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Comparative Advantage of Foodgrains Production in Bangladesh: Estimates and Implications

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INTRODUCTION

Agriculture is the dominant sector in the Bangladesh economy, accounting approximately for 47 percent of GDP, 58 percent of total employment and 40 percent of foreign exchange earnings. Within agriculture the production of foodgrains, particularly that of rice, is by far the most important of all activities. The acreage (2.47 acre = 1 hectare) under rice has remained virtually unchanged over the eighties which is estimated at 25,474 thousand acres in 1980/81 and 25,507 thousand acres in 1987/88. This represents, however, more than 77 percent of the country's total cropped area; and the value of foodgrains output accounts for about 75 percent of total agricultural production value (BBS 1989). Most of the development programming and policy directions in the country have been heavily influenced by considerations over attainment of self-sufficiency in foodgrains production, but Bangladesh still remains a food deficit area, and that, inspite of the fact that total foodgrains production has increased from 13,563 thousand metric tons in 1980 to 16,251 thousand metric tons by 1989. Although there has occurred a marked increase in yield volumes over time - attributable significantly to the extensive introduction of HYV Boro, a variety grown during the natural-hazard-free period of the year - the per capita growth rate in food production turned out to be negative because of the higher population growth rate. Concerns have, therefore, been expressed in different quarters that if the current trend in population growth and food production continues, attainment of food self-sufficiency even by the revised target date of 1992 will remain as elusive as in the past and in fact, the gap between food production and its requirements will widen dramatically over time. All the same, so abiding has been the compulsion to fill up this gap both from the Bangladesh side as well as many donor assistance programmes which have projected self-sufficiency as a justification for continuing with the huge level of general assistance and food aid programmes, that nobody ever paused to ponder and question the wisdom of such an objective. It has been almost taken for granted that Bangladesh will certainly be economically better off by following the self-sufficiency path. Even the recently completed Agriculture Sector Review Study (UNDP 1989) takes such a position as its given point of departure and does not seriously examine the relative merits and demerits of the food self-sufficiency issue. As a result, there is a critical lacuna in our current knowledge about comparative advantage of producing different crops in Bangladesh. An attempt is made in this paper not to act as an iconoclast but simply to probe from the academic standpoint a subject which deserves closer attention from researchers but has up till now been surprisingly accepted almost as a matter of faith in this country.

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The study uses a number of standard economic tools, as detailed in section of method and data, but is essentially preliminary in nature and is confined to rice and wheat production only. Section of results and interpretation presents the estimated results along with some brief interpretations of the same. The limitations of the study are next set out in section of limitation of the study, while, finally, some concluding observations are made in section of conclusion.

LIMITATIONS OF THE STUDY

One major general problem of this study, as already noted, relates to the dubious nature of data. In addition, there are methodological issues involved in all our estimates which render our results somewhat tentative. For example, with regard to nominal protection coefficients, several shortcomings may be noted. As is well known, world prices (import prices) of foodgrains in Bangladesh, specially of wheat, contain subsidies the extent of which is difficult to determine and hence were ignored for the purpose of our estimates. Also the protection revealed is the outcome of a series of uncoordinated policy decisions, many of which are not (and/or cannot be) taken into consideration. Moreover, since the international prices are exogenous, the domestic prices are determined more on the basis of the demand supply equilibrium rather than on cost of production plus protection basis. Again, augmentation of domestic supply through commercial imports by government is restricted due to foreign exchange controls.

Similarly, with regard to ERP estimates, they do not capture the effects of all tax and subsidy measures. In particular, subsidy elements were ignored in the calculations for lack of segregated data on subsidy contents in the different agricultural inputs. However, the importance of agricultural subsidies which totalled about TK. 3049 million in 1980/81 and declined to TK. 1301 million in 1987/88, are of diminishing importance in Bangladesh and therefore, they are unlikely to have any long-term impact on the protective rates.

