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***FOODGRAIN PRICING POLICIES IN BANGLADESH:
AN ANALYSIS OF WELFARE EFFECTS***

R. K. Talukder

ABSTRACT

This paper attempts to develop a market model for foodgrain, incorporating the typical circumstances prevailing in Bangladesh. The resulting market outcomes are measured in terms of producer, consumer, and social benefit-cost using economic surplus approach. It can be tentatively concluded that producers have been gaining from the existing dual price structure while consumers have been losing substantially. The treasury has been acquiring some net gain from foodgrain operations in the concessional market but the society has been incurring substantial loss in the open market.

I. INTRODUCTION

The foodgrain market in Bangladesh is characterized by government intervention both on the supply and demand sides. In addition to subsidizing some of the inputs the government also provides support price to producers. On the other hand, the government distributes the domestically and internationally procured grains at concessional rates to different categories of consumers. Such policy mix has resulted in segmentation of the foodgrain market into two components namely concessional and open market. As a result of such market segmentation; both producers and consumers are confronted with dual price structure which ultimately results in different outcomes in terms of producer, consumer, and social welfare than what would have been the case had the market been allowed to operate under conditions of free trade at world price or left to reach the situation of autarky. These aspects need careful examination because in allocating scarce

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public resources among competing ends, the relevant social opportunity cost of resource use need to be taken into consideration.

Not enough is known about the welfare effects of foodgrain pricing policies being pursued by the government of Bangladesh. Some studies dealt with the relative merits of the input subsidy and price support policies in attaining self-sufficiency in food (Ahmed 1979, Tolley et al. 1982, Bayes 1984, Osmani and Quasem 1987). These studies considered attaining or maintaining some levels of production and the impacts of alternative policy, measures, in attaining the objectives, on producers, treasury, society and to some extent on classes of producer beneficiaries. Few evidences are available on the comprehensive impacts of government intervention in the foodgrain operation system on the welfare of producers, consumers and society as a whole. Ahmed (1979) estimated the budgetary subsidy on account of import, procurement and distribution of foodgrain by the government. He also examined the impact on consumption of some alternative rationing and distribution schemes. No attempt has so far been made to measure the social cost arising out of the prevailing food pricing and distribution policies in Bangladesh.

Attempts have been made in this paper to develop a market model for foodgrain, incorporating the typical circumstances prevailing in the country. The resulting market outcomes are measured in terms of producer, consumer, and social benefits/cost using economic surplus approach [1]. A conceptual model of foodgrain market is developed in section II of the paper. Empirical procedures are presented in section III. In section IV, estimated findings are discussed and some conclusions are drawn in the final section of the paper.

II. CONCEPTUAL MODEL OF THE FOODGRAIN MARKET

Bangladesh has long been striving to achieve food self-sufficiency by setting production targets through the successive five year plans. Self-sufficiency, however, has not yet been achieved and every year the country has to import foodgrains to meet her consumption requirement. Although the term self-sufficiency is fraught with a host of conceptual and methodological controversies, in Bangladesh the usual practice has been to use some administratively determined per capita level of consumption as the basis for determining total requirement of foodgrain in the country.

It is, however, difficult to say as to whether such quantity corresponds to nutritional norm of foodgrain intake [2]. Also, given the demand and supply function, this quantity need not and perhaps does not correspond to the quantity demanded at the world price [3]. However, our objective is to identify and measure the nature and extent of distortion in the foodgrain market from the view point of neo-classical notion of resource use efficiency and as such we shall use quantity demanded and supplied at the world price as the base for comparison with other policy outcomes. Thus, let us genera-

like that under conditions of free trade at world price, given the aggregate demand and supply functions, the country produces certain quantity of foodgrain which falls short of demand such that the excess of quantity demanded over supply is imported. Such a situation for rice market is presented in Figure 1. It is against this situation that the outcomes of any policy intervention will have to be evaluated.

In Figure 1, dD is the aggregate domestic demand curve and sS is the aggregate supply curve. Under conditions of free trade at world price P_w , total quantity demanded is OQ_2 of which quantity OQ_1 is supplied by domestic producers and the remaining Q_1Q_2 quantity is imported. Producers' surplus is indicated by area sP_w while area dmP_w which area dmP_w represents consumers' surplus.

If, however, the government plans to abandon import and allow the domestic market to reach an autarky situation, domestic equilibrium price and quantity reach at OPe and OQ_2 , respectively. Compared to the situation under free trade, consumers' surplus decreases by area P_wmPe . Producers surplus increases by area P_wfePe , but this increase is less than the decrease in consumers' surplus by the area efm which constitutes net loss to society. Of this, area efn represents social cost of production distortion while the social cost of consumption distortion is indicated by area emn . Apart from the elements of resource cost both from the point of view of production and consumption, such a policy may not be socially desirable because it will aggravate the already existing undernutrition situation in the country.

Although optimism is expressed in some circles that Bangladesh has a good long term potential for foodgrain production (IBRD 1972, Hossain 1980), given the existing state of technology and other physical and institutional constraints the country is not likely to achieve food self-sufficiency in the very near future. This means, in order to maintain and/or improve food consumption and nutritional intake of the people, she will have to depend on food imports for years to come. As regards pricing and distribution arrangements, in view of the widespread undernutrition and inadequate purchasing power of the majority of the people, government pursues the policy of distributing food at lower prices by giving subsidy to (some category of) consumers. Since the government intends to increase domestic production as well, by maintaining domestic price at reasonable level, it also provides incentive price to producers through procurement of grains. This situation calls for modelling more specifically the dual market condition in the country. Such a market model for rice is presented in Figure 2.

