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THE STRUCTURE AND CONDUCT OF BANGLADESH'S WHEAT MARKETS: SOME EMERGING INSIGHTS

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(USAID Contract No: 388 - 0027 - C - 00 - 9026 - 00)

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Bangladesh Food Policy Project

August, 1993

* Author is Marketing Economist with IFPRI's Dhaka Office. He is indebted to Steven Haggblade and Raisuddin Ahmed for stimulating interactions while preparing this report. Nasir Farid, FPMU Assistant Chief, helped with some very useful data from his data files. The primary data used herein were generated during IFPRI Wheat Marketing Survey and Farm Survey. Mahbub Morshed and Shoumi Mustafa, both former IFPRI Research Assistants and subsequently Dhaka University Economics Lecturers contributed to designs for primary data collection. All of IFPRI field staff of those surveys and especially the Field Coordinator, Shahjahan Mia, deserve the author's appreciation for their dedicated performance. Rahima Kaneez and Kibria Khan, IFPRI Research Assistants, painstakingly cleaned and crunched the numbers. Nasreen Fatima Haque, IFPRI Office Secretary, wordprocessed several versions of an oft-changing manuscript, and produced this report. To all these dutiful colleagues, the author wants to express his appreciation for their support or assistance. The author remains responsible for all remaining shortcomings of this paper. He is grateful to the Government of Bangladesh and the USAID for creating the mandate for the study. This report does not necessarily reflect the position of USAID.

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Executive Summary

Introduction

(1) With projections upto the year 2000 pointing up strong likelihood of wheat deficits in most years (and rice surpluses in most years) and with visible gains in relative wheat prices to match, the case for the crystallization of a core of firm knowledge about the structure, conduct and performance of the wheat market in Bangladesh has become compelling as never before. This study, presented as no more than a modest first cut in an involved area, utilizes data from two sample surveys designed specifically to address the issues that relate to these themes.

Issues of Wheat Demand

(2) During the seventeen years through 1991/92, trend growth rate of wheat utilization, at 1.5% per year, tops that for rice. In 1988/89, wheat fared about 15% of total foodgrain availability. For the same year, HES wheat's proportionate share in national foodgrain consumption, at 11%, understates, as does its estimate of urban Bangladesh's relative share in wheat consumption. Wheat the HES passes for wheat consumption omits that of wheat-using processed food --- where urban areas predominate --- and wheat's use as cattlefeed, the dairy industry being a suburban activity. HES therefore understates urban wheat consumption more. Estimates of cross-price elasticity of wheat demand with respect to rice price in currency seem likely to overstate because omitted, mainly urban, component is more powerfully influenced by a battery of nonprice variables --- female labor force participation, for example --- most of whom

having positive correlation with incomes and unit values (the proxy for prices used by most demand models using HES data). Absent these nonprice variables in the estimation, which is the case with the estimates in currency, cross-price elasticity can overstate.

(3) The case is more firm that rural wheat consumption demand has negative income elasticity. Urban wheat consumption, for all its understatement, is mildly income-responsive. The component of wheat demand omitted from HES is presumably more income elastic. There is some room for agnosticism about the overall wheat income elasticity of demand.

Issues of Wheat Market Supply

(4) Domestic wheat production grew at a trend rate of 12% during the seventeen years through 1991/92. Area growth swamped yield growth as a source of production growth: in this respect, Bangladesh stands off from other nontraditional wheat growers among developing countries. Production variability is extremely high: here, too, area, not yield, variability leads. In turn, wheat area variability is more substantively due to climatic, morphological and crop rotational imponderables, not price-responsive rice-wheat substitution.

Factors determining Bangladesh's wheat import dependency

(5) Some admittedly ad hoc regressions show that imports per capita registers a significantly positive time trend. Public rice stock and wheat imports, both lagged by one year, decrease per capita wheat imports. The first of these

effects turns on price expectational effects of public rice stocks. The second effect reflects a possible two-year cyclicity of international wheat donations to Bangladesh.

Prices

(6) During the seventeen years through 1991/92, real wheat price fell at annual rate of 2.8%, as against 2.9% for rice. Note that wheat availability grew far more rapidly than for rice but that real price declines for both are of the same order of magnitude.

Structure of the Wheat market

(7) In 1992, we estimate the wheat economy to have 11981 processors including thousands of small units for custom milling, and about 28 thousand traders of assorted description and about 8 thousand bakeries. Between 1985 and 1992, the number of wheat allottees in the Flour Mills (FM) channel of the public food distribution system (PFDS) grew at a compound annual rate of 7.8%. The number of atta chakkis rose also at 7.8% between 1987 and 1992. The ranks of wheat processors thus swelled rapidly. The number of wheat wholesaling, however, grew more slowly, by common consent.

(8) Despite relatively rapid growth in the number of units, the industry appears to remain concentrated: forty eight per cent of milling capacity are retained by only 2% of the establishments. The class of units at hand here relates to major and compact mills: nearly three fourths of their capacity are located in four terminal markets, viz. Dhaka, Narayangnaj, Chittagong and Khulna. Wheat milling, despite

the appearance of concentration, is, however, not oligopolistic in structure.

Spatial Movement of Wheat

(9) Western parts of Bangladesh, especially the five greater districts of the Rajshahi division, produces a lion's share of the country's marketed surplus of wheat. Market coordination has these surpluses transported to the mills that, for the most part, are located in eastern Bangladesh. Much like the spatial flow of surplus domestic wheat, the flow of the wheat deflected mainly off aided channels is also from western Bangladesh into the eastern cities and populous towns.

Wheat's Marketing Channel

(10) The summary observations here treat the marketing channel of domestic wheat and imported wheat separately.

(11) Seventy seven per cent of farm wheat surplus are marketed during first two months following harvests. These are mopped up by terminal wholesalers but also by assembler-wholesalers. Wholesalers on our sample were found to tap other wholesalers for as much as half their purchases of domestic wheat (Table 13). Even at the wholesalers' level, there is a division of labor between two sets of agents. Specialization has proceeded far. Beparis, farias and farmers divided up the balance of wholesalers' collection on a 54:34:12 ratio. More than two-fifths of the farias' collections are from other farias. Beparis collect about 40% of their merchandise from other, presumably smaller-scale, beparis. Numerous, parttime petty traders, with low

opportunity costs to match, are transporting the wheat from the farmgate to the wholesaler, each adding a little of marketing value in the process.

(12) The "retrading" channel for imported wheat is different. The evidence suggests active retrading for "dudhia", "dhepa" and Australian varieties after they leach into the market. FFW sardars and chairmen of the project implementation committee (PICs) are a rich artery to tap for farias and beparis for two of the five grades covered. The wholesalers draw forth their supplies of imported wheat from a number of concurrent sources --- evidence that the network of trade contacts that comprise the market chain is dense.

Marketing Chain for the Millers

(13) Both roller and major/compact classes of mills actively rely on trade networks, as opposed to their own buying staff, for sourcing wheat requirements. Major/compact class of millers tap wholesalers for about 52% of their wheat purchases; and beparis for about 30% (Table 12). Roller mills tap wholesalers for 55% of their wheat needs, and beparis for about 27% (Table 12).

Ownership and Dispersion of Wheat Stocks

(14) Seasonal data show that farm wheat stocks disappear especially quickly during March and April, as a consequence of heavy selling (Table 6; Table 14). Eighty-nine percent of a year's marketing are all marketed during the first five months after harvest. Surplus stock transits during this part of the marketing season from the farmer's storage to assembler-wholesalers', involving transportation in the 25-

100 mile range. But this may also entail a spatial relocation of the farm stocks to terminal wholesalers' storage in eastern Bangladesh altogether, involving transits in the 200-350 miles range. From dispersed location among numerous farms, especially small farms, in wheat-surplus districts, the stocks are relocated into a regime of more concentrated ownership of wholesalers and stockists, in wheat-deficit eastern Bangladesh.

Conduct of Wheat Market

(15) During the year through march 1993, the milling industry sourced their wheat requirement by tapping (a) leakages off PFDS channels; (b) DGF allotments; (c) marketed surplus of domestic production; and (d) private imports. During study year, a total of 160 thousand MT of wheat, or 45% of the total, are estimated to have been monetized in FFW and VGD. A preponderant proportion (80% or more) of this was mediated by wheat's market channel to urban mills, not retained within rural areas (Table 18, 10). The point is not that so much of publicly-subsidized wheat is recycled into the market flows due to the *esprit de corps* of invisible market coordination, which has been known for quite some time, but that so much of it should be ending up as part of urban consumption. Because an overwhelming proportion Bangladesh's poor population live in rural areas, the urban bias of monetization of targeted wheat deliveries significantly weakens the case for inkind distribution.

(16) Wheat milling is an yearround industry: it is not seasonal or spasmodic. Wheat markets are open for business throughout the year, even though there, as would be inevitable, is some marked seasonal ebbs and flow in the

volume of business. Millers' rate of wheat millage registers a fair degree of stability across months for virtually all types of imported wheat. The notable, but unsurprising, thing is that the rate of millage of domestic wheat --- the trade in which is legal --- is much more seasonally variable than for imported wheat, of which a significantly large component is taboo for retrading. This is unsurprising because, characteristics of final demand shape supply, seasonality included, and flour demand, of which the staples are the imported wheat, is seasonally more stable, than can be said for the domestic wheat (Appendix Table 1).

(17) Cross-month variability in prices is not excessive for any of the imported wheat variables, but the matched variability is significantly larger for domestic wheat (Appendix Table 2).

Performance of Wheat Markets

(18) Wheat marketing margin is estimated at 41% for the year through March 1993. This is significantly higher than for rice. This is higher, too, than the magnitude reported by FPMU/IFPRI rapid rural appraisal for 1991/92. Marketing margin of wheat is higher than for rice, in part because retrading, which is taboo *de jure*, chalks up costs *sotto voce*, which do not exist in rice marketing. Also, the marketing grid is spatially more truncated and specialized, not of national scope and as "democratic" as for rice.

