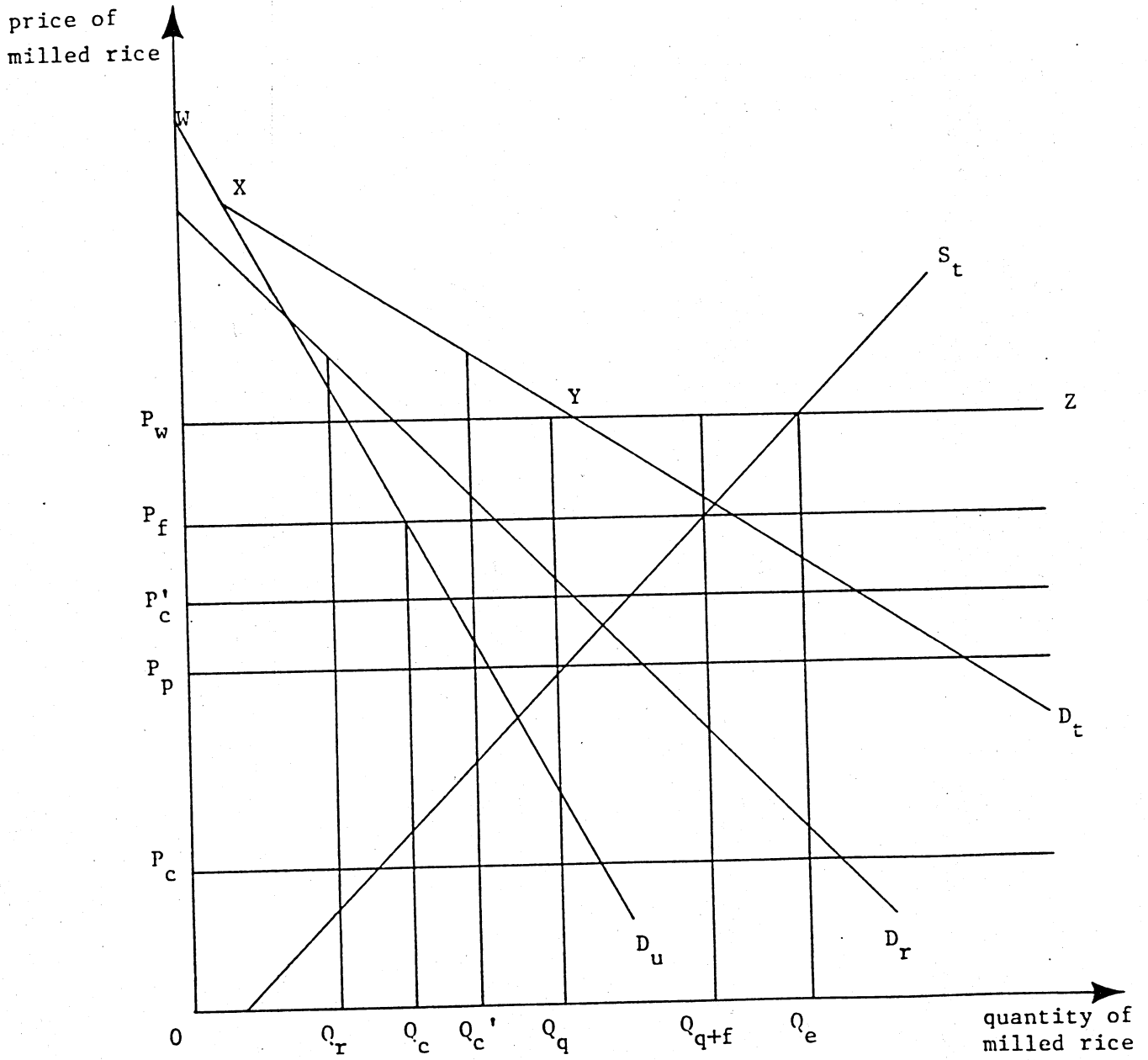


Figure 2

The price elasticity of total demand for rice at the retail level in Egypt has been estimated to be between -0.31 to -0.59 [See Bale and Lutz (1981), Lutz and Scandizzo (1980)]. Estimates of income elasticity have varied between 0.96 and 1.03, making rice a superior good. [Badawi (1971)].