On the right hand side of the figure, aggregate domestic demand curve for rice is shown by dDT . The aggregate domestic supply curve, assuming no import of rice, is represented by sST curve. However, the aggregate supply of rice to all consumers in a situation of free trade at world price is shown by the sif curve. Under conditions of free trade, market equilibrium at the world price P_w is at f . At this point, aggregate domestic

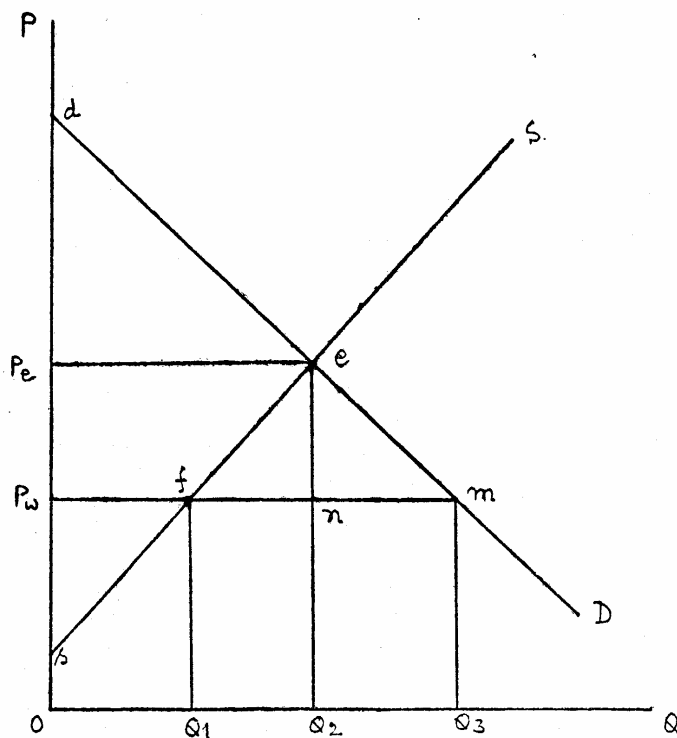


Figure 1. Welfare Effects of Autarky as opposed to Free Trade Situation of Market for Foodgrain (Rice) in Bangladesh.

consumption is OQ_3 , of which OQ_2 is supplied by the domestic producers and the quantity Q_2Q_3 is imported.

However, consequent upon the government intervention market is segmented into government controlled and open market components. Government intervention takes place in the form of purchase of some limited quantity of grains from domestic producers at stipulated prices and sale of domestically and internationally procured grains at concessional rates through rationing.

At this point some comments on the nature of internal procurement are in order. Internal procurement takes place in two forms compulsory and voluntary sale of grains by producers to the government procurement agents. Compulsory sale implies that the producers are bound to sell to the government a certain proportion of their output at whatever prices set by the procurement authorities. However, in reality compulsory procurement targets are seldom achieved except under circumstances when either the procurement authorities are able to enforce the program in appropriate time and manner or the procurement price remains higher than the open market price.

While compulsory procurement, by implication, is invariant with respect to procurement price, voluntary procurement is expected to be an increasing function of procurement price. Although this happens to be the case some times, especially after harvest, in general and on annual average basis, farmers' decision to sell to the government can not

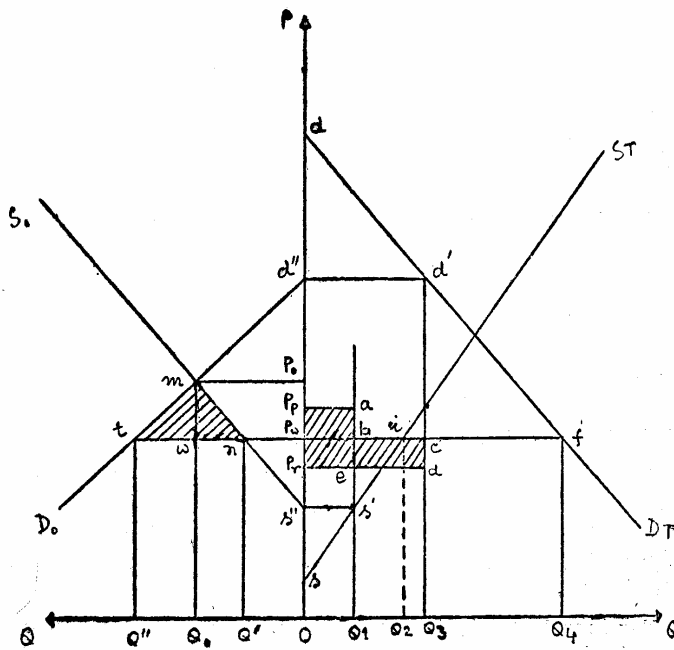


Figure 2. Welfare Effects of Dual Market Model for Foodgrain (Rice) in Bangladesh.

be said to be dictated by the procurement price. Historically, procurement prices have remained lower than the annual average open market prices, except for a few years. In reality, farmers sell their produce to the government either to meet their debt obligations or due to proximity of the procurement centres or because the procurement price remains temporarily higher than the open market price. On balance, we assume that the total quantity procured by the government is invariant with respect to procurement price.