The Case for Monetization

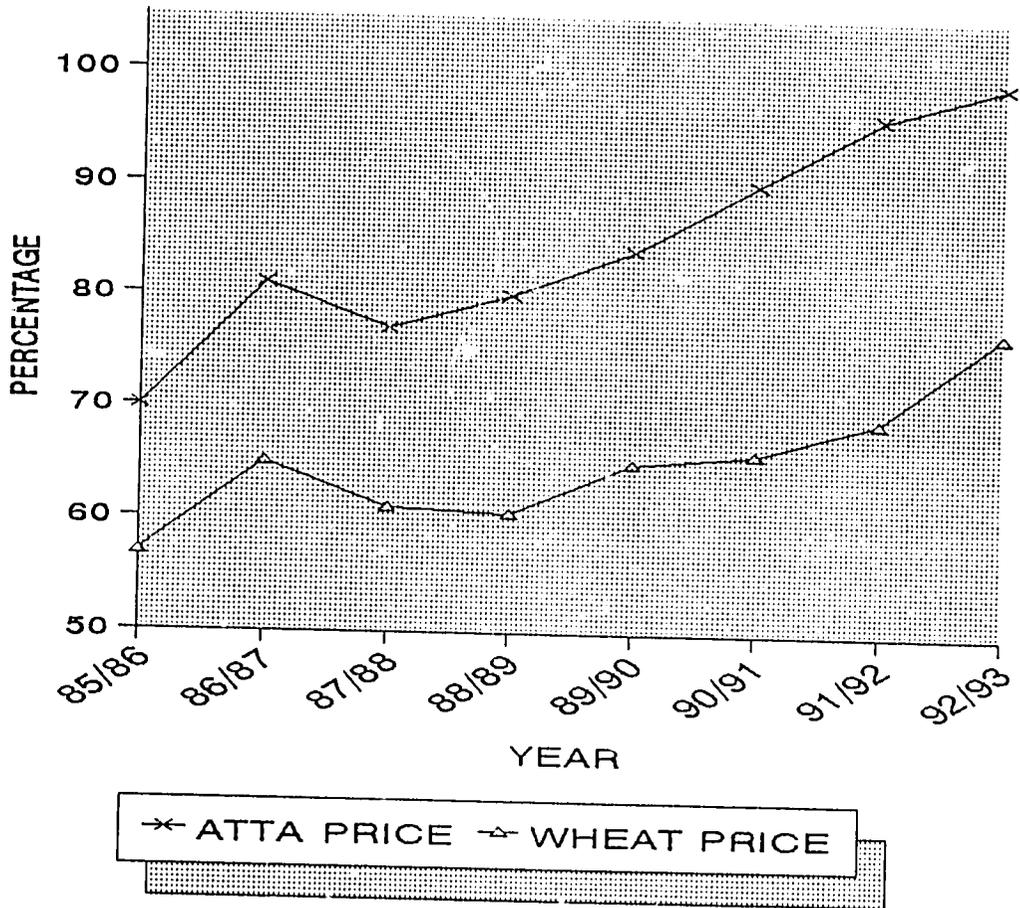
(19) The evidence creates some nagging questions about what remains of the case for targeted distribution of wheat for such schemes as Food for Work Program, Test Relief and the like. Foodgrains are available; their markets, for the most part, are labor-intensive, participatory. Even poor households in remote areas are able to buy rice in most seasons what quantity it has money to buy. For these types of targeted programs, powerlessness is not at issue to justify distribution in kind. And bureaucratic managerial capacity is not more suited to handling food in kind than cash funds. (For VGD, powerlessness can be invoked with greater conviction. But, even here, there is hardly any room for dogma.)

I Introduction

One of the most riveting recent changes in Bangladesh's foodgrain markets is about shifts in price relativity between rice on the one hand, and wheat and, more to the point, atta (Fig. 1). Atta prices acquired near parity with coarse rice even before the onset of rice's precipitous price decline, as against the traditional 65%-70%. With projections upto the year 2000 pointing up deficits in wheat and surpluses in rice for Bangladesh (Goletti and Ahmed, 1990), and with an accent on maximizing counterpart yields of aided wheat, the wheat question has recently acquired a new policy significance. With humanitarian commodity aid increasingly whittled down following the cessation of the cold war, the accent is now on the imperative to increase the cost-effectiveness of food aid. As well as underlining the importance of better targetting, this has now packed more punch in the case for the production of firmer knowledge about the structure and conduct of markets that source off food aid conduits. It will be remembered that the evaluation of the relative merits of targeted distribution of food as distinct from its monetization turns for guidance on whether and how markets perform. The case for insights about wheat markets, a tenable one in times past, has now become a compelling one.

This study has been undertaken in order to light upon the structure, conduct and performance of Bangladesh's wheat markets. So that it may become possible to mount a searching examination of some of the fundamental economic questions surrounding them, the author has utilized data

Figure 1 -- Wheat-rice Relative Prices 1985/86-1992/93



from two concurrent sample surveys during the first half of 1993.¹ The objectives of the study are as follows:

- (a) to understand the present structure of the wheat market in terms of the number and size-distribution of the units, the spatial flow of and the marketing channel for wheat and the dense network of commercial contacts through which wheat flows from upstream farmers and traders further downstream;
- (b) to understand the conduct of the establishments in the wheat market amid a two tier wheat market (one public the other private), in terms of pricing of the flour output;
- (c) to understand the size of the market for wheat, especially local wheat, seasonality of wheat marketing and farm stocks;
- (d) to ascertain the marketing margin on wheat;
- (e) to evaluate the implications of wheat market insights for the pros and cons of monetization.

¹The data sources are described in an Appendix-III.

A survey of the literature

Very little hard knowledge exist about wheat markets.² In this sense, the present study is a first cut in a fairly misty area.

Structure of the report

The rest of the paper is structured as follows. Because marketing actions of agents are driven by what will sell, we begin with the demand for wheat, in section II. This is followed by the supply side issues, in section III, where the channels that mediate PFDS wheat into market streams are also elucidated. Section IV takes up the structure of the wheat market. Section V examines the conduct of the market and section VI looks at wheat market performance. Section VII puts the insights gleaned from the preceding sections in the context of the pros and cons of monetization of wheat aid. Section VIII presents the main conclusions.

²For quite fragmentary evidence on the size of the market for domestic wheat, see Maziruddin (1988), and World Bank (1988). FPMU/IFPRI, in 1992, conducted a Rapid Rural Appraisal (RRA) on Wheat marketing. This effort comprised interviews with a small sample of flour millers, and produced some results, especially about marketing margin in wheat distribution. These results, despite their small sample limitations, remain the first ever expose of some intriguing aspects of wheat markets. Chowdhury et al (1988) estimated the cost of distribution of *atta* produced by rural *chakkis* for 1986/87, using data for 33 approved *chakkis* selected from eight thanas from all over Bangladesh.

Limitations of the report

Before going any further, it is imperative to issue forth a disclaimer. Several important aspects of market conduct and performance are not even raised, let alone discussed or resolved hereinafter. These include (i) market integration and price discovery, (ii) the "access" to credit, (iii) the trade practices, (iv) the rates of returns relative to some competitive norms. These remained unaddressed in the present exercise because they turn on some data that have yet to be fully processed. These omissions do not hopelessly cripple where, as at present, one's desire is to make an approach towards an informed descriptive account of the wheat market structure and conduct. They however imply that this treatment is short of a compelling analysis of the same subject.

II The Wheat Market: the Demand Issues

On the demand side, the following are important measurement issues for the wheat economy. What is the total size of the wheat market? What are the rural and urban relative shares in it? What are average wheat consumption in rural and urban areas? What is the income elasticity of demand for wheat in Bangladesh? What are the key nonincome determinants of wheat in general?

The data required to answer all these questions is not as yet on hand. Even so, we have amassed what data is available. In the main, we rely upon macro data on wheat availability (opening stock plus net production plus net public distribution minus closing stock)³, cross-section data on wheat consumption pattern from Household Expenditure Survey (HES), and other more fragmentary sources.

Aggregate utilization for wheat

Table 1 shows that overall wheat availability grew during the 17 years through 1991/92 at a rate of 3.5% per year. It will not be very erroneous to treat this as the growth rate of the sum of consumption and intermediate use

³Existing data makes it impossible to evaluate changes in demand over time. To equate demand with availability is untenable. The most one can do is to equate utilization with availability; this is the procedure used here, when the context called for time series data.

Table 1 -- Major Trends in Rice and Wheat Markets, 1974-1992

(time trends; % per year)

Variable	1974-85		1981-92		1974-92	
	Growth rate	Variability	Growth rate	Variability	Growth rate	Variability
Wheat area	19.2	35.7	.6	31.2	9.8	34.6
Wheat output	27.9	44.0	-.8	40.2	12.2	50.6
Wheat yield	7.3	26.3	-1.4	22.6	2.2	19.7
Wheat import	2.8	31.0	2.3	27.6	1.7	31.0
Rice area	0.6	2.4	.02	2.6	0.3	2.1
Rice output	2.2	3.6	2.7	3.0	2.5	3.3
Rice yield	1.6	4.4	2.7	3.8	2.2	3.2
Rice import	-.8	89.0	-12.0	99.0	-8.6	125.0
Wheat availability	3.8	26.6	1.1	22.7	3.5	29
Rice availability	2.3	3.3	2.7	3.0	2.4	3.3
Real wheat price	-6.2	33.8	0.6	41.8	-2.8	22.8
Real rice price	-5.8	30.0	0.2	38.0	-2.9	21.1
Wheat-rice price relative	-0.5	5.9	0.4	5.4	.03	5.1

Note: Availability equals opening stock plus net production plus offtake minus procurement minus closing stock. Offtake means public distribution. Variability is measured as the standard deviation of percentage deviation from trend. Computation of the more fluctuation-sensitive Kakwani growth rates did not significantly change conclusions based on time trends. They are not reported here for that reason.

Source: DGF data; BBS data from various yearbooks.

of wheat.⁴ Per capita wheat availability on the other hand grew at a trend rate of 1.5% per annum during this period. This growth rate of wheat utilization is higher than for rice. And an oversimplified model of wheat utilization using timeseries data shows that income elasticity of utilization for wheat was about 0.52.⁵ That is, a ten percent increase in average incomes causes a five percent increase in wheat utilization. Because the appropriate interpretation of the coefficients in a time series regression is made problematical by complications associated with the problem of structural change, we would not read fine print in these results. Unreliable as they are, they nonetheless do convincingly argue against taking at face value the estimates of (much lower) income elasticities from cross-section results, treated later below.

HES results about wheat consumption

Household Expenditure Survey (HES) remains the only source of nationally representative data on household budgets. Table 2 reports per capita intakes of rice and wheat per month relative to rural and urban households for 1988/89. The one key result in this table is that 11% of foodgrain intake in 1988/89 according to HES is wheat. Data

⁴There is no reason to believe that changes in stock had a strongly rising trend component to them; the statement in the text would in that case, strictly speaking, be incorrect. Per capita wheat stocks if anything went down towards the end of our period.

⁵It is to be granted that this simplified model does not do any justice to the analytical requirements of estimation of parameters of demand amid the presence of rationing, and in-kind wheat distribution as part of the government's poverty alleviation program.

on availability suggest that, for that year, wheat fares 15% of overall cereal availability.⁶ Table 3 reconciles economy-wide consumption estimates for rice and wheat based on HES intake data with the corresponding availability levels. For two of the three years the HES wheat intake data betray serious "understatement" relative to availability levels. Part of this owes to HES intake data omitting intermediate demand associated with wheat.⁷ Significantly, the understating years are in the second half of 1980s.⁸ Another part of the understatement owes to HES intake data being exclusive of wheat that is eaten as part of processed food (BBS, 1991). There is no well-accepted basis for the apportionment of this as between its rural and urban components. Only very rough suppositions can be proffered at this juncture. For one, the understatement due to processed wheat product consumption must almost entirely be associated with urban areas. For a second, the commercial dairy industry is a mainly suburban activity, for reasons of proximity to markets. Urban wheat consumption is thus more significantly understated in the HES data than is its rural counterpart. At first glance, HES data appear to suggest the rural proportion in wheat consumption at three quarters or so. However, this is to overstate grossly. All

⁶There is a hint here that HES wheat consumption data understates in the aggregate.

⁷As shown below, wheat outputs bran --- the most important cattlefeed in Bangladesh. Also, wheat is the staple of much processed food, omitted in HES wheat consumption data.

⁸The fact that the size of cow population in Bangladesh has, by all accounts, registered an upward trend in the 1980s may have something to do with it.

said and done, however, rural areas probably account for no more than about half of total consumption.⁹ *A priori*, rural consumption is likely to be more responsive to relative prices.¹⁰ Because all available estimates of cross-price elasticity use HES data which covers all rice consumption but only covers wheat consumption partly, they are likely to be overestimates if the omitted, mainly urban, component, *a priori*, is more powerfully influenced by nonprice variables, like food convenience, women's time-use pattern, female labor force participation, dietary selectivity and food cognition, the proportion of young people with pinmoney to sustain fast food binge, and the like. All of these nonprice variables correlate positive with incomes, and with unit values, and they are omitted from demand models. That case is a reasonable one to make.

⁹In all fairness, rural areas according to BBS include 470 Thana headquarters. Although not municipalities, these are electrified, have governmental colleges, are within much easy reach from district headquarters. They have a significant content of urbanism about them.