Finally, the DRC (and consequently RCR) estimates are sensitive to assumptions on input-output coefficients, crop yields, prices (nominal and shadow) and shadow exchange rates, all of which are necessarily subject to some degrees of inaccuracies in a developing country like Bangladesh. Therefore, caution dictates that we do not treat our findings as conclusive, although they definitely have some indicative values.

METHOD AND DATA

We have made a series of estimates beginning with Nominal Protection Coefficients (NPC), defined as the ratios of domestic prices (Pd) to international prices (Pw), and the Nominal Rate of Protection NRP= Pd-Pw/Pw=(Pd/Pw)-1=(NPC-1). Because the excess of domestic over world market price can be regarded as an "implicit tariff", the ratio of the former to the latter is defined as an index of product protection. Ordinarily both price measures (e.g. tariffs, sales taxes, development surcharge, export taxes or subsidies, multiple exchange rates etc.) and non-price measures (e.g. quota, licensing, exchange control, import prohibition etc.) are used as instruments of protection and hence in computing the nominal protection the tariff equivalent of both

measures has been estimated. On the other hand, the implicit tariff on/or nominal protection rate for input (NPRi) has been calculated with the help of the following formula:

$$NPRi = P'di - P'wi/P'wi = (P'di/P'wi) - 1$$

where, $P'di$ = domestic price of input i,
$P'wi$ = world price of input i, and
$i = 1,2.....$, n (inputs).

As compared to NRP, the effective rate of protection (ERP) measures the margin of protection not on the product, but on the value added (i.e. gross value of output- cost of material inputs) and is usually considered a better indicator of the impact of trade regime on incentives (Balassa 1965; Corden 1966; Johnson 1965). It takes the whole activity in consideration and measures the joint effects of tariffs and other protective measures applied to both inputs and output. The concept of value added is central to any effective rate of assistance measures and ERP is the proportion by which per unit value added is changed by assistance policies affecting its inputs and outputs. To calculate ERP, we first derive the effective protection co-efficient (EPC) as follows:

$$EPc = \frac{O_d - I_d}{O_w - I_w} = \frac{V_d}{V_w}$$

where, O_d = domestic value of output or output valued at domestic (wholesale) prices,
I_d = value of material inputs at domestic (financial) prices $= \sum_{i=1}^{n} P'di$,
V_d = domestic value added,
O_w = value of output at border (economic) prices,
I_w = value of material input at border (economic) prices $= \sum_{i=1}^{n} P'wi$, and
V_w = value added at world prices.

The equation for effective protection rate is : $ERP = \frac{V_d - V_x}{V_w} = \frac{V_d}{V_w} - 1.$

therefore, ERP = EPC-1.

Next, we have made an attempt to estimate the Domestic Resource Cost (DRC) which is a measure of the economic cost of domestic factors of production needed to produce a unit of value added. In order that DRC provides a useful policy advice it is

important that both the costs and the benefits of the activity be valued at shadow prices and thus avoid the distorting effect of current prices.

The formula, which is based on International Food Policy Reasearch Institute (1987), used is:

$$DRC = \frac{\text{Domestic cost of factors of production in Shadow Prices per unit of output}}{\text{Border price of output - Foreign costs per unit of output in Border Prices}}$$

When DRC is divided by the shadow exchange rate (SER), we derive what is known as the Resource Cost Ratio (RCR). In other words, RCR = DRC/SER, hence, that the DRC and consequently RCR can be thought of as a cost benefit ratio with the numerator representing cost and the denominator benefit. Activities with relatively low DRCs (RCRs) are considered as economically efficient and enjoying comparative advantage in that they yield a relatively large benefit per unit of domestic resources employed. Activities which do not have comparative advantage and need to be discouraged. If the RCR coefficient is greater than one, the opportunity cost of domestic factors of production is greater than the benefits of their being employed in that activity. To the extent that the shadow cost of domestic factors of production is closely related to value added, the DRC is closely linked with the ERP. In general, the lower the DRC more desirable the activity is and the lower the effective rate of protection needed for it to the profitable.