S_t is the domestic supply curve for rice and represents the marginal opportunity costs for the factors of production utilized in the production of rice in Egypt. Let P_w represent the world price for rice at Egypt's border. This price is assumed to apply to both exports and imports so all relevant export and import costs have been netted out.

It is known that cultivation of rice in Egypt depends on the availability and application of irrigation water. The Ministry of Irrigation issues annual permits to plant rice. The acreage in rice is also affected by land reclamation policy, the profitability of growing competitive summer crops (such as cotton and maize), a comparison of the net revenue of a wheat and rice rotation, a cotton-rice rotation, and costs of production.

Estimates of the supply elasticity for rice at the farm gate have varied between 0.10 and 0.44 in the short run and in the long run, between 0.44 and 0.52 [see e.g., Sarris and El Amir (1981), Bale and Lutz (1981), Lutz and Scandizzo (1980), Abdel Rehim (1980), Food and Agriculture Organization (1972) and Nabila (1970)].

The curve WXYZ in Figure 2 represents the maximum marginal values of rice to the economy as a whole. The segment WXY suggests that quantities below point Y are more valuable when consumed domestically, whereas quantities above point Y are more valuable to the economy if exported and the foreign exchange is utilized to buy foreign goods that are available to Egypt in international trade.

On the supply side, OQ_q is the quota of milled rice equivalent in paddy imposed on rice producers and that is delivered to the government. The disposition of this quantity is assumed to be as follows: OQ_r is quantity allocated by ration cards to rural consumers at price P_c , $Q_r Q_c$ is the quantity issued to urban consumers by ration cards, also at price P_c , $Q_c Q'_c$ is the quantity available to urban consumers at price P'_c and $Q'_c Q_q$ is the quantity exported at the world price P_w .

The government pays the producers P_p for quota rice. As pointed out above, the remainder of the production is consumed at home by rural consumers or is traded in rural areas in a free market. An extended analytical apparatus is needed to represent the complexity of the rural market.

In Figure 3, D'_r represents the demand for nonquota rice in rural areas. It is derived by subtracting the rationed quantity in rural areas OQ_r from rural demand D_r . D'_r is composed of two parts: the demand for home consumption of rice by the families growing it and the demand in the free rural market.

The supply curve relevant to the rural market, S'_t in Figure 3, is the total supply S_t less the quota Q_q . Given the demand and supply curves D'_r and S'_t the equilibrium price in the free market is P_f and the equilibrium quantity is Q_f . If this quantity is added to the quota, the resulting quantity is the total supply Q_{g+f} in Figure 2. The upshot of this analysis is that the marginal price guiding production decisions at the margin is the price in the free market, P_f , and not the quota price, P_p , so long as $P_f > P_p$. This means that it is P_f that determines the area planted to rice, since the farmers will compare the marginal profitability of growing various crops in reaching a decision on acreage as well as the use of other productive inputs. Obviously the quota price affects the farmer's net income and the economic