¹⁰Rural population is on average poorer than urban population: the relatively poorer are more price responsive. And they are more active, too, and rice is, at least in Bangladesh's countryside, perceived as a better "stomach-filler" weight for weight than is *atta*. This constitutes a further "nonprice" basis for rice-wheat substitution. Bouis has estimated cross-price elasticity of wheat demand relative to rice price of 0.13. Goletti and Boroumand (1992) have estimated at 2.1, an overestimate by wide margins. (These last authors have been careful enough to recognize that all their price elasticity estimates, cross-price effects included, will likely be overstated: the HES price data are proxied by *unit values*. Changes in the latter may be due, in addition to prices, to the demand for quality or "prestige-buying".

**Table 2 -- Foodgrain Consumption by Expenditure Deciles,
1988/89**

(Kgs/capita/month)

Deciles										% rice	% wheat
	Rural			Urban			Bangladesh				
	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total		
1 st	7.6	1.8	9.4	10.3	1.4	11.7	8.2	1.7	9.9	83	17
2 nd	10.1	2.0	12.1	10.8	1.6	12.4	10.3	1.9	12.2	84	16
3 rd	11.4	1.9	13.3	11.8	1.7	13.5	11.5	1.8	13.3	86	14
4 th	12.3	2.0	14.3	12.4	1.4	13.8	12.3	1.8	14.1	87	13
5 th	13.1	2.0	15.1	12.6	1.4	14.0	13.0	1.8	14.8	88	12
6 th	14.1	1.9	16.0	12.8	1.6	14.4	13.8	1.8	15.6	88	12
7 th	14.9	1.8	16.7	13.1	1.5	14.6	14.4	1.7	16.1	89	11
8 th	15.9	1.7	17.6	12.8	1.5	14.3	15.1	1.6	16.7	90	10
9 th	17.8	1.3	19.1	12.0	1.9	13.9	16.4	1.4	17.8	92	8
10 th	19.9	2.1	22.0	14.8	1.9	16.7	18.6	2.0	20.6	90	10
All	13.7	1.8	15.5	12.3	1.6	13.9	13.4	1.7	15.1	89	11

Notes: Rounding errors may render the comparison of average wheat intake related to successive deciles somewhat gross.

Source: BBS, Household Expenditure Survey, 1988/89.

Table 3 -- Understatement of Wheat Consumption in HES Intake Data, 1983/84, 1985/86, 1988/89

(Million Metric Tons)

1983/84				1985/86				1988/89			
Rice		Wheat		Rice		Wheat		Rice		Wheat	
HES	Macro data	HES	Macro data	HES	Macro data	HES	Macro data	HES	Macro data	HES	Macro data
13.8	15.0	2.3	2.0	17.0	15.2	1.6	3.2	15.8	16.3	2.0	2.9

Source: BBS, HES, various rounds; DGF data; BBS production data.

Estimating of Wheat Demand Models

Most foodgrain demand models using Bangladeshi data are cross-sectional, mainly for reasons of data availability. Most have used Household Expenditure Survey (HES) data (Mahmud, 1986; Ahmed, 1990; Goletti and Boroumand, 1991; and Ahmed, 1993). Only the latter two studies have estimated parameters of wheat demand function. Goletti and Boroumand have estimated all of income elasticity, own and cross price elasticities (relative to rice price) for wheat demand.¹¹ Ahmed (1993) estimated wheat demand elasticities (from Engel's functions) for poor rural households of $-.2$, using

¹¹This study estimates expenditure elasticities for rural and urban Bangladesh for 1988/89 at $.08$ and $-.28$. For Bangladesh as a whole, the authors estimate elasticity to be at $-.15$.

data from eight villages for July - October 1991.¹² The fact that two large and independent sample surveys report fairly close estimates of negative elasticities for wheat for rural Bangladesh appears to be strong evidence that, in rural Bangladesh, wheat is an inferior good¹³ in the long run. For urban areas, HES data suggest that wheat's income elasticity is positive but small. However, there is a presumption that the component of wheat consumption omitted from HES is more income elastic. Therefore, there is some room for agnosticism about the overall income elasticity of demand for wheat. All of this, coupled with rural areas looming large in wheat consumption, suggests that perhaps changes in incomes are unlikely to have been an important source of wheat demand growth.

Nonincome Determinants of Wheat Demand

How is one to reconcile this with measured per capita wheat availability growing at a rate in excess of population growth rate, something more than can be said for rice? Which nonincome factors have had an important role in the matter? To what extent has direct targeting of food aid fostered the access to wheat by the poor? To what extent was the wheat ration that food aid made possible "extramarginal" or "inframarginal"?¹⁴ These questions point

¹²It is reasonable that if Ahmed's sample were to be supplemented with better off farms, income elasticity would have probably fallen further.

¹³Our own results, using grouped HES data, come to the same conclusion.

¹⁴See Ahmed (1993) in this regard. When a targeted food distribution program operates on the basis of an entitlement
(Footnote continued)

at the need to factor in structural change in a broad sense in an analysis of wheat demand.¹⁵ The last two are attributable, at least in part, to donor policy.

which is larger than would be true in the without-program situation, its impact is extramarginal. Otherwise, it is inframarginal. Consumption effect of income transfers in kind compared with cash incomes is, in theory, higher when the entitlement is extramarginal.

¹⁵Of the structural variables, some of which are noted earlier on, degree of urbanization, female labor force participation ought to be relatively easy to incorporate in timeseries demand analysis. But even that is beyond the present data resources at our disposal.

III Supply side Developments in the Wheat Economy, 1974 - 1992

In the last section we reviewed some evidence about wheat demand. The object of this section is to provide an overview of major developments in the wheat supply, mainly embracing domestic production and import.¹⁶

Table 1 presented trend growth rates of production and import for two major cereals of Bangladesh, rice and wheat for 1974-1992.¹⁷ The following observations follow. First, wheat production, starting in 1973/74 from the quite low base of 60 thousand MT, grew at a very high rate of 28% per year to reach in 1985,¹⁸ whereafter growth rate, now negative, decelerated to -3.6% a year. Second, rice production had positive growth rates in both subperiods; if anything, rice output growth rate intensified in the second period, due, among other things, to a more dispersed availability of minor irrigation (Guisselquist, 1992), and the reform of fertilizer market (Samad et al. 1989). The far slower growth rate in wheat area after 1984/85 and the rapid increase in area under irrigated rice (Goletti, 1993) reflect the reality that the balance of the farmer's profit

¹⁶Because rice and wheat are substitutes in consumption, the two grains are lighted upon in tandem.

¹⁷In this report 1974, for example, shall relate to 1973-74, and so on. Only semilogarithmic growth equations are used. Trends relative to both rice and wheat are presented in tandem: the two are substitutes both in production and consumption.

¹⁸Plant breeding work, championed by CIMMYT, Mexico, and supported by the government of Bangladesh, played a crucial role in the production upturn. The rapid diffusion of crosses between imported and indigenous varieties is also a tribute to the agnomic dynamism of Bangladesh's farmers.

consideration was increasingly in favor of irrigated rice, as the pace of irrigation development mounted. (This result does not show up in this table, but is reconfirmed here on the basis of data relative to varietally deaggregated data for rice.)¹⁹ Many farmers switched from cultivating wheat on soil naturally suited for it into cultivating irrigated boro rice. Nonetheless, wheat production rose at 12% during the overall period. (Growth in wheat output owes more to area growth than to yield growth. In this respect, Bangladesh is the opposite of other nontraditional developing countries growing any wheat, where yield advances have dominated (Byerlee, 1983)). Variability of wheat production around the estimated trend is estimated at 51% and is extremely high. Variability owes principally to area, not to yield. The greater acreage variability is not so much due to wheat-rice substitution: note that the variability in real rice and wheat prices during 1974-1992 is roughly of the same order of magnitude. Because rice and wheat prices move up or down in tandem due to the cross-price elasticity being positive by common consent, this implies that the variability of the wheat-rice price relative would be rather small. More likely, wheat area variability is substantively due to climatic and morphological and crop rotational imponderables.²⁰

¹⁹This is now well-accepted. See Mahmud et al (1993); Hossain et al 1991; Hossain, 1993.

²⁰Supporting evidence of this effect will be reported in a companion paper, currently in train (Chowdhury and Murshed, 1993)

By contrast with wheat, rice output has maintained steady growth from one period to the next. Rice yield in the second period has accelerated: yield gains are the decisive engines for output growth in both period.

During the overall period, average incomes rose at the rate of 1.9% annually. Wheat availability, rose at a trend rate of 3.7% for the overall period as against 2% for rice. Significantly, real wheat price during the overall period fell at annual rate of 2.8%, as against 2.9% for rice. Real wheat prices have stood up better against the growth in availability than have rice prices.

Because a relatively large proportion of wheat availability during the overall period owes to targeted public distribution and not price - or income-responsive consumption decisions, the above may not necessarily implicate relative income elasticities between rice and wheat.²¹ Also, since wheat yields decelerated in the second subperiod, even as fertilizer and other subsidies were being pared down, this probably implied a cost-push effect on prices too.²²

²¹It has recently been closely shown that effectively targeted public distribution programs achieve a higher consumption effects associated with a given income transfer than if the equivalent income were made available in cash (Ahmed, 1993).

²²For rice, the continued trend increase of yields throughout overall period imply that rice unit costs were not rising, or rising less steeply, due to the diffusion of modern rice technology.

Finally, we note that wheat-rice price ratio has not grown at during the seventeen years in this study.²³

Wheat imports

During the entire period, government held a monopoly on wheat imports. A preponderant share of all wheat imports were sourced from international donations. In any given year, commercial imports by the government would likely absorb between 5 and 8% of total imports. All foodgrains imports are admitted duty free.

Wheat import, whether taken *in toto* or per capita, both register the influence of a positive trend. Even though domestic wheat production per capita has grown at a trend rate of 9% yearly, or so, imports per capita, too, has risen at a trend rate of more than 1.5%.

Determinants of Total Wheat Import

A simple model of total yearly wheat imports is estimated, of the following form

$$\text{WHTIMP}_t = a_0 + a_1 \text{AMANDEVN}_{t-1} + a_2 \text{RISTOCK}_{t-1} + a_3 \text{WHTIMP}_{t-1} + a_4 T + e_t$$

where

WHTIMP = Total wheat import (1,000 MT)
 AMANDEVN = Absolute deviation from trend for aman rice (1,000 MT)

²³Real prices were equal to nominal prices deflated by the index of wholesale prices of manufactures.

RISTOCK = Average monthly public rice stock
(1,000 MT)
 T = Time
 t = time subscript
 e = disturbance

Expected coefficient signs are $a_1 < 0$; $a_2 < 0$; $a_3 < 0$; $a_4 > 0$;

Lagged dependent variable is used as an explanatory factor as a proxy for all previous adjustments to prices, as also to capture any institutional *modus operandi*, such as cyclicalilty.

The results are reported in Table 4 below

Table 4 -- Determinants of Total Wheat Import 1974-1991

Variable	Coefficient	T-Statistics
C	2499.33*	6.05
AMANDEVN _{t-1}	-0.238	-1.34
T	118.87*	4.78
RISTOCK _{t-1}	-3.87*	-4.83
WHTIMP _{t-1}	-0.68*	-2.65
R ²	.67	

Notes: * denotes that the coefficient is significant at 5% error probability level. Residuals pass the White test for heteroscedasticity.

Source: Estimated by the author from data from DGF.