Thus, still on the right hand side of Figure 2, the government procures OQ_1 quantity of grains from the domestic producers at P_p price. The government also procures Q_1Q_3 quantity from abroad at the world price P_w [4]. By procuring OQ_1 quantity at price P_p and Q_1Q_3 at price P_w and selling the entire OQ_3 quantity at price P_r , the government incurs a net loss equal to the areas P_paePr and $bcde$. In relation to the world price P_w , producer subsidy is indicated by area P_pabP_w and consumer subsidy is represented by area P_wcdPr .

Now we come to the left hand side of Figure 2. As is evident from the right hand side of the figure, government distributes OQ_3 quantity of the rice through rationing. Consumers' marginal valuation of OQ_3 is at point d' on the dDT curve. Then marginal valuation of the successive units of grains after OQ_3 or point d' is indicated by the remaining $d'DT$ portion of the dDT curve. This is the relevant demand curve in the open market and is transferred to the left hand side of the figure as $d'Do$ curve.

In deriving the open market demand curve the important consideration is to take account of the income and substitution effects of rationing. As Ahmed (1979) vividly discussed, income effect will tend to shift the open market demand curve to the right while substitution effect will drive it to the left (assuming that the curve is on the right hand side). The ultimate direction and magnitude of the change will depend on a number of factors including the respective parameter values, eg. marginal propensity to consume, marginal rate of substitution etc. However, we assume here that the demand curve is self-adjusted for given degrees of income and substitution effects corresponding to a given level of ration distribution.

As regards supply, we already mentioned that the producers supply OQ_1 quantity to the government under internal procurement scheme. After they have supplied OQ_1 along the sST curve, $s'ST$ is the residual supply curve relevant for the open market. This $s'ST$ portion is transferred to the left hand side of Figure 2 as $s'So$ which is the open market supply curve.

Now the resultant market outcomes are apparent. Given that $d'Do$ and $s'So$ are the open market demand and supply curves respectively, equilibrium price and quantity are determined at P_o and Q_o respectively. In relation to the world price P_w , consumers' surplus decreases by P_wmPo and producers' surplus increases by area P_wnmPo .

Thus the loss in consumers' surplus exceeds the gain in producers' surplus by the area *mnt* which represents net loss to the society. Area *mnw* indicates the social cost of production distortion and the social cost of consumption distortion is represented by area *mtw*.

Although no separate model for wheat is presented here, it is assumed that the direction of welfare effect will be more or less the same for wheat and only the magnitudes will vary. However, depending on the observed values of the variables, the directions of welfare effects are expected to vary from year to year for both rice and wheat. Such variations will duly be captured in the empirical estimates of the model.

III. EMPIRICAL PROCEDURES

Derivation of Supply and Demand Functions

It is evident from Figure 2 that linear demand and supply functions have been assumed in the model. The algebraic derivation of aggregate demand and supply functions for a representative year consistent with Figure 2 can be as follows :

$$dDT = a - bP_o \quad (1)$$

$$sST = c + dP_o \quad (2)$$

where *a* and *c* are intercepts and *b* and *d* are slopes of the functions and *P_o* is the open market price.

From the above functions, values of the relevant intercept, slope and elasticity coefficients can be obtained from the following relationships :

$$a = QDT.n + QDT$$

$$b = QDT.n / P_o$$

$$n = b (P_o / QDT)$$

$$c = QST - QST.e$$

$$d = QST.e / P_o$$

$$e = d (P_o / QST)$$

where, *QDT* = total quantity demanded ;

QST = total quantity supplied by domestic producers ;

n = price elasticity of demand ; and

e = price elasticity of supply.

Assuming that the slopes of the demand and supply functions remain constant in the open market, the relevant open market demand and supply functions and the related coefficients can be specified in the following manner :

$$d'' Do = a' - b' Po \quad (3)$$

$$s'' So = c' + d' Po \quad (4)$$

From (3) $a' = a - QR$

$$b' = b$$

where QR = quantity issued under ration

From (4), $c' = c - QP$

$$d' = d$$

where QP = quantity procured by government from domestic producers.

Given the above specification of the open market demand and supply functions, quantity demanded and supplied in the open market at the world price is given by the following relationships :

$$QDw = a' - b' Pw \quad (5)$$

$$QSw = c' + d' Pw \quad (6)$$

where, QDw = quantity demanded in the open market at world price,

QSw = quantity supplied in the open market at world price ; and

Pw = world price.

Data and Parameters

The basic data used in estimating the functions and the subsequent welfare effects were obtained mostly from various issues of the Statistical Year Book of Bangladesh and other published and unpublished sources. Total quantity transacted in the open market represented net quantity produced less quantity procured by the government. No allowance was made for stock changes both in the concessional and open markets and thus it was assumed that total quantities available during a given year were consumed in the same year. While open market prices represented average wholesale prices of rice and wheat, ration prices were the issue prices at which government sells ration goods to the dealers [5]. World price used in this study was the cif price and no transportation costs were considered in comparing the cif price with the domestic price.

In order to estimate the empirical magnitude of the variables, some parameter values such as elasticities were of crucial importance. We did not resort to the task of estimating the required elasticities for the present purpose, rather looked for some from other sources.

Estimates of the price elasticity of supply and demand for staple food commodities are not very plentiful in Bangladesh. As regards supply elasticity, some estimates are available for rice and a number of cash crops. Cummings (1974) found short run and long run elasticities of rice acreage to be 0.13 and 0.19 respectively. Ahmed's (1981) estimate of short run and long run elasticities of rice acreage were 0.09 and 0.12 respectively. His estimates were exactly corroborated by those of Hossain (1984) with yield effect, of course, being taken into account. Karim (1983) also estimated a set of elasticity coefficients for both rice and wheat. His short run and long run estimates were 0.10 and 0.30 respectively for rice, and 0.15 and 0.21 respectively for wheat.