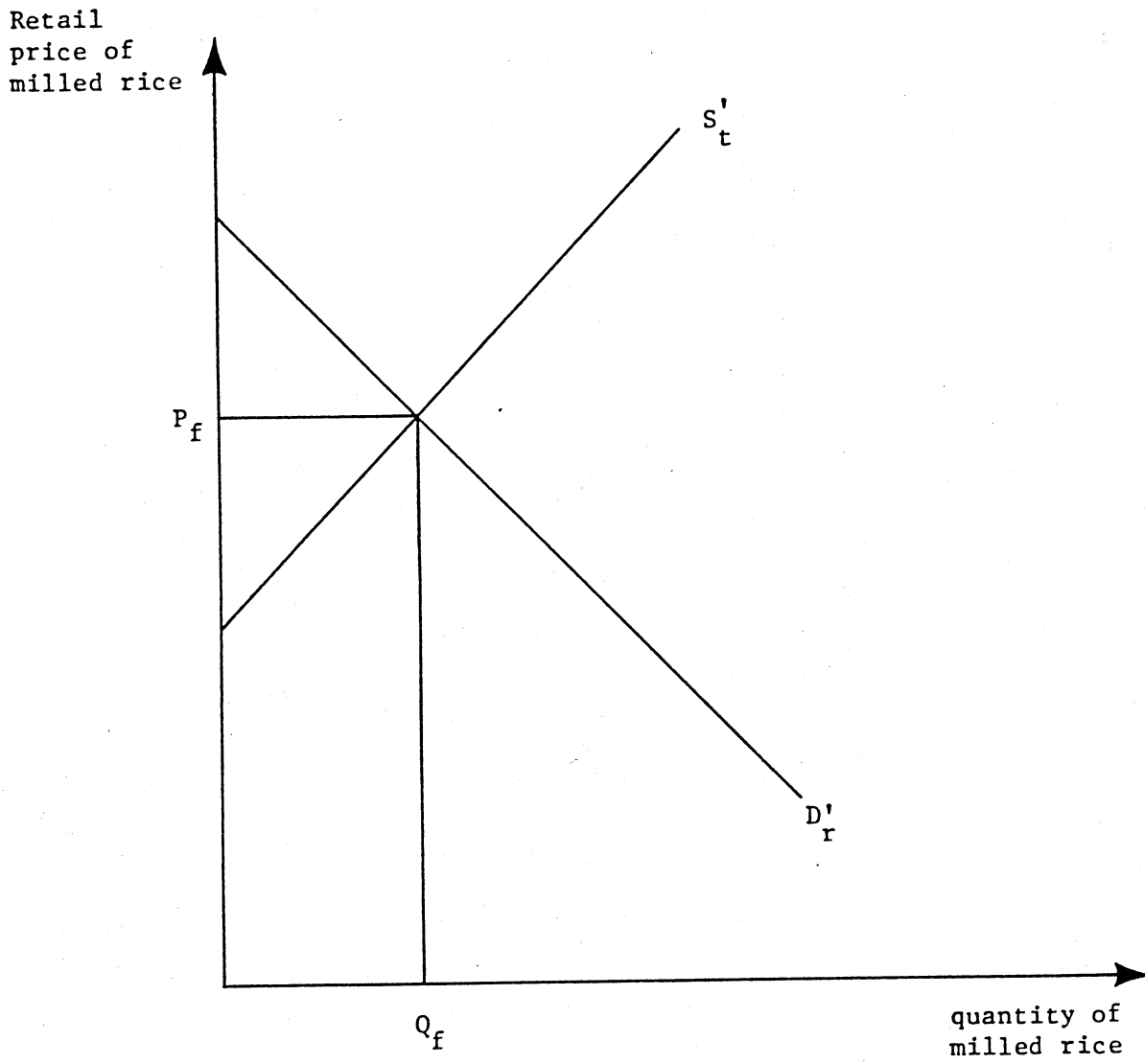


Figure 3

rent available after the variable factors have been paid, but the significant supply determinant is the free market price.

Let us now explore some of the economic implications of these institutional arrangements for pricing and allocating rice. If demand curves could be estimated econometrically, it would be possible to estimate the consumer surplus captured by consumers because of the rationing and subsidy policy. Likewise, the net costs or benefits could be estimated from the policy of exporting rice rather than consuming it domestically. Unfortunately, the data are not available that permit such an estimate.

Also of interest is the question of what might happen if there were not government intervention at all. Suppose there were no fixed quotas and that prices to producers were permitted to rise to world market levels. What would be the economic efficiency implications? The quantity supplied would rise to OQ_e in Figure 2. The quantity demanded domestically would be P_wY and YQ_e would be exported.