The results suggest that total wheat imports have had a significantly positive time trend during the study period.²⁴ During this period wheat imports by South Asia -- - Pakistan, India and Bangladesh put together --- decreased very substantially, largely due to rapid production gains in the first two countries (Byerlee, 1983). The resultant fall off in aided imports associated with Pakistan and India has, it appears, been diverted to Bangladesh. While the underlying trend had indeed been upward, aggregate imports nonetheless are negatively influenced by both public rice stocks and wheat imports, both lagged by one year.²⁵ (Public wheat stocks lagged appropriately had no effect.) Both these effects are highly significant. The coefficient of trend deviation in aman output lagged by one year had the expected sign albeit statistically insignificant.

Determinants of Per Capita Wheat Import

The same model of eq. (1) but in per capita term was estimated. We may call this a model of wheat import dependence. Model results are in Table 4. Following results may be noted. First, Bangladesh's dependence on

²⁴However, this does not give an accurate picture of the trend relative to the degree of dependence on wheat imports of the economy. That particular issue would have to be tackled using per capita import regressions.

²⁵The rationalization of the rice stock effect is as follows. Public rice stocks are likely to significantly lower lead rice prices (Goletti et al 1991, p. 33), inducing import planners to pare down lead planned wheat import in order for foodgrain prices to be forced upward.

wheat imports registers a significantly positive time trend.²⁶ Second, public rice stocks lagged by one year significantly decreased current per capita wheat imports. The intuition, again, is that public rice stocks by lowering expected prices reduce the quantity of imports consistent with a restabilization of prices. Finally, wheat imports lagged by one year reduces the current-period wheat imports. This merely reflects the two-year cyclicity of the level of international wheat donations to Bangladesh.

Table 5 -- Determinants of Per Capita Wheat Imports, 1974-1991

Variable	Coefficient	T-Statistics
C	0.035*	6.392
PAMNDEVN _{t-1}	-0.209	-1.145
T	0.00046*	2.447
PRISTOCK _{t-1}	-3.073*	-4.898
PWHTIMP _{t-1}	-0.699*	-2.799
R ²	.65	

Note: *denotes that the coefficient is significant at 5% error probability level. Dependent variable is PWHTIMP, per capita wheat imports, PAMNDEVN is per capita aman deviation, PRISTOCK is per capita rice stock, and T is time.

Source: Estimated by the author using data from DGF.

²⁶This suggest, basically, the inherent donor country decision to sustain, even increase, the accommodation of Bangladesh's aid needs.

The Mechanisms of Wheat Private Market Arrivals

Specific details of the mechanisms of commercialization of wheat are apt at this stage: a major share of privately traded wheat represents leakage from food aid channels. True, a portion of wheat milled is of domestic origin, which can be freely traded.

Extent of Commercialization of domestic Wheat Output

Wheat farmers on IFPRI Wheat Survey marketed 56% of their 1992 wheat output. The corresponding proportion of 1993 wheat marketed is estimated at 48%. The size of domestic wheat market during the year through March 1993 is about 0.59 MMT. Small farms, i.e. those owning 2.49 acres of land register a marketing-to-output ratio of 52%; medium farms, a ratio of 66%, and large farms, a ratio of 83%.²⁷ Of 1992 wheat output, 43% left farmers' storage within the two months of the harvest, another 7% between May and July 1992 (Table 6). The rest were marketed during the remainder of the year.

Of the total 1992/93 wheat millage by roller mills, and by major/compact mills, respectively, on IFPRI Market Survey sample --- outlined in greater detail in appendix-I --- 31% and 26%, respectively, by weight are domestic wheat. Total millage by flour milling industry during 1992/93 is estimated at 1.6 MMT. Sixty three percent of atta chakki wheat millage require domestic wheat.

²⁷Census data from 21 villages show that 83.9% of all farmers are small, 9.6% are medium and 6.5% are large farmers (Table 14).

Table 6 -- Wheat Marketing Ratio and Seasonality, the year through March 14, 1993

Month	Small	Medium	Large	All
March '92	18.2	20.9	15.0	18.2
April '92	22.9	24.4	53.3	25.2
May-July '92	6.8	9.9	7.6	7.1
Aug.-Oct. '92	2.7	7.4	3.4	3.5
Nov.-Feb. '92	1.7	3.6	4.0	2.0
Total marketing ratio	52.3	66.2	83.3	56.0

Note: Each number in this table is a sizeclass specific percentage computed against the 1992 wheat output. Wheat output includes net output from land tenancy transactions. Marketing ratios are relative to gross, output, not net.

Source: IFPRI Wheat Farm Survey, 1992/93.

Imported wheat is sourced by flour mills and atta chakkis in one of two ways. One is through availment of wheat allotments in the FM channel and Palli Chakki (PC) channel, when price relatives dictate so. Flour mills' channel absorbed 10% and 16% of total wheat issue in PFDS during the early 1980s and the late 1980s, respectively (Table 8).

Where does the rest of the wheat that millers sourced come from ?²⁸ During the late 1980s, when private wheat imports were not at issue, flour mills and atta chakkis used to source a good deal of their requirements tapping the leakages off the PFDS (FPMU/IFPRI, 1992).²⁹ This renders a quick glance at the evolving levels and structure of public interventions in wheat market imperative.

²⁸During the year through June 1993, private wheat imports amounted to about 0.36 MMT.

²⁹It is commonly accepted that food-for-work (FFW) wheat routinely is monetized for one or the other reason (Choudhury, 1983; CARE, 1993). Our respondents concede that more than ninety per cent of all wheat issue through monetized channels are "resold" to private wheat traders and thus augment market supplies. Recipients of VGD wheat are permitted to sell a part of their quotas: about 19% or so percent were estimated to have been monetized in the 1991 lean season (September through November) (Ahmed, 1993).

Public Interventions in Wheat Markets, 1973-1993

Public interventions in wheat market have been by way of the offtake, both monetized and nonmonetized.³⁰ Several channels steer wheat to supposedly "priority" groups at administered prices; other channels exist to target wheat deliveries to the vulnerable; yet others exist to distribute wheat only to wheat processors (of various description) that are registered with the Director General of Food (DGF).³¹ Operating procedures in monetized rationing did make outright unlawful resale of the foodgrain received on the basis of ration cards; however, it would be prohibitively expensive to police their implementation, even given conscientious enforcement staff. Significantly high spread between market prices and administered prices created significant impetus for resale. Available evidence overwhelmingly suggests that virtually all monetized

³⁰A considerable amount of literature exists related to the changing *modus operandi* of the Public Foodgrain Distribution System (PFDS). See Berlage 1972; Sobhan, 1979; World Bank, 1979; Clay 1979; Clay 1981; Chowdhury, 1986; Chowdhury et al. 1986; Chowdhury et al 1988. Procurement interventions have been much less important.

³¹All monetized channels operate on set periodic determination of mainly weekly wheat entitlement. Likewise, the nonmonetized programs operate on the determination of the entitlement. Wheat quotas in monetized rationing have been trendless and, to some extent, variable, reflecting fluctuating public wheat and rice stocks. Principal monetized channels are Statutory Rationing (SR), Palli Rationing (PR), Essential Priorities (EP), Other Priorities (OP), Large Employer (LE), Flour Mills (FM), Open Market Sales (OMS), Palli Chakki (C). Principal nonmonetized channels include Food-for-Works Program (FFWP), Test Relief (TR), Vulnerable Group Development (VGD) and Gratuitous Relief (GR). The *modus operandi* of these channels have been covered elsewhere (for example, Chowdhury et al. 1986), and will be omitted here.

channels shortcircuit the access of the nonpoor to food subsidies, to the relative exclusion of the poor (Chowdhury, 1987; Chowdhury, 1988), and leak heavily (Haggblade et al. 1993).

By showing the percentage difference between market prices and ration prices, Table 7 highlights upon the potential incentives for resale. Feeding off the public distribution system was extremely profitable in the three years after the liberation (box 1). Even subsequently, the unit budget subsidies remain nonnegligibly high.

The Structure of Wheat Public Issue

Total wheat issued in the PFDS averaged 1.25 MMT per year during first three years of the 1980s, and 1.5 MMT per year during the early 1990s (Table 8). However, this has since slumped by more than 60% during 1992/93 upon the preceding triennium. In this paper, one is especially interested in 1992/93 seen against the background of three preceding years.

One change stands out. First, in 1992/93, availment of wheat against both FM and PC channels have severely fallen. This is because for the first time in memory, wheat market prices are 11% down on the administered price. Much of the FM wheat lifting during 1992/93 took place during the four months through September 1992 --- before rice prices, and wheat prices with them, went on a precipitous decline.³² Second, sharp contractions in wheat issue, especially

³²This is seen more clearly in monthly wheat offtake figures by individual channels (WFP, July 1993, p. 12).

regarding SR, OP, LE, FFW --- usually the most porous of the wheat channels --- translate into increased reliance on domestic and privately-imported wheat.

Table 7 -- Percentage Spread between Wheat Market Price and Ration Price

(Price in Tk./quintal)

Year	Wheat		
	Ration price (RP)	Market price (MP)	MP/RP (%)
1973/74	85	234	175
1974/75	134	389	190
1975/76	157	241	54
1976/77	188	209	11
1977/78	201	255	27
1978/79	217	260	20
1979/80	250	354	42
1980/81	299	332	11
1981/82	323	407	26
1982/83	374	491	31
1983/84	389	417	21
1984/85	426	506	19
1985/86	452	485	7
1986/87	499	558	12
1987/88	514	575	12
1988/89	449	600	34
1989/90	597	625	5
1990/91	647	719	11
1991/92	665	734	10
1992/93	739	660	-11

Note: Market price relates to wholesales level; ration price is simple average of delivery prices ex-LSD for three channels, viz. Statutory Rationing (SR), Other Priorities (OP) and Flour Mills (FM). The issue price in the FM channel corresponds to the "first-slab" price of the open Market Sale (OMS) channel.

Source: DGF data

Table 8 -- Structure of Wheat Public Offtake

	(000 metric ton)					
	1980/81-1982/83		1989/90-1991/92		1992/93	
	Offtake quantity	% of total	Offtake quantity	% of total	Offtake quantity	% of total
Monetized channels						
SR	209	17	175	12	56	9
PR	157	12	16	1	0	0
EP	38	3	54	4	62	10
OP	230	18	171	11	11	2
LE	55	4	31	2	13	2
FM	127	10	235	16	87	14
OMS	30	2	7	..	66	11
PC	0		95	6	41	7
Nonmonetized						
FFW	303	24	460	31	164	27
TR	28	2	59	4	3	..
VGD	43	3	173	12	76	13
GR	24	2	17	1	7	1
Total offtake/yr	1256		1492		598	

Note: .. denotes a percentage under .5.

Source: DGF data

IV Structure of the Wheat Market

Number of Wheat Marketing Agents

In 1992, there were 11981 wheat processors of various description on the coverage of the DGF's allotment program. Of these, 53 were major mills, 196 compact mills, 445 roller mills and 11287 were *atta chakkis*.³³ This count is likely to be comprehensive.³⁴ We estimate the number of wheat traders on various description at about 28.5 thousand.³⁵

In 1992, there were on the order of 7.5 thousand or so of bakeries in Bangladesh.³⁶

The rate of increase of the number of market participants in wheat markets in the past is one of this industry's potentially important structural facets. True,

³³All these are registered with the DGF.

³⁴Sizeable potential trading profits waited upon registration with the DGF: the wheat allotment could be retraded at a lucrative net profit. Gaining the right to register was usually a matter of stumping the right amount of money (the fees, etc.)

³⁵These traders break up as follows: farias, 12.6 thousand; beparis, 9 thousand; 4.9 thousand wheat paikers; 1 thousand wheat aratders-cum-wholesalers and close to a thousand flour/bran wholesalers. These estimates are based on IFPRI Wheat Marketing Survey, 1993. There is hardly any full-time retailers of wheat products. Retailers invariably deal in a wide range of consumption goods: wheat products happen to be included among them.