Some estimates of price elasticity of demand are also available from a handful of studies. Alamgir and Berlage (1973) using national time series data estimated own price elasticity of foodgrain demand to be 0.28. Mahmud (1974) using quarterly survey data and more demand theoretic framework, estimated foodgrain demand elasticity to be 0.39. Ahmed (1981) and Pitt (1983) using basically the same set of cross section data estimated price elasticity for both low and high income groups of consumers. Apart from the fact that both of them obtained relatively higher absolute values of the coefficient. One's estimates differed markedly from those of other. However, while Pitt estimated separate coefficients for rice and wheat, Ahmed's estimates were for all foodgrains together. Pitt's estimates for low and high income groups for rice were 1.32 and 0.83 respectively and for wheat his estimates for the corresponding income groups were 0.72 and 0.06 respectively. Price elasticity of demand for rice of 0.39, estimated by Karim (1983) from time series data was perfectly in agreement with Mahmud's estimates from quarterly survey data. However, his elasticity estimates of 2.28 for wheat was too high to be taken as a reasonable estimate.

Now, if we were looking for separate elasticity coefficients for rice and wheat, it would be evident from the above review that except for the estimates of Pitt and Karim, all the supply elasticity coefficients were for rice alone and the demand elasticity coefficients were for foodgrain as a whole. In adherence to the estimates of Karim, Pitt and Mahmud, we selected the following values of elasticities in respect of the rice and wheat :

Commodities	Supply elasticities	Demand elasticities
Rice	0.10	-0.40
Wheat	0.15	-0.72

Formulae for Estimation of Welfare Effects :

The following formulae were used for estimating welfare effects in the concessional and open markets :

Concessional Market ;

- A. Producer Subsidy : $(P_p - P_w) QP$
- B. Consumer Subsidy : $(P_w - P_r) QP + (P_w - P_r) QI$
- C. Net Treasury Cost : $(A + B)$

Open Market ;

- A. Gain in Producers' Surplus :
 $(P_o - P_w)QSD_o - 0.5[(P_o - P_w)(QSD_o - QSw)]$
- B. Loss in Consumers' Surplus :
 $(P_o - P_w)QSD_o + 0.5[(P_o - P_w)(QD_w - QSD_o)]$
- C. Social Cost of Production Distortion :
 $0.5[(P_o - P_w)(QSD_o - QSw)]$
- D. Social Cost of Consumption Distortion :
 $0.5[(P_o - P_w)(QD_w - QSD_o)]$
- E. Net Social Cost : $(C + D)$

where, QP = quantity procured from domestic producers ;

QI = quantity imported ;

QSD_o = quantity transacted in the open market at the open market price ;

QSw = quantity supplied in the open market at the world price ;

QD_w = quantity demanded in the open market at the world price ;

P_p = procurement price ;

P_w = world price ;

P_o = open market price ;

P_r = ration price.

IV. RESULTS AND DISCUSSION

Welfare effects of foodgrain pricing policies have been estimated in both concessional and open markets of rice and wheat. In the concessional market, annual economic subsidy [6] has been calculated for both producers and consumers for a period of ten years from 1975-1976 to 1984-1985. The results are presented in Table 1.

It would be evident from the table that producer subsidies were negative on both rice and wheat for the first three out of ten year period. During this period, although the nominal procurement prices of both rice and wheat increased moderately, they remained below their respective world prices which fluctuated to some extent (Tables A.1, A.2). In 1978-1979, although some positive subsidy was enjoyed by the wheat growers, high negative subsidy to rice growers easily outstripped the positive component, thus resulting in a total negative subsidy for producers. The situation however, changed

TABLE 1. PRODUCER SUBSIDY, CONSUMER SUBSIDY AND TREASURY COSTS FROM FOODGRAIN OPERATION IN BANGLADESH (1975-76 TO 1984-85).

Figures in million Taka

Years	Producer Subsidy			Consumer Subsidy			Net
	Rice	Wheat	Total	Rice	Wheat	Total	Treasury Cost
1	2	3	4	5	6	7	8 = 4 + 7
1975-76	-329.96	-1.88	-331.84	1698.22	733.91	2432.13	2100.16
1976-77	-74.35	- 7.24	-81.59	568.21	460.15	1028.36	946.77
1977-78	-849.52	- 1.56	-851.08	2287.96	602.37	2890.33	2039.25
1978-79	-423.00	11.88	-411.12	902.80	134.67	1037.47	626.35
1979-80	102.78	115.32	218.10	508.42	-1084.91	-576.49	-358.39
1980-81	600.10	160.89	760.99	101.70	-979.43	-877.73	-116.74
1981-82	208.17	11.04	219.21	15.40	-710.64	-695.24	-476.03
1982-83	62.37	12.19	74.56	-50.99	-766.75	-817.74	-743.18
1983-84	63.36	90.62	153.98	1.54	-998.49	-996.95	-842.97
1984-85	113.12	206.70	319.82	-433.07	-1472.41	-1905.48	-1585.66

Source : Tables A.3, A. 4 and A.5

from 1979-1980. From that year, producer subsidy on account of both rice and wheat have been positive and consequently producers as a whole seem to have been enjoying some positive subsidies.