Finally, in order to have an idea of the extent of economic profitability of foodgrains production in Bangladesh, we have also calculated net economic profit of foodgrains production at wholesale prices (NEPW) as under:

NEP = $Y \times P_i$ - [(C+My) in shadow prices]

where Y = yield per acro in maunds (1maund = 37.32 kg),

P_i = border price or import price (TK/maund),

C = cost of production per acre yield, and

My = marketing, including transport and processing cost per acre yield.

As far as basic data used in this paper are concerned, they have been taken, unless otherwise specified, from the Costs and Returns Survey of the Agro-economic Research Unit (AERU), Ministry of Agriculture, for the years 1980/81,1988/89. For a number of reasons, explained elsewhere (Reza, 1990), we confine our analysis on transplanted Aman, HYV Boro and HYV Wheat only, keeping Aus variety out of our purview. In fact, agriculture statistics in Bangladesh vary widely depending on whether they are AERU or the Bangladesh Bureau of Statistics (BBS) estimates, the ambiguity in the official agro-statistics in Bangladesh has been a vexing problem for both researchers and policy planners. However, since cost figures are provided only by AERU, we have preferred to use the same source also for the yield figures to ensure at least some element of consistency in the analysis.

RESULTS AND INTERPRETATION

Because of the non-availability of the international price data separately for Boro and Aman we have calculated the NPC and NRP for rice as a single broad category and c.i.f. import price for rice is taken as the same for both Boro and Aman for estimating the world value of domestic output (Ow). The estimated NRPs for wheat and rice are presented in table 1. The results do not indicate any specific trend in protection of the domestic producers during 1980/81-1987/1988. However it can be easily seen that the domestic producers had been taxed in relation to world prices before 1984/85, while in recent years, they appear to enjoy protection to some extent. This may be contrasted with the ASR suggestion that the trade regime in Bangladesh neither penalises nor favours farm producers (UNDP 1989).

Table 1

Nominal Protection Rate for Output

(Percentage Values)

	1980/81	1981/82	1982/83	1983/84	1984/85	1985/1986	1986/87	1987/88
Rice	-43	-8	-4	-10	24	30	60	35
Wheat	-16	-17	-4	-1	5	-11	16	30

Source: Author's estimates based on the basic data of, AERU, BBS, and World Bank's Bangladesh:*Recent Economic Development and short term perspectives* (1989).

The estimates on NPRi, as presented in Table 2, clearly demonstrate some distortions in the domestic input prices from the world prices. However, it appears that the nominal protection rates for output outweigh the implicit tariff on inputs.

Table 2

Implicit Tariff on Input

(Percentage Values)

Crop	1984/85	1987/88
HYP Aman (Paddy)	13	20
HYV Boro (Paddy)	6	11
HYB Wheat	27	22

Source: Author's estimates based on AERU data.

Looking at ERP estimates, as provided in table 3, we find that all food grains enjoy some degrees of effective protection in Bangladesh which stem from the package of subsidies and incentive prices or exemption of duties on imports of agricultural inputs, rescheduling of loans or interest rebates and write-offs etc.

Table 3

Effective Rates of Protection

(Percentage Values)

Crop	1984/85	1987/88
Aman (Paddy)	56	91
Boro (Paddy)	53	82
Wheat	15	89

Source: Author's estimates; for basic data source see table 1.
Details are available in Reza (1990).

Table 4 presents the estimates with respect to DRC and RCR. It is found that all DRC Values are less than 1 except for HYV wheat in 1987/88. However, in contrast, RCR is found to be less than one only for HYV Aman in 1984/85 which also changed in 1987/88, probably as a result of severe crop damage due to unusual flood in that year. In other words, our results indicate that production of neither Boro nor wheat had any comparative advantage in the reference years and the situation was particularly bad for wheat in 1987/88, which however, seems to be a consequence of AERU's doubtfully inflated cost of production estimates for wheat in 1987/88.