³⁶Bakeries are not a part of wheat industry to be sure. Yet, because they are the most important demand source for flour and *atta* outside of households, it would seem inadvisable to leave them totally unaccounted for.

available evidence quickly occasions a certain degree of scientific handwaving.³⁷ Having said that, useful conclusions can still be reached about broad underlying trends.³⁸ Two elucidatory observations can be offered. First, the number of indigenous light engineering workshops that can put together flour-milling machinery has risen from six in 1986 to thirteen in 1992. The number of DGF wheat allottees among major compact and roller mills rose from 411 in 1985 to 694 in 1992. This suggests a compound growth rate of 7.8 in the number of relatively modern mills.³⁹ The

³⁷A country-wide census of establishments returned 3382 wheat processing establishments in 1986 (BSIC 3118), and 3388 bakeries (BBS, 1989). A subsequent count by the DGF showed that the number of atta chakkis alone in 1989/90 was close to 10,000. If the DGF count is correct, the BBS' 1986 census figures are understaters: the number of wheat processors could not possibly have risen by 31% per year between 1986 and 1990. Even conceding the possibility that some nonexistent atta chakkis were entered into the DGF allotment records as operative, the presumption of an undercount by the BBS of the population of BSIC 3118 is a compelling one. What happened is the following. A significant proportion of the atta chakkis are also customized rice mills that dehusk farmers' paddy using the same power source. The BBS enumerated about 26,000 dehusking mills in 1986. This included a fairly large number (about 9000) dualpurpose rural mills. The owners of these units later obtained recognition in 1989/90 when the government instituted the Rural Chakki channel, whereby atta chakkis were entitled to fixed allotment per month.

³⁸Data from IFPRI Wheat Market Survey suggest that between 1986 and 1993, the number of wheat market agents have risen on the order of about 22%.

³⁹We discount the alternative explanation, viz. that many mills that were not DGF allottees in 1985 achieved that status in 1992. A pervasive refrain among the millers interviewed for the IFPRI Wheat Market Survey was about the emergence of "excess capacity". Alternatively, respondents bemoaned the presence of a buyers' market, whose only

(Footnote continued)

number of atta chakkis in 1980/81 was 5821; in 1986/87, 7733 and in 1992, it was 11287. The growth rates were 4.8% between 1991 and 1987, and 7.8% during the 1988-1992 period (Chowdhury et al. 1988, p. 120). The number of wheat wholesalers has not increased commensurately.⁴⁰ Note that private trade in wheat leached from the aid pipeline has always been a shadowy affair, best conducted *sotto voce* and demanding a knack for paying speed money to a long litany of "collectors". In short, this was a low-profile but big-ticket business: unalluring even if remunerative (see Box 1).

As well as depending on the number of marketing agents, the competitive health of market depends also on the degree of the concentration in it. This is taken up next.

The degree of concentration

Industrial concentration is frequently cited as a major dimension of a market structure (Upton, 1970). In the absence of accessible data related to 4-or 8-firm concentration ratios, which is the measure of concentration typically measured in empirical research, we settle for an alternative, albeit less revealing, procedure, namely percentage distribution of wheat millage capacity

appetite is for dollops of trade credit from the millers. These issues will be addressed more fully in a companion paper, which will include data related to farmers' wheat marketing activities. For the moment, suffice it to say that the increase in the number of wheat processors has been at least consequential.

⁴⁰Why this is so should not detain us here. This will be examined later in more detail.

Box 1 – Peddling PFDS Wheat and a Rag-to-Riches Story

This is a real-life account of a man, of 36 years of age in 1993, who hails from Comilla. Let us call him Preco. (which is code for precocious). At the tender age of 14, he took his first job as a machine-boy at a huller-unit, set within the Mainamati cantonment, 13 km from Comilla. His boss, an Urdu-speaking man, trained him for the job: as a *quid pro quo*, his monthly salary, even for a time of dirt-cheap rice prices, was a pittance of Tk. 25. This was in 1970. During 1971/72, the country went through the throes of a war of liberation, and the destruction of a lot of its infrastructure. In 1972, a groundswell of international sympathy in the wake of the rape of Bangladesh led to the mounting of the United Nations Relief Operations in Bangladesh (UNROB). Between July 1972 and June 1973, 2.5 MMT of wheat were issued in Bangladesh. This represented a 178% increase over 1969/70 (Berlage, 1972). Millers were flush with wheat to mill. In this pre-green-revolution setting, rice prices tended to be high during much of the year, but especially during July through October. Trade in atta, for which the demand was high, was highly profitable. Preco was offered a machine-boy's job at an atta chakki at 6 times what he was earning. Preco was 15 then.

His new employer had three lines of enterprise. One, he was milling wheat, mainly on custom-mill basis but occasionally as a own-account wheat miller. Second, he used to "supply" wheat ex-PFDS to a slew of mills situated in Comilla town including a major mill. Third, he used to retail flour produced by this major mill. As an insider, Preco realized how alluringly profitable his boss' business was. In 1974, he quit, over his boss' unwillingness to allow him to trade in the major mill's flour and atta on his own capacity in his spare hours.

In 1974, the year of the famine, Preco joined a trading unit as a junior partner. By this time, his fortune stood at Tk. 1400 only. However, he was a young trader to reckon with: he was healthy, did not mind putting long hours, was technically knowledgeable and was trusted by the owners of flour mills around the place. His lack of formal schooling was to his advantage: he took naturally to manual, dirty, work, and he did not mind wheeling and dealing. In an age of anti-hoarding laws and lot of cool cash in the wake of successful "grain" operations across districts, a flair for wheeling and dealing was like money in the bank.

The two year period through August 1975 opened an window of glorious profiteering in wheat product markets. Preco and his two partners, along with only one competitor --- his former boss --- were well-poised to hit it off. During the famine of 1974, when wheat market price exceeded issue price by a staggering 190% (Table 7), Preco's firm regularly advanced cash to government employee rationing contract (GERC) dealers or MR dealers to buy off delivery orders (DOs) and/or what wheat quantity they could resale. Simply, Preco hit gold for his partnership.

His firm went on doing well. His stature in the wheat traders community went on growing. Today, Preco and his lone partner comprise the single most important wheat wholesaler in the town in eastern Bangladesh. His firm has vertically integrated backward into transportation industry: it owns three 5-ton-capacity trucks. In the year through February, 1993, Preco's firm was one of the twenty largest wheat wholesalers in Bangladesh. Preco is by now a wealthy man, but he does not flaunt his wealth. He still wears a lungi and panjabi and, even though he still does not feel comfortable wielding a fountain pen, he can scarcely hide the quiet yet protruding selfassurance that only selfmade millionaires are entitled to feel. And, all of this, when he is not yet 40!

technological classes of establishments. This information is presented in Appendix- I. It's main conclusion is that about two percent of the establishments in wheat milling industry prevails over just under half (48%) of capacity. Of this, as much as three fourths are located in four terminal markets, viz. Dhaka, Narayanganj, Chittagong and Khulna.⁴¹ Greater concentration is one major difference between rice and wheat markets; But even so, it would not follow that wheat milling is oligopolistic in structure.⁴² This does not alter the fact that in rice, the required cash for setting up a mill with the capacity to generate equivalent cashflow of a major mill over the plant's life cycle is at least 15-20% lower.⁴³

⁴¹The spatial constellation of a large proportion of the establishments implies easy and, if necessary, frequent hands-on reach. Whenever market conditions so warrant it, this creates the potential for coordination of market moves. Cost of communication and collective decisionmaking tends to be low.

⁴²The hallmark of classic oligopoly is product promotion and promotion of brand names, as a market share instrument. Flour mills brand their ware; rice mills do not. However, it is doubtful that brand-loyalty is strong enough to pass the oligopoly test. In flour milling industry, instead, the provision of trade credit is the denominator of the campaign to chalk up market share gains. Pervasive trade credits, suggestive of excess capacity, lead one to reject entry barriers as a valid characterization of this industry. Perhaps, the real problem is that too many entered. However, wheat wholesale trade is almost certainly more concentrated than is wheat milling.

⁴³We mean that an entrepreneur's equity investment in a flour mill (a so called major mill) with a capacity of, say, 20 MT per day will be on the order of Tk. 20 lakh while the banks may put up another Tk. 40-45 lakh. This is on account of fixed cost alone. Add to this the working capital requirements of another Tk. 50 lakh. Of the latter, the banks may be willing to cough up about half as Cash Credit Limit, the balance having to be marshalled by the

(Footnote continued)

The direction of interdistrict flow of wheat

A little under half of the country's wheat production originates in the five greater districts of Rajshahi Division (Table 9). Khulna division comes in at second place at about 17-18%. If Faridpur, which neighbors Jessore, is deemed more aptly to be a part of Khulna's agroclimatic parentage, the latter's relative share will be seen to increase to 25%. The traders and millers interviewed all pointed out that a lion's share of the domestic wheat's marketings hails from the North-West, greater Kushtia, and Jessore. Comilla, which raises more than one tenths of the country's output, does not have surpluses to market beyond its borders.

Much like the spatial flow of surplus domestic wheat, the flow of the wheat deflected off the aided channels is also from the Western Bangladesh into its Eastern cities and populous district town (Table 10).⁴ Significantly, there is a necessary blurring of the distinction of domestic wheat and aided wheat: both are headed towards a single market for

entrepreneur. All in all, an entrepreneur has to raise at least Tk. 45 lakh of cash in order to start up a major mill.

⁴Fifty nine percent of the public wheat issue outside the FM are in the western Bangladesh, which however accounts for only about thirty-nine percent of the economy's wheat milling requirement. The ensuing eastern deficit survives its 56% relative share in FM issue: this is because FM quotas are based on one-shift output, while mills pervasively desire to run a second shift. Western Bangladesh has a favorable balance in wheat issue outside FM because conventional wisdom about the geography of food stress, which underpins spatial distribution of FFW and VGD wheat, reprioritizes the relative importance of the many western districts annually subject to flood and river erosion.

Table 9 -- Proportionate Shares of Wheat Production by Districts

Greater Districts	(Output in '000 MT)			
	Wheat output		% of total	
	81/82- 83/84	85/86- 88/89	81/82- 83/84	85/86- 88/89
Chittagong	0	0	0	0
Chitt.H.T.	0	0	0	0
Comilla	125	127	11	12
Noakhali	1	2	0	0
Sylhet	10	10	1	1
Dhaka	45	64	4	6
Faridpur	90	74	8	7
Jamalpur	19	34	2	3
Kishorganj	15	21	1	2
Mymensingh	16	21	1	2
Tangail	38	43	4	4
Barisal	3	8	0	1
Jessore	64	75	6	7
Khulna	8	9	1	1
Kushtia	124	95	11	9
Patuakhali	0	0	0	0
Bogra	54	50	5	5
Dinajpur	129	99	12	10
Pabna	94	80	9	8
Rajshahi	98	98	9	9
Rangpur	157	121	14	12
Total	1091	1032	100	100

Source: BBS, Statistical Yearbook, various years

Table 10 -- Pattern of Regional Specialization in Wheat Production and Consumption

Region	Percentage of			
	Wheat requir- ment	Wheat produc- tion	Wheat public issue outside flour mills	Wheat issue to flour mills
Eastern Bangladesh	61	24	39	54
Western Bangladesh	38	76	61	46

Source: DGF data

a multiplicity of grades with a variety of users to match. The data highlight that a whole network of commercial transactions pivots around food aid shipments supposedly purporting to be consumed by this or that "priority" groups of users. This is due to the force of economic incentives as catalysts in the inceptions of markets that, eventually, feed off an aid pipeline (Box 1). But this is also suggestive of the high of a case of at least examining other more direct ways of injecting aided wheat into the markets, than the currently prevailing leakage routes.