As indicated above, the world (export) price of rice represents the opportunity cost to the economy as a whole of domestic consumption. If the free market price is below the world price because of barriers to export, these barriers will cause resource misallocation. At the margin, additional production will cost less than it is worth to the economy. In Figure 4, domestic production is at quantity Q_{q+f} rather than Q_e , the efficiency maximizing level of supply. If production were at Q_e , the quantity above Q_{q+f} would be worth more than it costs by the area $1/2(P_w - P_f)(Q_e - Q_{q+f})$ or area ghi in Figure 4.

Of course, Q_e cannot be observed since the world price is not the price which rice farmers see as the return for their marginal output. As argued

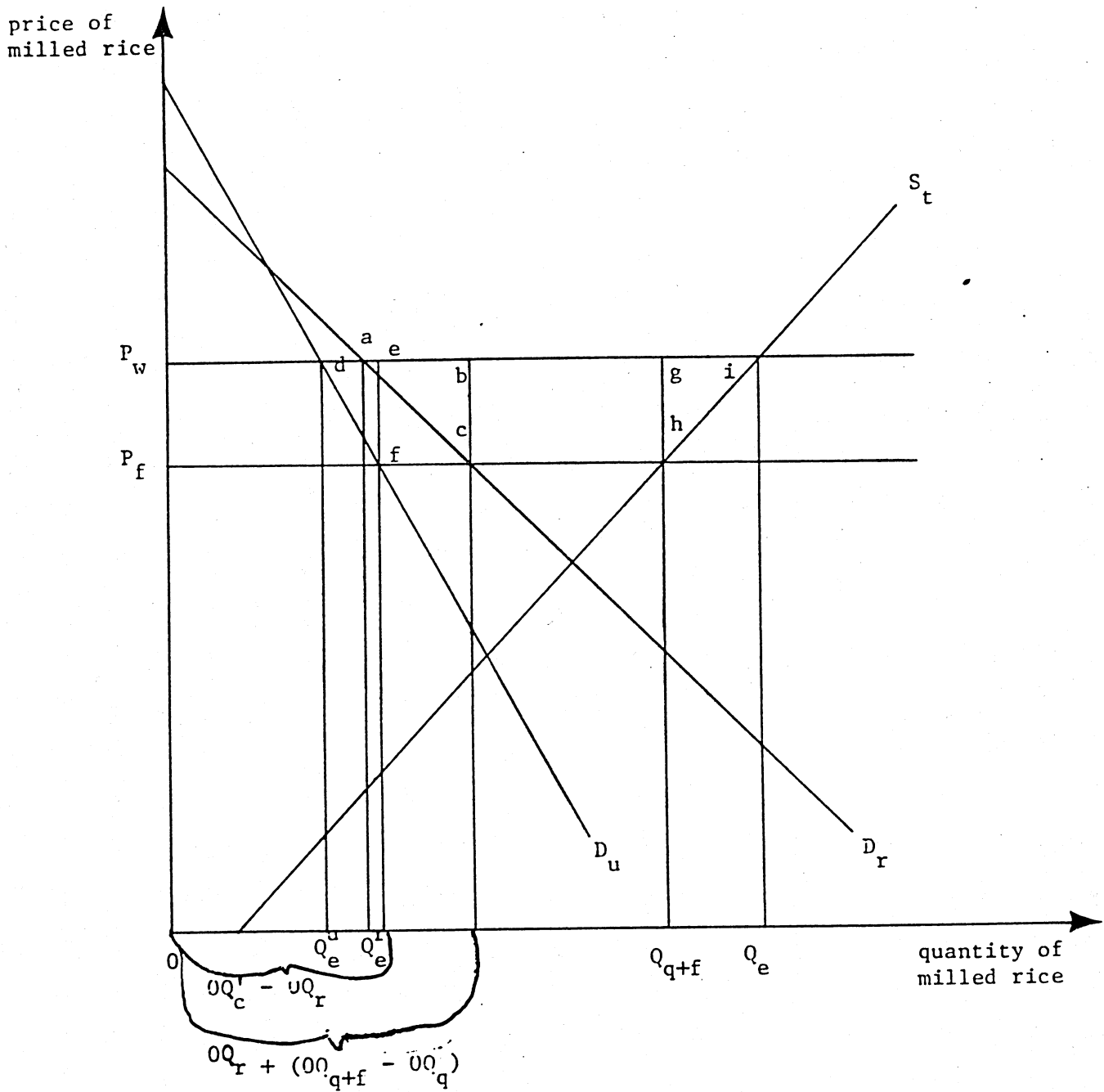


Figure 4

above, the effective marginal supply price for rice farmers is the free market price P_f in Figure 4. This price is observable. The total production Q_{q+f} is also observable. To estimate point Q_e , the quantity that would be supplied at the world price, P_w , the elasticity of supply is required. In fact, Q_e can be variously estimated for different elasticities of supply by using the formula for are elasticity,

$$\epsilon = \frac{\frac{Q_e - Q_{q+f}}{Q_e + Q_{q+f}}}{\frac{P_w - P_f}{P_w + P_f}}$$

and solving for Q_e . The estimates for area ghi, the welfare efficiency loss on the supply side for various elasticities of supply given in Table 2.

These supply-side welfare losses to the economy ranged from L.E. 370,200 at an assumed supply price elasticity of 0.10 to L.E. 2,913,100 at an elasticity of 0.75. It is significant to note that the loss is heavily influenced by two factors: 1) the elasticity of supply, and 2) the difference between the world price and the domestic marginal supply price.

As for point 2, it is apparent that if the free market price is close to the world price, area ghi in Figure 4 will be small. Also, since the free market price is greater than the quota price to producers, the argument that the free market price is the relevant supply price means that estimated supply-side welfare losses are smaller than would be the case if an average price received by producers were used as the supply price. This means that the existence of the free market in rural areas reduces the welfare losses to

the economy. If the free market were extended to the urban areas as well and if the free market price approached the world price, there would not be supply-side welfare losses at all.