In the area of consumer subsidy, it appears also from Table 1 that consumers enjoyed some positive subsidy for years from 1975-1976 to 1978-1979 on both rice and wheat. These are the years when creepingly increasing nominal ration prices of both rice and wheat have remained consistently below their respective world prices which have shown some moderate degree of fluctuation. However, the situation abruptly changed from 1979-1980. From that year, although consumer subsidy on rice has been positive in some years, the same on wheat component has been negative for all the years which ultimately has resulted in negative total consumer subsidy for the years.

Thus it appears from Table 1 that although producers had been loser from mid through late 1970's they started to gain from early 1980's and maintained their position as gainer from the foodgrain pricing policies. On the contrary, while consumers used to gain substantially from mid through late 1970's they started to lose from early 1980's and have continued to be loser, rather increasingly.

As regards implications for treasury, results presented in Table 1 indicate that the treasury used to bear a heavy burden of subsidy till the end of 1970's. From early eighties however, the treasury started acquiring net gain from foodgrain operations. If allowance is made for the fact that a substantial proportion of import comes through aid and concessional rates, the magnitude of gain will increase further. However, as long as all foodgrain distributions have been charged at the ration price and the transportation and incidental charges have not been taken into account, revenues from foodgrain operations have been overestimated in view of the fact that the government distributes some portion of the grains on non-monetized accounts such as Food for Works, relief etc., and distribution of grains in any form entails some positive costs.

In the open market, welfare effects have been estimated in terms of producers' surplus, consumers' surplus and the resultant social cost. However, instead of covering ten year period, only one year (1984-1985), the latest in the series considered, has been used for the estimations. As long as the open market price has remained higher than the world price, the direction of welfare effects are expected to have remained the same and only the magnitudes have varied. Thus the policy implication being generated from the analysis may be considered relevant for at least a few years preceeding 1984-1985 during which open market prices of both rice and wheat have remained higher than their respective world prices (Table A.1, A.2).

The estimates of welfare effects for 1984-1985 in both concessional and open markets are presented in Table 2. Regarding the picture in the concessional market, as has already been mentioned in Table 1, while producers enjoyed some positive subsidy,

TABLE 2. WELFARE EFFECTS OF FOODGRAIN PRICING POLICIES IN BANGLADESH (1984-85)

Measures of welfare	Figures in million Taka		
	Rice market	Wheat market	Total
Concessional Market ;			
A. Producer Subsidy	113.12	206.70	310.82
B. Consumer Subsidy	-433.07	-1472.41	-1905.48
C. Net Treasury Cost	-319.95	-1265.71	-1585.66
Open Market ;			
A. Gain in Producers' Surplus	29126.63	1414.42	30541.05
B' Loss in Consumers' Surplus	31108.70	1831.62	32940.32
C. Net Social Cost	1982.07	417.20	2399.27
D. Social Cost of Production Distortion	374.35	33.68	408.03
F. Social Cost of Consumption Distortion	1607.72	383.52	1991.24

consumers' subsidy was highly negative and as a result the treasury in fact acquired a net gain to the tune of Taka 1586 million. In the open market, it appears from Table 2 that producers gained Taka 30541 million as surplus while consumers' surplus decreased by Taka 32940 million. Net social cost, which is the difference between the loss in consumers' surplus and gain in producers' surplus, amounted to Taka 2399 million. Of the net social cost bill, Taka 408 million was on account of social cost of production distortion which is the cost of extra resources being devoted to foodgrain production rather than importing grain at the world price. Social cost of consumption distortion, which is the value of the additional consumption forgone, constituted the remaining Taka 1991 million of the net social cost bill.

Thus it appears that producers gained in both concessional and open markets. Consumers however, suffered huge loss in both the markets. In the concessional market, treasury acquired a substantial net gain from foodgrain operation. In the open market,

on the other hand, society incurred a huge loss on account of both production and consumption distortions.

However, all these outcomes are based on comparison of the world price with different domestic prices. Instead of comparing the ration price with the world price, if it is compared with the open market price which is approximately the opportunity cost of foodgrain distributed through rationing [7], the consumer subsidy and the associated treasury cost would be positive as long as the open market price remains higher than the ration price.

Limitations of the study

The results obtained from the study are subject to several limitations. First, we implicitly assumed that no transfer of foodgrain occurs from one market to another. In fact, some transfer of grains from concessional to open market occurs through open market sale by the government and resale of part of ration grains by consumers to their counterparts in the open market.

Second, in addition to the substitution and income effects of ration rice and wheat on their respective open market demand, there is also mutual substitution effects between rice and wheat in the form of effect of distribution of one in the ration on the open market demand for other, depending on the degree of their mutual substitutability. In estimating separate welfare effects from rice and wheat, we did not take those effects into account.

Third, we did not distinguish farm households' demand from aggregate demand assuming that both aggregate demand and supply were augmented by the extent to which the farm households consumed their home produced grains.

Fourth, in estimating the welfare effects we used single values of demand and supply elasticities. In selecting the elasticity values from other studies, we observed that different authors used different methods and time periods in their studies and accordingly their estimates varied substantially. In view of such variations, it would be more appropriate to estimate the welfare effects for a range of values of the demand and supply elasticities.

Finally, the estimated welfare effects relate to aggregate producers, consumers and the society as a whole and as such are not likely to have reflected proper and accurate implications for policy. The basic parameter values and the related policy outcomes are likely to vary according to classes of producers and consumers. Thus a more disaggregated analysis involving different classes of producers and consumers would have been more worth

while. Such analysis would have given more useful clues for formulating target group specific intervention measures.