Marketing Channel of Wheat

One of the important structural facets of a functioning market is about its marketing channel, viz. (a) the number of various tiers at which agents operate; (b) the number of agents in each tier; (c) the nature of marketing functions performed by participants; (d) the character of the economic organization of the agents in each tier with regard to their capitalization and technological choices, the extent of vertical integration and the like; and (e) the ownership of stocks. If a market has what looks like the right number of tiers, each having enough participants with essentially equal access to operating capital, information and other operative prerequisites, the presumption is that its conduct would be competitive. Before launching into a fuller discussion of market channels, a brief elucidation of what is meant by marketing will perhaps be in order.

What is Marketing?

Production of agricultural commodities, like wheat, anywhere is highly seasonal and regionally specialized, while its consumption may be continuous and spatial. This provides marketing participants a role to play that is valuable enough for the society to pay for. For a price, market participants link producers up with consumers. More elaborately, marketing agents process, transport, store farms' produce and, driven by the invisible hand of a market coordination, betake it to the consumers at the place and time and in the form in which the consumer pleases.⁴⁵

The Number of Wheat Market Tiers⁴⁶

There are basically six tiers of marketing agents in Bangladesh's wheat markets, viz. (a) the farmers⁴⁷; (b) farias; (c) wholesalers; (d) millers; (e) flour wholesalers; (f) retailers.

⁴⁵For a definition of marketing, see Timmer et. al., 1983. For exhaustive empirical treatment of rice marketing in Asia, see Myers, 1958; Mears, 1972; Farruk, 1972; Islam et al, 1985; Chowdhury 1992. For marketing of food items in India, see Lele, 1971; Moore et al, 1973.

⁴⁶It is hard not to notice a *hierarchical array* of marketing agents in major commodity markets in labor-surplus economies. A pyramidal formation is an workable first approximation for this array. The basal tier of the pyramid comprises farmers; the next higher tier comprises farias; and so on.

⁴⁷The farmers can not be treated as being altogether above the tendency to speculate in wheat markets. Most cereal farmers are traders at heart.

There are approximately 1.5-2 million wheat farmers in Bangladesh. About 84% of these farmers own less than 2.49 acres of land (IFPRI Farm Survey, 1992/93). And they absorb about 52% of all wheat farmers market. Of the remaining 16%, 9.5% percent own between 2.5 and 4.49 acres of land. The remaining are large farmers. Wheat farmers are drawn from fourteen out of twenty one greater districts of Bangladesh: the associated wheat stocks are therefore distributed in a spatially dispersed manner. Also, because there is only one wheat season the predominance of other than small farmers in wheat marketed surplus suggests, that temporal arbitrage will remain an important farmer incentives.⁴⁸

Farias, representing the first tier further downstream, number about 12.6 thousand. Farias buy solely from farmers. They purchase an average of 61 quintals per month: their purchases peak in March-April (Table 11). The working capital requirement of their representative specimen --- the only capital they have --- is a meager Tk. 26 thousand. Throughput-to-inventory ratio works out at a staggering 37. Farias sell most of their ware to wholesalers in the assembly markets, from whom they also receive *dadan* credit.

Assembly-market wholesalers (in short assembler-wholesalers) comprise the next higher tier. The markets where they are based are located either in the heart of an

⁴⁸During the year through March 1993, wheat temporal spread has been 19%, as against -22% for rice. This spread is equal to $(P_t - P_h) / P_h$, where P relates to farmgate price per unit, t and h relates to end and beginning, respectively, of wheat market season.

Table 11 -- Wheat Volume Traded by Grade, Season and Type of Trader, the Year through March 1993

Business Type	Variety of Wheat													(Quintals)	
		March	April	May	June	July	August	Sep.	Oct.	Nov.	Dec.	Jan	Feb.	Monthly Average	C.V
Retailers	HRW/HRS/AWH	4.8	4.9	2.7	2.5	3.2	3.1	2.5	2.5	7.3	6.7	5.2	5.1	4.2	38.3
	Dudhia	5.1	5.2	3.0	2.0	2.0	2.3	2.2	3.9	4.7	4.4	1.6	2.1	3.2	40.4
	Dhepa	2.6	2.6	1.2	0.9	1.3	1.1	0.1	0.6	1.0	0.4	0.2	0	0.1	889.6
	Local	123.9	144.7	125.1	100.7	44.9	27.5	15.9	12.2	8.2	8.2	10.4	12.3	52.8	97.9
	All grades	136.4	157.5	132.0	106.2	51.3	34.0	20.8	19.4	21.2	19.7	17.5	19.5	60.4	87.0
Wholesalers	HRW/HRS/AWH	168.6	165.1	85.0	78.4	102.0	72.5	293.2	95.2	135.3	106.7	154.9	100.4	129.8	45.2
	Dudhia	266.2	167.8	109.1	109.0	210.5	205.8	191.1	289.6	333.9	293.9	314.4	351.2	236.9	33.7
	Dhepa	62.6	46.0	53.9	62.0	74.8	81.7	73.6	62.4	47.7	52.4	50.0	43.8	59.2	20.0
	Local	1248.9	1815.5	1396.5	1157.1	623.2	492.5	469.7	345.8	199.9	256.5	236.9	181.2	702.0	75.8
	All grades	1746.5	2194.4	1644.6	1406.5	1010.6	852.5	1027.7	793.1	716.8	709.6	756.2	676.6	1127.9	42.5

Note: CV stands for coefficient of variation

Source: IFPRI Wheat market Survey 1992/93

important wheat production region (e.g. Badarganj in Rangpur district) or proximate to a "FFW-bowl" where a large number of food-for-work (FFW) schemes are on hand (e.g. Kurigram). These wholesalers assemble Bangladeshi wheat for onward shipment mainly to other wholesalers in terminal markets.⁴⁹ Their most important shipping destinations are Dhaka/Narayanganj, Chittagong and Feni, in that order. Their *modus operandi* is important enough to merit a description at this stage.

Typically housed in drab tinsheds, these enterprises, almost always family businesses, mobilize mainly domestic wheat from primary markets. Domestic wheat marketing season is a short one, running from the middle of March through to the middle of June (Table 6).⁵⁰ They are not sufficiently capitalized to absorb the large volume of market arrivals during the early summer, even when the seasonal spreads in prospect might well be attractive. This void is filled by a handful of wholesalers in terminal markets (see below).⁵¹ Terminal wholesalers negotiate a price with assembler-wholesalers to remain valid for a stated period. The price

⁴⁹Data collected from IFPRI Wheat Marketing Survey suggests that direct shipments from this class of wholesalers to wheat mills in terminal markets form a relatively minor proportion (29%) of their overall shipments.

⁵⁰Farm stocks during the rest of market season (ie. after the middle of June) are mostly held on small or medium farms, are motivated by subsistence considerations.

⁵¹When flour market registers brisk demand, wheat demand is similarly firm, and the assembler-wholesalers can take a ride on the crest of favorable demand. The 1992 market season was such a period. When wheat demand sags, as it did in 1993, terminal wholesalers fill the void mainly on their own terms.

is inclusive of all of the latter's cost and any profit he might be able to make. Terminal wholesalers stand ready to purchase any quantity of wheat the regional wholesaler can ship.⁵² The regional wholesalers, too, enter into similar supply contracts with primary-market assemblers, thereby passing down the line a part of his prospective profit from the deal. The reason why, despite the risks inherent in any such forward-pricing arrangement, most of assembly-wholesalers are more thoroughly bound up with terminal wholesalers (than with wheat millers) is because the latter have large credit ceilings.

Terminal-market wholesalers, of which there are no more than perhaps one hundred and twenty in the whole of Bangladesh, operate in the market for local wheat by way of purchases of the forward-pricing sort. Trading domestic wheat is a bona fide activity, and creates a legitimate cover for transactions of more dubious character. Most deal primarily in wheat round the year, and most have fairly generous credit ceilings.⁵³ A clear division of labor exists in this market, whereby the large millers count upon terminal-wholesalers to assemble wheat on their behalf while

⁵² An important caveat attaches here. When flour demand is brisk, wheat demand is brisk, too, and terminal wholesalers pay up promptly. When the reverse condition holds, wheat demand slips, and terminal wholesalers' credit payable mounts. Sustained success of the assembly wholesaler depends on remaining current with the creditworthiness of terminal wholesalers. The *carte blanche* in the sentence in the text should be taken with some qualification.

⁵³ Terminal wholesalers on IFPRI Wheat Market sample boasted an average credit ceiling of Tk. 26 lakh. Compare this against the corresponding figure for the assembler-wholesalers of Tk. 8 lakh only.

they tend to the miller's cares.⁵⁴ This implies a situation of relatively restricted choice on the part of assembler-wholesalers. In the ensuing one-on-one situation involving both terminal and assembly wholesalers, it is the former --- who have far more credit-clout --- that dominates the balance of the consideration.

Wheat millers are the next tier to consider. Their remit is to buy wheat, process it into flour and associated byproducts and sell the latter. They stand to make money by buying wheat on the cheap, and by selling flour at remunerative margins. There is a quite patent degree of excess capacity in milling, without creating the warrant for believing that unit margins are thin. Most mills worth their salt seek assiduously to neutralize excess capacity: this they do by consolidating their market shares by priming the market with trade credit, and by cultivating the flour wholesalers. Keeping the usually large volume of trade credit under the tab, and sustaining at the desired rate the flour output of a grade that can compete, pricewise, with substitutes keep most millers' attention focussed. Therefore, these entrepreneurs have to leave the other option --- viz. to buy domestic wheat on the cheap --- to the terminal wholesalers. A crucial aspect to the operation of these millers is about the size of their credit ceiling. The millers' capacity to supplement credit ceiling with their own resources is the other influential aspect to the organization of production of this subsector. The

⁵⁴Millers have to prime the flour market with generous piles of trade credit, which need monitoring and collection. That happens to be a timeconsuming chore. It is nice to have a market one can count upon to ship wheat to one's mills in the quantity and at the time one desires.

major/compact mills on the IFPRI Wheat Market sample registered an average credit ceiling of Tk. 1.7 million, while the roller mills on the same sample returned an average ceiling of Tk. 0.14 million. Major/compact mills are, organizationally, the most advanced among all classes of mills.⁵⁵ Their organizational harmony and cohesiveness is considerable, as is demonstrated in the 1992 action by the Association to mount a centralized import of US wheat.⁵⁶ The Association has invited bids in July 1993 apropos the import of 50,000 MT, even though, as common knowledge would have it, on the order of 450,000 MT of wheat are on public storage. It has apparently calculated that, despite the public stock hangover, the market can well do with 50,000 MT of hard red winter wheat to arrive at Bangladesh in

⁵⁵There is an Association of Major and Compact Flour Mills Owners Association which have chapters in several districts, federated in Dhaka.

⁵⁶The Association imported 60,000 MT wheat during 1992/93. This required an effort to sign off 29 flour mills, secure their consent to deposit in advance Tk. 7,00,000 per 100 MT of prospective imports, negotiate centrally with Cargill, the major US wheat shipper, open Letters of Credit (L/C) for import, pay up on duties, transport wheat to the gate of each of the payee of the advance for a flat rate of Tk. 265/md, and, finally, to return to each payee a portion of the advance not used up. The fact that the Association charged a pan-regional delivery price, delivered to millgate, reimbursed the payees and supplied quality wheat deserves to be stressed. It is a tribute to the Association's capacity for import coordination that the combination of the wheat quality and price left everyone involved a happy customer. The achievement was particularly notable in that this was the first episode of private wheat import, whether at individual or group level, in Bangladesh. Again, the Association apparently knew when not to import: quite a few of the stand-alone importers in 1992 have come to grief, due to inappropriate timing. Group action enabled a pooling of information not possible in situations of individual action.