Let us now move to an assessment of the demand-side welfare costs of the existing pricing and allocating policies for rice. These costs will be positive if the pricing policy leads Egyptian consumers to attach lower marginal values to rice consumption than its worth to the economy as exports.

Consider Figure 4. D_r and D_u represent the demand curves for rice in rural and urban areas respectively. In the rural areas, total consumption consists of the quantity rationed to rural consumers ($0 Q_r$) plus the difference between total production ($0 Q_{q+f}$) and the delivered quota ($0 Q_q$). This difference is consumed at home or sold to other rural consumers in the open market. Thus, total consumption in rural areas is $0 Q_r + (0 Q_{q+f} - 0 Q_q)$ in Figure 4. Analytically, what is required is a marginal valuation number that will permit us to establish a point on the demand curve D_r .

The open market price P_f seems to be the most suitable number. Rural families that produce and consume rice would be expected to apportion their nonquota production between home consumption and sales to the open market such that their values at the margin are equal. Rationed rice may be valued lower if it is of inferior quality. But if it were indistinguishable from nonrationed rice it might also be traded at the open market price by those who valued it less. Even though good evidence exists that rationed rice is indeed of lower quality, it is not clear how much of a quality discount should be applied. It is therefore assumed that all rice consumed can be valued at the open market price and the relevant point on the demand curve is point c in Figure 4. As will be seen later, the direction of the bias of this assumption is to understate the magnitude of the welfare loss.

As argued earlier, the opportunity cost to the economy of domestic rice consumption is the world price at Egypt's border, the foreign exchange earnings from exports. Thus, at the margin the welfare loss is bc in Figure 4. The loss would be less on the inframarginal quantities. Given D_r , the area of welfare loss is abc. To estimate the area in this triangle, point a must be estimated - the quantity of rice that would be demanded in rural areas at the world price ($O Q_e^r$ in Figure 4). If point c, and the world price are known, point a can be estimated by extending the demand curve D_r back until it crosses the world price. This can be done if the average elasticity of demand is known over the arc ac. The well-known formula is,

$$\eta = \frac{q_1 - q_0}{\frac{q_1 + q_0}{P_1 - p_0}} \quad \text{where}$$

$$P_1 + p_0$$

$$q_1 = OQ_r + (O Q_{q+f} - O Q_q)$$

$$q_0 = O Q_e^r$$

$$P_1 = P_f$$

$$P_0 = P_w$$

If η is known all the variables except q_0 are known and we can solve for it.