V. CONCLUSIONS

Foodgrain pricing policies in Bangladesh and their resultant welfare effects seem to be at a state of transition. Both producers' and consumers' welfare have reversed within a span of ten year period.

Subject to the limitations of the study mentioned earlier, it can be tentatively concluded that producers have been gaining from the existing dual price structure while consumers have been losing substantially. The treasury has been acquiring some net gain from foodgrain operations in the concessional market but the society has been incurring substantial loss in the open market. However, the relative positions of producers and consumers as gainer and/or loser need some further examination. From a realistic point of view, it is not proper to make a clear cut dichotomy between producers and consumers in a country like Bangladesh where more than 70 per cent farms operate at or below subsistence level. Most of these farmers hardly produce any marketable surplus and although they make some distress sale especially after harvest, they are ultimately net buyers of foodgrain from the market. As long as the annual average open market price remains higher than the procurement price, it can be said that whatever benefits accrue to them from the harvest season price rise as a result of procurement, are more than offset by the annual average price rise and ultimately they lose from having to buy foodgrains from the open market. It follows that it is always the surplus or big farmers who benefit from higher prices of grains round the year.

This is not to say that producer incentives should be jeopardized by bringing prices down. But from distributional point of view, the superior alternative of retaining producer incentives seems to be the provision of input subsidy, the relative merits of which have been well documented in the specific context of Bangladesh (Ahmed 1979, Bayes 1984, Osmani and Quasem 1987). On the other hand, in order to maintain or improve food and nutrient intake level of the people, the existing food distribution systems should be restructured and geared up to cater to the needs of the low-income, vulnerable groups of people.

NOTES

(1) The relative merits and demerits of the economic surplus approach have extensively been discussed in the literature (Currie et al. 1971, Willing 1976, Cochrane 1980, Mishan 1981). However, despite the limitations, it is widely regarded as a useful tool of social cost benefit analysis.

(2) Administratively determined requirement is 15.5 ounces or 455 grams of foodgrain per capita per day. According to the existing consumption pattern, total per capita calorie intake is 1925 kcals of which 1614 kcal or about 84 per cent comes from cereal (BBS 1986b). The Institute of Nutrition and Food Science (INFS) estimated average calorie requirement of 2273 kcals per capita per day (Ahmad and Hassan 1983). Allowing for due proportions of rice and wheat consumed in the total foodgrain intake, 455 grams of foodgrain yield about 1557 kcals which is lower than the existing intake. Thus if due recognition is taken of the fact that the existing intake itself is lower than the requirement (by about 14%, according to INFS), then 15.5 ounces of foodgrain intake is not consistent with the calorie intake norm set by the INFS.

(3) If the existing level of consumption (allowing for the actual import) is considered to represent administratively determined required quantity, then given the demand and supply function, as long as the open market price remains higher than the world price, it can be said that the quantity demanded or transacted at the open market price falls short of the quantity demanded at the world price.

(4) In practice, the government procures grains from abroad under a variety of arrangements namely cash purchase, purchase on credit and receipt of grains through grants. However, for our purpose, we have considered all imports of grains as commercial purchase at the ruling world price.

(5) A more sensible proposition would be to take retail price as consumer price and farm-gate price as producer price. However, in taking world price as the cif price, we did not consider any transportation and incidental costs of imported grains. This has under-estimated consumer subsidy in the concessional market when ration prices have remained lower than the world price, and over estimated the producer subsidy as long as the procurement prices have remained higher than the world price. Thus a retail ration price would have contributed more to the under estimation of consumer subsidy.

In the open market, as long as the open market price has remained higher than the world price, non-inclusion of transportation cost has led to over estimation of consumer welfare loss and producer welfare gain. In this situation while use of ration price for both would have been more inappropriate for producers, farmgate price would have been the same from the view point of consumers. Since we had to use a common price for both producers and consumers, use of wholesale price may have been a compromise solution and as long as the consumer welfare loss is greater than the producer welfare gain, this has restricted to some extent the social cost bill from being higher.

(6) By economic subsidy is meant the difference between world price and domestic price. The world price used here is the cif price provided by the Bangladesh Bureau of Statistics based on its procedure used for compiling foreign trade statistics. Two types of domestic prices have been used for calculation of subsidy—the procurement price offered at the procurement centres and the wholesale ration issue price. The method used in this

study corresponds roughly to the full valuation method of estimating subsidy, but differs markedly from the procedures used in the estimation of budgetary subsidy commonly used in the government documents (Details about these and other methods can be seen in World Bank 1979). Depending on the type of data, estimation procedures and assumption about the domestic and world prices, the results obtained in the present study may differ from those obtained from other studies.

(7) The actual open market price does not represent the true opportunity cost of grains because the sale of ration grains in the open market would cause the open market price to fall to some extent.