September-October, 1993. The Association, apparently, is responding to atypically low world wheat prices in 1993: in a year of record low domestic wheat prices, the Association is taking a calculated risk it can make money selling premium-grade flour using hard US wheat (subsidized under EEP by USDA), which neutralizes the statutory 15% import duty. This duty demonstration of entrepreneurial activity by the Association is a testimony of its business selfassurance. But it is also a sign of our times. Such a behavior may have been deemed as hubristic a few years ago.

Despite the effective coordination of wheat imports, the Association leaves alone all other firmspecific policy decisions (e.g. related to output determination, and the like). Intense competition for market shares rules out output coordination among the members of the Association. The presence of the Association does not amount of an evidence in favor of the existence of an oligopoly.

Table 12 reports on how wheat millers on the IFPRI Wheat Market Survey had sourced their various wheat requirements.⁵⁷ So that we are able in this particular exercise to isolate privately-imported wheat from aided wheat, presumably leaking from the PFDS channels and mediated by wholesalers, those sets of transactions were treated as distinct activities.⁵⁸ Several observations are

⁵⁷The information presented in Table 12 also suggest the outlines of the marketing channel for wheat.

⁵⁸In this connection, the overlap between private importers and traditional wholesalers during 1992/93 would be significant issue. It appears that this overlap is not substantial. The largest private importer in the study year
(Footnote continued)

apposite at this juncture. First, wholesalers are the wheat suppliers of choice for both major/compact mills, and roller mills. For both classes, imported wheat grades predominate, without wheat sourced from own-account of commercial imports being of any significance. This implies that mainly leakages from the PFDS are steered by the invisible hand of market coordination to the millgates of industrial processors on the sample. BeParis supply about 17% of the mills requirement: they are the second most important source.⁵⁹

has been the major mill owners' Association. Four other major importers were either generalized importers, or mill-owners. It is valid that the overlap is not of any real significance. The importers have mostly marketed their imports directly to the mills, in order to keep user costs low and competitive in a year of low wheat prices.

⁵⁹Many beParis invest their money with the GERC dealers and, in 1992, with the labor Sadars of FFW and Test Relief schemes during the six months of the study period before the introduction of rice-for-wheat swap. In the next table, we produce direct evidence about both farias and beParis milking FFW wheat sources. It would be idle to think that all there was to it. Hence we asked the millers, too: having nothing of real value to lose, the millers have given the beParis' real story away.

Table 12 -- Marketing Chain for Wheat, by classes of Mills, for the Year through March 1993

Wheat sources	(Percentage of Wheat Milled)											
	Roller						Major mills					
	Local	HRW	HRS	A	Dudhia	Dhepa	Local	HRW	HRS	A	Dudhia	Dhepa
Farmers	2	-	-	-	-	-	2	-	-	-	-	-
Farias	22	3	6	50	9	13	8	-	1	50	8	2
Beparis	16	33	40	12	26	23	27	2	11	31	23	61
Wholesaler	60	60	53	37	60	60	63	75	61	12	54	30
Govt. allotment	-	3	1	1	3	3	-	21	18	7	9	4
Private imports	-	-	-	-	1	-	-	1	9	-	4	-
Others	-	-	-	-	-	-	-	-	-	-	2	3
Total	100	99	100	100	99	99	100	100	100	100	100	100

Note: For some of the columns, figures do not add to 100, due to rounding errors. HRW denotes Hard Red Winter; HRS, Hard red Spring; A denotes Australian; Dudhia and Dhepa are trade names for two hard-to-classify wheat varieties that are widely used in Bangladesh.

Source: IFPRI Wheat Market Survey 1992/93.

Table 13 below reports on the marketing channel for six wheat grades for three types of traders. The trader types are the faria, the bepari and the wholesalers. Several observations now follow. First, and here we look at the collection profile of the wholesalers, these agents tap other (perhaps assemblers wholesalers) for half their supplies of local wheat.⁶⁰ Beparies, farias and farmers divide the balance up on a 54:34:12 ratio. Of imports "dudhia", "dhepa" and Australian wheat are each actively retraded after they leach into the market: witness the proportions of the sample wholesalers' collection from other wholesalers, beparies and faris.⁶¹ Also, wholesalers have tapped the Open market Sales (OMS) channel. A small proportion is also sourced from private imports.

Second, the farias and beparis draw forth their supplies of domestic wheat from farmers and other farias. Noting that the average faria on the samle is fairly small, the fact that there should be a "subordinate" set of farias dealing in even smaller quantities than those on the sample is suggestive that perhaps trading at this level is labor-

⁶⁰If, for domestic wheat, this implies a multilayered pattern of wholesaling with a primary-market-to-terminal-market progression, this is quite significant that the same should also be true of three of the imported varieties of wheat, viz. hard red winter (HRW), "dudhia" and dhepa" varieties. The point to underscore is that the character of the market chain, substantively, is the same for both domestic and PFDS wheat other than privately-imported wheat.

⁶¹Let this be reiterated that the transactions surrounding these proportions at hand involve primarily aided wehat, and notprivetely-imported wheat. Hence the accent is properly put on retrading from upstream traders to downstream ones --- just as if another normal and competitive farm good is being marketed. This point is important enough to take some repetition.

intensive. Numerous of parttime and marginal farias operating from their village homes, and carrying what quantity can be carried on a bicycle to a faria who operates out of a primary market here exemplify the low opportunity costs implicit in the marketing services at these stages.

Overall, the marketing channels for domestic wheat table (viz. "dudhia", "dhepa" and Australian white) are similar in the sense of a regular pattern of up-and down-stream commodity flows. Such an intuitive pattern is to be expected for domestic wheat. That it also is faithfully descriptive of the market chain for grades of wheat that, except under prescribed conditions and in relatively small quantities, are not to be privately traded at all implies, strongly, that powerful incentives to coax PFDS wheat into the market domain and routinely realized.

Table 13 -- Marketing Margin for Wheat Traders

	Faria						Bepari						Wholesaler					
	Local	HRW	HRS	AW	Dudhia	Dhepa	Local	HRW	HRS	AW	Dudhia	Dhepa	Local	HRW	HRS	AW	Dudhia	Dhepa
Farmer	59	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-
Faria	41	-	39	-	3	-	61	100	30	-	30	-	17	-	-	5	4	10
Bepari	-	-	-	-	-	-	39	-	-	-	-	-	27	46	13	42	15	14
Whole-saler	-	-	-	-	92	-	-	-	-	-	-	-	49	54	18	30	40	73
OHS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64	-	19	-
VGD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FFW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sardars	-	-	48	-	3	-	-	-	70	-	-	-	1	-	-	-	-	-
FFW: Chairman	-	-	13	-	1	-	-	-	-	-	70	-	-	-	-	-	14	-
Imports (private)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	22	8	3

Source: IFPRI Wheat Market Survey, 1992/93

Table 14 -- Proportion of 1992 Output held in Storage at month end

Month	Small Farmer	Medium Farmer	Large Farmer	All Farmer
March '92	49.3	59.0	65.5	51.3
April '92	30.1	36.2	32.6	30.8
May '92	22.6	27.0	21.9	23.0
June '92	18.3	22.1	16.5	18.5
July '92	15.1	17.9	14.3	15.3
August '92	12.4	16.8	12.8	12.8
September '92	10.8	12.9	11.3	11.0
October '92	8.9	7.6	6.6	9.3
November '92	1.2	1.4	0.4	1.0
December '93	0.5	0.6	0.1	0.4
January '93	0.3	0.4	0.1	0.2
February '93	0.8	7.0	2.2	1.8
All months	14.2	17.4	16.2	14.6
1992 Wheat output/farm (md)	9.0	13.3	38.1	11.3
% of all wheat farmers in the economy	83.9	9.6	6.5	100

Note: By March 1993, some farms have harvested the 1993 wheat crop, thus raising the ratio at hand in the last row of the table.

Source: IFPRI Wheat Farm Survey, 1992/93

In 1992/93, availment of government wheat allotment was unremunerative for the millers. This was due to public issue price being higher than market prices (Table 6). It mostly not pay to lift one's allotment.⁶² Third, farias are a supply channel of some consequence, especially as concerns Australian wheat, and local wheat used by roller mills.

Flour wholesalers are the next tier to consider. The three largest flour mills in the country, namely, the Fauji, Chittagong and Diamond --- all owned by a para-statal organization --- wholesale through a slew of selling agents. These units in turn appoint sub-agents to market further afield. The other major mills, too, sell using a string of flour wholesalers. The cardinal wholesale flour markets in Bangladesh are Moulvibazar in Dhaka --- the destination of much of the flour output of mills in Dhaka and Narayanganj -- and Khatunganj in Chittagong. Flour wholesalers comprise an exclusive enclave of no more than 60-100 businesses, usually of long standing. The only thing more rivetting than the low-key profile of their physical turnout is the amount of over-the-counter credit, almost invariably on the millers' account, they absorb. The flour wholesalers are assiduously wooed by the millers by other than credit,

⁶²The fact that domestic wheat can, technically, turn itself to a fairly close substitute for the Hard Red Winter wheat after three to four months of efficient storage helped, too. Especially, this significantly added to the range of marketing choice of major/compact mills, because these mills are better equipped than rollers millers to put into effect relatively exacting input quality control, to mention only one advantage.

too.⁶³ Well-known mills, with long track record, and newly-fangled ones, trying to build beachheads, are all alike in keeping the flour wholesalers "in good humor".⁶⁴

Retailers are the last tier to describe. These agents retail many products, flour being one of them. They come in at a fairly large range of scale of business, primeness of location and the number and variety of goods they are cosold along with flour. The diversification is germane to the unit marketing margin charged on flour retailed.

⁶³Several well-known mills reward sales performance of their wholesale agents using ceremonial awards at annual occasions summoned for the purpose at posh hotels. The mills of the parastatal hold their prize distribution ceremony at a four-star hotel at one port city.

⁶⁴Several leading flour mills have begun to market flour in packed form. Towards this end, flour is put into airtight polythelene bags, which are then shipped to the wholesalers'. This stems from a desire by the millers at hand to take further the campaign to blur competition on the basis of price. Direct mill-to-retailer shipments have yet to start on an appreciable extent. The fundamental force that still underlines the traditional marketing regime --- viz. mill-to-wholesale points --- is the economies of scale in transportation and marketing staff input, and in the recovery of credit. Additionally, the typically well-established flour wholesalers offer their trade creditors some potential advantages by way of pooling of risks.

Ownership of Wheat Stocks

Table 14 reports on the seasonal pattern of wheat stock ownership on farm.⁶⁵ The agrarian baisi of the wheat stock ownership is also shown.⁶⁶ It will be emphasized here that, for the first time, we have some firm data about ownership of farm wheat stock in Bangladesh.

Two sets of observations now aptly follow. First, for all classes production disappears rapidly during March and April --- probably a consequence of heavy selling. Virtually, 80% of all output disappears from the farms within three months of harvest. In 1992, this surplus wheat was absorbed by assembly-wholesalers, and stockists. By the middle of September, i.e. within six months from the appearance of wheat harvest, stocks on all farms have whittled down to between 12% and 17% of the output. Second, at 14% and 16% respectively, the overall monthly stock-to-output ratio of small and large farms are not significantly apart. Insofar as stock ownership is closely related to a "convenience

⁶⁵Stock at issue originate from production alone or land tenancy rights; they are net of any market purchase. The stock data at issue were found to obey the following stock identity:

$$S_t + Q_t = M_t + C_t + S_{t+1}$$

where S = stocks, Q = production plus net transfers due to tenancy transactions, M = marketing, C = onfarm consumption, t = time subscript. Data from 420 farms drawn using a stratified random sampling procedure are used in this exercise. Also, data from a census of 4523 farmers in 21 villages from as many districts have allowed the computation of weights for small, medium and large farms.