Table 4

DRC and RCR for Foodgrains Production in Bangaladesh

	DRC		RCR	
	1984/85	1987/88	1986/87	1987/88
HYV Aman (Paddy)	0.71	0.86	0.87	1.05
HYV Boro (Paddy)	0.92	0.91	1.12	1.11
HYV wheat	0.92	1.60	1.12	1.95

Note : Shadow prices used for both the years are estimates for 1987/88.
Source : Author's estimates based on AERU data and shadow price figures as provided in TIP (1988); for basic calculations see Reza (1990),

Finally, the estimates on profitability of foodgrains in Bangladesh, as presented in table 5, show that production of only HYV Aman may be justified on economic considerations and that cultivation of both Boro and Wheat lead to significant losses. Although net economic profit for Aman is found moderately negative in 1987/88, this may probably be explained by the extensive crop damage in that year. This is indicative of the fact that under the current circumstances, resource use in agriculture in this country is rather inefficient and that management of foodgrains production is quite poor, which contributes to negative net economic profit from this sector.

Table 5

Net Economic Profit in Food Production

(Tk/acre yield)

Crop	1984/85	1987/88
HYV Aman (Paddy)	937	-10
	(23.10)	(-0.27)
HYV Boro (Paddy)	-484	-554
	(-11.17)	(-11.12)
HYV Wheat	-171	-1836
	(-7.07)	(96.58)

Note: Figures in parentheses indicate net economic profit per maund. (1Maund=37.32 Kg, TK is Bangladesh currency.)
Source: Same as table 4.

CONCLUSIONS

It is found that Bangladesh does not enjoy comparative advantage in producing Boro Paddy and wheat. All the same, in an economy characterized by subsistence farming and negative per capita growth of foodgrains production, it would be only rational for farmers to continue to engage most of their lands for growing food crops. Some degrees of competition are provided during the wet season by jute and by a host of winter crops during the dry season, but the choice is mostly limited to marginal shifts and the supremacy of paddy is unlikely to be threatened (Vylder 1982).

The Bangladesh government policies also appear to be guided by major concerns to ensure food security which possibly explains the nominal and effective protection provided to foodgrains cultivation. Food security apart, it is also noteworthy, that comparative advantage in particular line is not a permanent phenomenon and that it itself may change in a dynamic context, specially when viewed against the fact that the international market for foodgrains is usually very volatile. Therefore, inspite of our findings about the absence of comparative advantage at a particular point in time, it does not necessarily lead to a recommendation of completely switching over to other crops.

Moreover, deliberate attempts can also be made to change the comparative advantage in favour of Bangladesh. As is well known, Bangladesh still suffers from an extremely low yield rate for rice. The yield rate is 1.98 tons per hectare in Bangladesh as compared to as high as 5.63 tons for Egypt and 5.51 tons for South Korea. For neighbouring Pakistan and Sri Lanka, the figures are 2.45 and 2.51 tons, respectively although they are somewhat lower than Bangladesh in the case of India and Nepal. (FAO, 1985). The situation can be easily bettered by a suitable policy mix, including for example, further spread of new technology, which, however, requires the existence of a congenial socio-economic environment. An important element in this respect, for example, may be identified as the rice-urea price ratio which has increased in this country from 0.869 in 1985 to 1.089 in 1987, which still compares quite unfavourably with a large number of countries including India, Sri Lanka, Philippines, and South Korea. THis is probably one reason why fertilizer use in Bangladesh is still extremely

low and is estimated at 44 kg/ha against as high as 248 in Egypt and 351 in South Korea.

As far as wheat production is concerned, it is evidently less competitive than rice in the Bangladesh context. Even then, considering the higher nutritional value, shorter maturation period and the lower risk of exposure to natural calamities, its cultivation should not be totally ignored. However, within the country some regions are better suited for its cultivation than others and only a detailed study can possibly determine the areas and the extent to which it can be profitably produced in Bangladesh.

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