The next step is to estimate area abc. Assuming the demand curve is linear, $abc = 1/2(p_0 - p_1)(q_1 - q_0)$.

Table 2 contains estimates of welfare losses for various assumed elasticities of demand discussed previously. In the rural areas they range from L.E. 625,000 at an assumed elasticity of -0.12 to L.E. 2,903,000 at an assumed elasticity of -0.59.

In estimating welfare losses in urban areas, the situation is even more complex. There is no free market to provide evidence on the marginal valuations of rice. It is known that rice sold at 14 p.t. per kilo is not always available and that sales are often accompanied by customers waiting in queues. These facts suggest excess demand at the prevailing fixed price. Even though somewhat arbitrary, the assumption is employed here that the free market price in rural areas represents the marginal valuation for urban as well as rural consumers. If so, area def in Figure 4 will represent the welfare loss to the economy of the marginal valuation of urban consumers of rice being below the world border price. These losses are measured in precisely the same way as described for rural areas. They range from L.E. 268,000 at an assumed price elasticity of demand of -0.12 to L.E. 1,042,000 at a price elasticity of -0.59 .

It must be remembered that if the marginal valuation of urban and rural consumers of rice have been overstated by using the free market price, the welfare losses will have been understated. We believe that this result is quite possible and that our estimate of welfare losses are quite conservative. It seemed preferable to be conservative rather than increase the estimated losses without having good evidence for doing so.

Conclusions and Implications

In conclusion, if an intermediate elasticity of supply (say 0.44) is assumed, the supply-side welfare costs of current policies are L.E. 1,667,000 annually. On the demand-side, if an elasticity of -0.31 is assumed, the combined urban and rural welfare costs are L.E. 2,254,000. The sum of supply-side and demand-side losses is L.E. 3,921,000 annually. This is only about 10 p.t. per capita, not a large loss.

Table 2: Social Efficiency Losses Due to Price and Subsidy Policies for Rice in Egypt

Assumed Price Elasticity of Supply	Supply-side Losses Estimate of Equil. Supply at World Price (Q_e)	Welfare Loss (Area ghi of Figure 3)	Assumed Price Elasticity of Demand	Demand-side Losses Estimate of Equil. Demand at World Price (Q_e)	Welfare Loss (Area abc of Figure 3)	Total Rural and Urban loss
	(tons)	L.E.		(tons)	L.E.	L.E.
0.10	1,648,000	370,000	- 0.12	urban 611,000	268,000	893,000
0.25	1,688,000	944,000		rural 1,423,000	625,000	
0.44	1,738,000	1,667,000	- 0.31	urban 583,000	677,000	2,254,000
0.50	1,754,000	1,900,000		rural 1,357,000	1,577,000	
0.75	1,825,000	2,913,000	- 0.59	urban 557,000	1,042,000	3,945,000
				rural 1,265,000	2,903,000	

It is interesting and somewhat ironic that this analysis shows that the existence of the free market for rice is a strongly mitigating force in reducing welfare costs. Both producers and rural consumers use the free market to increase their well-being by trading in rice.

This analysis must not be misinterpreted. Pricing the quota far below world market levels surely discriminates against farm families and reduces their incomes. The heavy subsidy given to consumers of rationed rice no doubt permits them to capture large quantities of consumers surplus and increases their well-being. These are the principal equity effects of the policies for growing, pricing, and allocating rice.

Efficiency in resource allocation could be enhanced by taking all restrictions off the free market and allow it to develop in urban areas.

Footnotes

¹The seven governorates were alexandria, Behera, Kafer el Shaek, Garbia, Dakahlia, Domiata, and Sharkia.

²The remainder of the governorates were Menofia, Kalubia, Giza, Beni-Souef, and Minia.