APPENDIX TABLE A.1. DATA ON PRICES AND QUANTITIES OF RICE USED IN THE ESTIMATION OF WELFARE EFFECTS

Years	Quantity in '000 long ton				Taka per long ton				
	Net domestic production (QST)	Internal Procurement (QP)	Import (QI)	Ration off take (QR)	Net availability (QDT)	Open market price (Po)	World price (Pw)	Procurement price (Pp)	Ration issue price (Pr)
1	2	3	4	5	6 = 2 - 3 + 5	7	8	9	10
1975-76	11305	343	396	509	11471	3389	4228	3266	1930
1976-77	10634	306	192	773	11101	3079	3509	3266	2368
1977-78	11480	560	300	597	11517	3769	5164	3647	2504
1978-79	11381	300	56	561	11642	4145	5221	3811	2685
1979-80	11283	141	903	691	11833	5482	3762	4491	3275
1980-81	12295	850	83	507	11952	4585	3920	4628	3811
1981-82	12074	284	144	759	12549	5999	4466	5199	4430
1982-83	12592	165	316	488	12915	6522	5338	5716	5444
1983-84	12878	161	162	514	13231	7122	5694	6125	5689
1984-85	14041	132	729	400	14309	8014	5893	6750	6396

Sources : All basic data on quantities, procurements and world prices are from BBS 1982 and 1986a. Open market and ration issue (whole sale) prices are from Chowdhury, 1986.

APPENDIX TABLE A.2. DATA ON PRICES AND QUANTITIES OF WHEAT USED IN THE ESTIMATION OF WELFARE EFFECTS

Years	Quantity in '000 long ton				Taka per long ton				
	Net domestic production (QST)	Internal Procurement (QP)	Import (QI)	Ration off take (QR)	Net availability (QDT)	Open market price (Po)	World price (Pw)	Procurement price (Pp)	Ration issue price (Pr)
1	2	3	4	5	6 = 2 - 3 + 5	7	8	9	10
1975-76	193	07	1049	1159	1345	2089	2229	1960	1534
1976-77	93	13	603	677	757	2151	2571	2014	1824
1977-78	310	12	1309	1400	1698	2490	2416	2286	1960
1978-79	437	55	1106	1225	1607	2488	2234	2450	2118
1979-80	729	124	1923	1711	2316	3166	1928	2858	2458
1980-81	967	177	978	1019	1809	3007	2085	2994	2933
1981-82	857	13	1082	1277	2121	3675	2526	3375	3175
1982-83	970	24	1525	1418	2364	4418	3166	3674	3661
1983-84	1072	119	1938	1588	2541	4518	3191	3920	3675
1984-85	1398	212	1805	2138	3324	4655	3434	4409	4164

Sources : All basic data on quantities, procurement and world prices are from BBS 1982, 1986a. Open market and ration issue (wholesale) prices are from Chowdhury, 1986.

**APPENDIX TABLE A.3. PRODUCER SUBSIDY ON RICE AND WHEAT
FROM INTERNAL PROCURMENT OPERATIONS**

Year	Taka per long ton			Quantity procured (^{'000} tons)	Total subsidy (ml. Taka)
	Procure- ment price	World price	Unit subsidy		
1	2	3	4=2-3	5	6=4 × 5
Rice					
1975-76	3266	4228	-962	343	-329.96
1976-77	3266	3509	-243	306	-74.35
1977-78	3647	5164	-1517	560	-849.52
1978-79	3811	5221	-1410	300	-423.00
1979-80	4491	3762	729	141	102.78
1980-81	4626	3920	706	850	600.10
1981-82	5199	4466	733	284	208.17
1982-83	5716	5338	378	165	62.37
1983-84	6125	5694	431	147	63.36
1984-85	6750	5893	857	132	113.12
Wheat					
1975-76	1960	2229	-269	07	-1.88
1976-77	2014	2571	-557	13	-7.24
1977-78	2286	2416	-130	12	-1.56
1978-79	2450	2234	216	55	11.88
1979-80	2858	1928	930	124	115.32
1980-81	2994	2085	909	177	160.89
1981-82	3375	2526	849	13	11.04
1982-83	3674	3166	508	24	12.19
1983-84	3920	3191	725	125	90.62
1984-85	4409	3434	975	212	206.70

Sources : Tables A.1 and A. 2

APPENDIX TABLE A.4. CONSUMER SUBSIDY ON RICE FROM INTERNAL PROCUREMENT AND IMPORT COMPONENTS:

Years	Taka per long ton			Quantity	Quantity	Subsidy	Subsidy	Total
	World price (cif)	Ration price	Unit subsidy	procured and distributed ('000 tons)	imported and distributed ('000 tons)	on procured component (ml. Taka)	on imported component (ml. Taka)	subsidy
1	2	3	4=2-3	5	6	7=4×5	8=4×6	9=7+8
1975-76	4228	1930	2298	343	396	788.01	910.01	1698.22
1976-77	3509	2368	1141	306	192	349.14	219.07	568.21
1977-78	5164	2504	2660	560	300	1489.96	798.00	2287.96
1978-79	5221	2685	2536	300	56	760.80	142.00	902.80
1979-80	3762	3275	487	141	903	68.66	439.76	508.42
1980-81	3920	3811	109	850	83	92.65	9.05	101.70
1981-82	4466	4430	36	284	144	10.22	5.18	15.40
1982-83	5338	5444	-105	165	316	-17.49	-33.50	-50.99
1983-84	5694	5689	5	147	162	0.73	0.81	1.54
1984-85	5893	6396	-503	132	729	-66.39	-366.68	-433.07

Sources : Tables A.1 and A.2

APPENDIX TABLE A.5. CONSUMER SUBSIDY ON WHEAT FROM INTERNAL PROCUREMENT AND IMPORT COMPONENTS

Years	Taka per long ton		Quantity		Quantity	Subsidy	Subsidy	Total
	World price (cif)	Ration price	Unit subsidy and	procured and distributed ('000 tons)	imported and distributed ('000 tons)	on procured component (ml. Taka)	on imported component (ml. Taka)	subsidy
1	2	3	4=2-3	5	6	7=4×5	8=4×6	9=7+8
1975-76	2229	1534	695	07	1049	4.86	729.05	733.91
1976-77	2571	1824	747	13	603	9.71	450.44	460.15
1977-78	2416	1960	456	12	1309	5.47	596.90	602.37
1978-79	2234	2118	116	55	1106	6.38	128.29	134.67
1979-80	1928	2458	-530	124	1923	-65.72	-1019.19	-1084.91
1980-81	2085	2933	-848	177	978	-150.09	-829.34	-979.43
1981-82	2526	3175	-649	13	1082	-8.43	-702.21	-710.64
1982-83	3166	3661	-495	24	1525	-11.88	-754.87	-766.75
1983-84	3191	3675	-484	125	1938	-60.50	-937.99	-998.49
1984-85	3434	4164	-730	212	1805	-154.76	-1317.65	-1472.41

Sources : Tables A.1 and A.2

REFERENCES

- Ahmad K. and Hassan, N. eds. (1983) : *Nutrition survey of Rural Bangladesh 1981-1982*. Institute of Nutrition and Food Science, University of Dhaka.
- R. Ahmed (1979) : *Foodgrain supply, Distribution, and Consumption Policies Within a Dual Pricing Mechanism : A Case Study of Bangladesh*. Research Report 8, International Food Policy Res. Institute, Washington D.C.
- (1981) : *Agricultural Price Policies under Complex Socio economic and Natural Constraints : The Case of Bangladesh*. Res. Report 27, International Food Policy Res. Institute, Washington D.C.
- Alamgir, M. and Berlage L. (1973) : "Foodgrains (Rice and Wheat) Demand, Import and Price Policy for Bangladesh" *The Bangladesh Economic Review*, I, 1 (January 1973).
- Bayes, A. (1984) : *An Evaluation of Combined Price support and Fertilizer Subsidy Policies for Rice self-sufficiency in Bangladesh*. An Unpublished Masters Dissertation, University of New England, Armidale, Australia.
- Bangladesh Bureau of Statistics (1982) : *Statistical Year book of Bangladesh*. Ministry of Planning, Govt. of the Peoples' Republic of Bangladesh.
- Bangladesh Bureau of Statistics (1986a) *Statistical Year book of Bangladesh*. Ministry of Planning, Govt. of the Peoples' Republic of Bangladesh.
- Bangladesh Bureau of statistics (1986b) : *Statistical Year book of Bangladesh*. Ministry of Planning, Govt. of the People's Republic of Bangladesh.
- Chowdhury, N. (1986) : "Public foodgrain Distribution system in Bangladesh in the Post Liberation Period : A Historical Profile". *The Bangladesh Development Studies*, XIV 3 (September 1986).
- Cochrane W. (1980) : "Some Nonconformist thoughts on Welfare Economics and Commodity-Stabilization Policy". *American J. of Agric. Economics*. 62, (Aug. 1980)
- Cummings, J.T. (1974) : "The Supply Responsiveness of Bangladesh Rice and Cash Crop Cultivators". *The Bangladesh Development Studies*, II, 4 (Oct. 1974).
- Currie, J.M. Murphy, J.A. and Schmit ; A. (1971) : "The Concept of Economic Surplus and Its Use in Economic Analysis". *The Economic Journal*, 81, (December 1971).
- Gunawardana, P.J. and Quilkey; J.J.(1986) "Shifts in Short run Demand and Supply Curves and Their Implications for Ex-post Evaluation of Agricultural Pricing Policies." Paper presented to the 30th Annual Conference of the Australian Agricultural Economics Society. Canberra : February 1986.
- Hossain M (1980) : "Foodgrain Production in Bangladesh : Performance, Potential and Constraints". *The Bangladesh Development Studies*. VIII, I, 2 (Winter-Summer 1980)
- (1984) : *Increasing Food Availability in Bangladesh : Constraint and Possibilities*. Technical Paper 'A', Food Strategy Exercise. Ministry of Agriculture, 1984 (mimeo)

- International Bank for Reconstruction and Development (1972) : *Land and Water Resources Sector Study*, Bangladesh. Technical Report No. 8. Washington D.C.
- Institute of Nutrition and Food Science (1977): *Nutritive Values of Indigenous Food Stuff* (in Bengali). University of Dhaka.
- Karim ; R. (1983) : *Multisectoral Model for Agricultural Policy Analysis in Bangladesh*. An Unpublished Ph. D Thesis, La Trobe University, Melbourne.
- Osmani, S.R. and Quasem ; A. (1987) : *Pricing and Subsidy Policies-Their Impact and Relevance for Domestic resource Allocation and Mobilization (Pricing and Subsidy Policies for Bangladesh Agriculture)*. Bangladesh Institute of Development Studies, Dhaka (mimeo).
- Pitt, M.M. (1983) : "Food Preferences and Nutrition in Rural Bangladesh". *The Review of Economics and Statistics*. 65, 1 (Feb. 1983).
- Tolley, G.S., Thomas, V and Wong , C.M. (1982) : *Agricultural Price Policies and the Developed Countries*. John Hopkins University Press, Baltimore.
- Willing ; R.D. (1976) : "consumers' Surplus Without Apology". *American Econ. Review*, 64, 4.
- World Bank (1979) : *Bangladesh, Food Policy Issues*. Report No. 2761-BD Washington D.C.