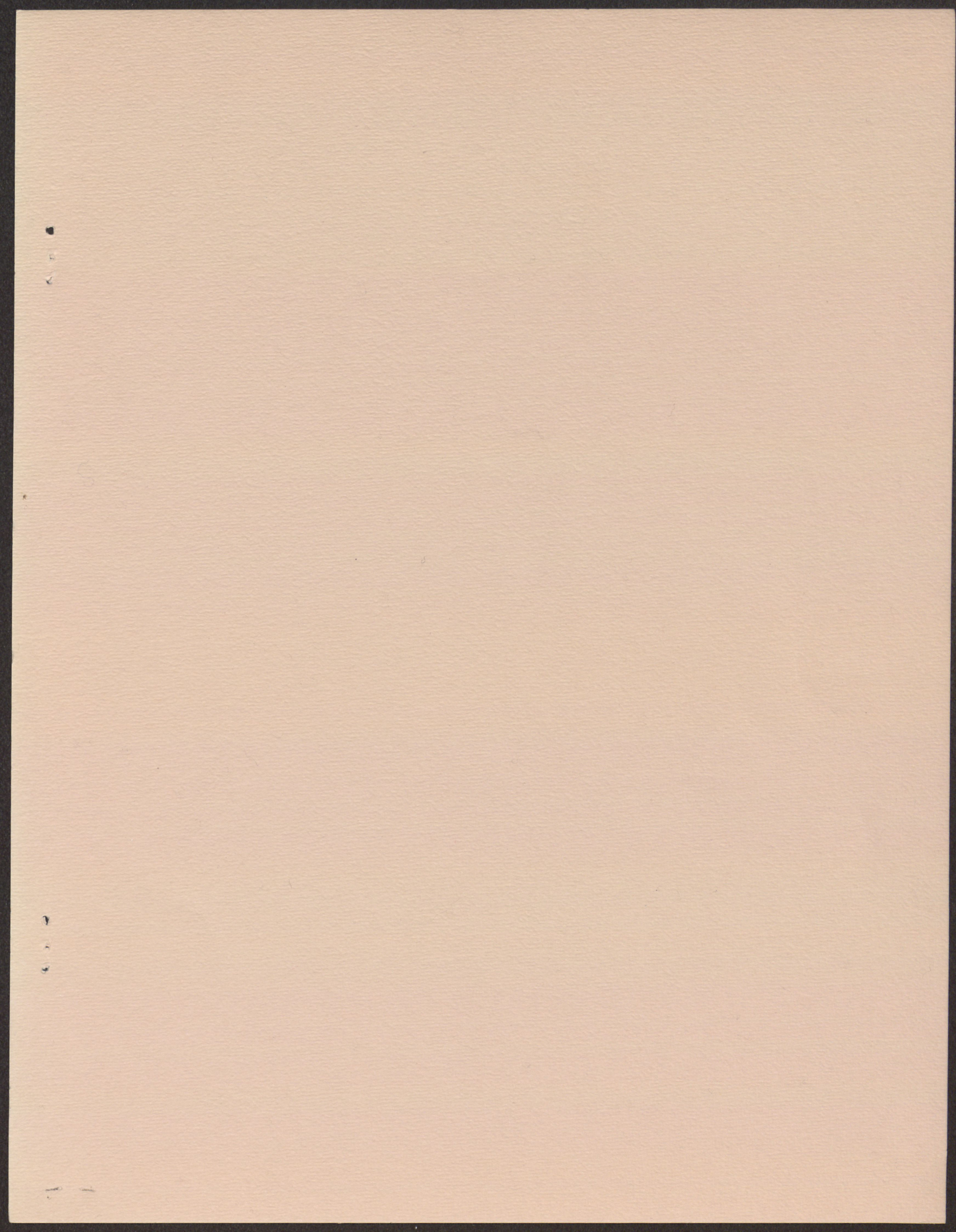
³Dariba equals 945 k.g.

⁴No actual data of waste are available. The Ministry of Agriculture uses an arbitrary measure which is about 2 percent of the total milled rice.

⁵Approximately 60 k.g. of paddy rice or 41 k.g. of milled rice is used for seeds per feddan.

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