⁶⁶Medium and Large farms might easily have been aggregated in view of their numeric smallness. However, the large farmers produce three times as much wheat as medium ones: aggregation would have begged some questions.

yield", to find that small and large farms are in the same company in this connection suggest that the balance between them in terms of access to credit is about equal.

Table 15 reports on throughput-to-stock ratio for farmers, millers and wheat traders during four seasons. This information illuminates the seasonal pattern of the ownership of trade wheat stock. Ownership and location of stocks form an important description of the structure of commodity markets. The information in the table has mainly two highlights. Having already documented that the farmers quickly run off their stocks soon after harvests, we now see that the terminal-wholesalers invest in stocks in the four months through July: hence their relatively low throughput-to-stock (TS) ratios in the first two rows.⁶⁷ In marked contrast, this is when the assembler-wholesalers register the most brisk TS ratios. During the rest of the year, the terminal-wholesalers take control of the wheat trade, which is why their TS ratios rise sharply subsequently.

⁶⁷Throughput refers to turnover during any given period; stocks are an average of opening stock and closing stock during the same period.

Table 15 -- Throughput-to-stock ratio, by classes of Wheat Market agents, year through March 1993

Period	Trader		Miller	
	Assembler- wholesaler	Terminal wholesaler	Major/ compact	R(3)
April-May	19	2.4	4.8	6.0
June-July	12	3.61	6.1	4.8
August-Oct.	3	5.11	6.6	3.0
Nov.-Jan.	1	3.8	2.2	2.2
Feb.-March	0	0.9	1.3	1.6

Thirdly, major/compact mills and roller mills register about the same throughout-to-stock ratios virtually throughout the year.

The most rivetting finding is that during the summer, surplus wheat stocks most transit from the ownership of farmers and, at a further remove, from assembler-wholesalers to the terminal-wholesalers. From a regime of more dispersed ownership, the stocks transform into a regime of more concentrated ownership. In the same breath, however, the centralization has a spatial facet too: surplus stocks are relocated from the north-west of the country to Dhaka, Chittagong and Feni. Furthermore, the number of wholesalers who really sustain a lion's share of this centralization of stocks is unlikely to top sixty. The resources and price expectations of these sixty major wholesalers, and the level of public wheat and perhaps rice stocks would likely determine what happens to wheat prices through this arbitraging stockpile. Why wheat prices in the six months through June 1993 are down by about 15% upon a year ago has much to do with this.⁶⁸

⁶⁸Wheat stocks with the government averaged at 0.2 MMT during six months through June 1992, while the matched figure one year on was 0.5 MMT. Grain traders and millers had earned tidy profits in 1989/90, and upto the end of July 1992. These profits were being ploughed back into foodgrains. The situation in this sense simply turned itself around twelve months on. Foodgrain traders and millers lost money in the rough and tumble of 1992 boro season (Haggblade and Rahman, 1993). Markets have continued to remain very unstable in the months since. Although, like in 1992, wheat farmers have transferred title to the stocks soon after 1993 harvest, and while those stocks have been cornered by the sixty odd wholesalers, the stock overhang make prices very jittery indeed.

v Conduct of Wheat Markets

Introduction

Our discussion of wheat markets' conduct is structured as follows. First, evidence is presented purporting to show that the markets are open for business round the year. Second, this is shown to be the case for both domestic as well as most of the imported varieties of wheat. Third, it is argued this means that in the year through March 1993, the channels steering leakages from the PFDS, which is the staple of the millers' imported wheat demand, are also open for business round the year. In the context of there being no FFW schemes paying workers in wheat in 1992/93 dry season, this moreover means that feeding off the monetized wheat channels has had a big incidence in 1992/93. Finally, price evidence is examined with respect to the various grades of wheat.

Comparative Wheat Balance in 1992/93 and the Preceding Quinquennium

The main motivation of Table 16 is to focus on the study year against the background of the quinquennium preceding it. A knowledge of the difference that the study year stands for is important in one's efforts to understand what is new.

The highlights of Table 16 are (a) that in the study year wheat offtakes and imports, especially the former, are sharply down on the past; (b) that the study year has been a period of significant public stock accretion; (c) that this has been a period of relatively low wheat prices; (d)

that private-sector wheat imports have, for the first time, taken place.

Millers' Demand for Wheat: A Componential Analysis

Table 17 focusses on Bangladesh's industrial millage of wheat.⁶⁹ Its point is to put in context both wheat millage by types of wheat processing mills and millage by sources, for the year through March, 1993.⁷⁰ Total millage estimated

⁶⁹The reason why this is not presented earlier on in the paper (while reporting on the supply aspects of the wheat economy) is that this material is a precursor to some specific data about the characteristics of millers' wheat demand, and how they are sourced. These data are from the IFPRI Wheat Farm Survey, 1992/93.

⁷⁰The data on total millage by types of mill are relatively firm, as they are based on a sample survey carried out specifically for this purpose. That on wheat millage by sources (e.g. domestic production as distinct from leakages from the PFDS and so on) are still firm, albeit a little less so. Our procedure has been to be conservative with regard to leakages, especially out of food for works (FFW) program. Three types of millers are treated here. The millage figures are economy-wide estimates: they are millage per establishment multiplied by number of establishments in each class. Millage distribution by wheat sources makes following assumptions about leakage out of PFDS channels. For FFW, "leakage" here includes what we call, for lack of a better term, structural leakage and voluntary monetization by workers (Box 2). For the study year, we conservatively estimate structural leakage plus voluntary worker monetization at 53% (Box 2). Structural leakage is, conservatively, 30%; worker-level monetization is worth 23%. The latter is an estimator for 1991 FFW season (Mitra & Associates, 1991). Because market costs of rice calories relative to wheat's have fallen by 10% between 1991 and 1993, proportionate worker monetization in 1993 may have figured more prominently. Conservatively we assume that a half of FFW wheat is monetized. For VGD, following Ahmed (1993), we estimate that program leakage is 14% and that 19% of what is issued are sold by beneficiaries for

(Footnote continued)

for all wheat millers at 1.6 MMT is higher than the quantity of wheat that we estimate to have arrived at the market from various sources, including surplus offerings out of domestic production. This is only to be expected: our conservative estimates of leakages out of the FFWP and VGD may well understate. In fact, the apparent discrepancy goes away if one assumes that the proportion of FFW wheat that leaks out is merely 75% and not, as before, 50%.⁷¹ That our independent aggregate estimates of market-level millage demand and the matched wheat supply are in notably close company suggests that the data from our sample survey, albeit the relative smallness of the underlying sample, are representative and credible.

cash. Thirty percent of VGD comes to market. $[{(.14) + \{(1-.14) \times .19\}} = .30]$ The VGD estimate about beneficiary monetization is based on the lean season, September to mid-November, 1991 (Ahmed, 1993). During the survey year, rice-wheat price relative is significantly lower than during lean season of 1991. High price of rice relative to wheat then prevailing suggests that wheat retention by beneficiaries might have been higher. There is a case that during the survey year, voluntary monetization percentage in VGD is higher than 19%. We should recognise the conservatism of the leakage estimates made. For monetized channels we assume, following the result for the survey of Statutory Rationing (SR) recipients, that 94% percent leak into the markets. We shall see soon that these leakage assumptions probably amount to understating the size of the wheat market.

⁷¹May we have overestimated the unit millage, or the number of establishments? As for the latter, we use only the number of units registered by the DGF for allotment. Of course, there are some units not recognized by the DGF. If anything, we are understating. Secondly, we assume that only 38% of the 11287 atta chakkis recognized by the DGF have milled any wheat in other than custom-milling fashion, and that only 75% of the recognized roller mills have milled any wheat. The degree of overstating bias in these assumptions, if any, is likely to be very small.

Box 2 -- On Wheat Leakage and Monetization

Leakage is an evocative concept. In public foodgrain distribution system (PFDS), leakage is said to occur when grain supplies, mandated ostensibly in order to augment food availability for vulnerable households specifically, are unilaterally diverted usually by insiders into the open market. (This may not always be a matter of maximizing private profits from milking the price difference). We call this *structural leakage*: this is inherent in the system. If this form of leakage occasions relatively low unit transaction costs relative to the prospective profits when it is motivated by profits, it will likely be quite widespread. If so, its existence weakens the case for in kind distribution. A second type of leakage can exist, too. This happens when the public distribution is carried through as laid down in the statutes, but when consumption preferences and relative prices are such as render it attractive for beneficiaries to retrade PFDS grains in order to buy more preferred privately-marketed food. This form of private re trading of publicly-mandated food can apply to both generalized regimes of subsidies and targeted subsidies. We call this "voluntary leakage". Usually, this is legal. But much as if increases market-level wheat supply, it dilutes the intrinsic case for inkind grain distribution.

The Food for Work (FFW) program is the most important specimen of targeted foodgrain distribution in Bangladesh and represents one of the largest inkind distribution programs undertaken anywhere in the world. All FFW activities are implemented by the Ministry of Relief. Bangladesh has two modules of FFW program: one of these is monitored by CARE, the IFFW. The other is monitored by World Food Programme (WFP).

WFP allows upto a maximum of 15% of grain allocations to be monetized. For CARE, the admissible cutoff monetization rate is 10%. Judging by the results of CARE's careful monitoring, the proportion misused is a lot higher, at about 36% for three years through 1991/92 (CARE, 1993, Table 1). The Working Group on Targeted Food Interventions (WGTFI) has adopted this as program leakage estimate for IFFW. Note that CARE fields a corps of personnel about 300 strong to rein in "leakage". WFP, with a component about 3 times the size of CARE's, has a field force of about 30 personnel. Recent estimates of program-level leakage for WFP-monitored schemes is not on hand. WGTFI used an estimate for 1982, of 28% (Chowdhury, 1983). Overall, program level leakage is put at 30% in this report, with the qualification that our sources in the trade regard the 28% estimate (corresponding to WFP) as underestimates.

Mitra & Associates (1991, p. 59) estimated what we have called voluntary leakage at 33% of what workers received while working on IFFW schemes in 1991 season. (It will be argued shortly that this may be a low estimate of such monetization by workers themselves in the study year.) Overall, on these assumptions, 53.1% of FFW wheat are assumed during the study year to have been "monetized". To be on the low side, we used 50% as our opening gambit.

This assumption may well understate. Between the 1991 FFW season (Feb -May 1991) and July-October, 1992, rice prices in open market fell relative to wheat price by 10 percentage points. The cost of rice calories fell relative to wheat's. This, for one thing, is likely to increase "voluntary leakage" in the study year. This creates the warrant for being willing to at least actively consider, if not accept without demur, an alternative and higher, overall monetization, in estimates of the size of wheat markets.

Table 16 -- Aggregate Data on Wheat Economy in two Periods

	1987/88- 1991/92	1992/93	1992/93 as % of 1988-1992
Opening stock	556	483	87
Wheat production	1023	1150	112
Monetized offtake	856	345	40
Nonmonetized offtake	895	253	28
Total offtake	1752	598	34
Procurement	60	0	0
Government import	1679	809	48
Private import	0	350	α
Closing stock	551	663	120
Real price (Tk./MT)	4925	4528	92

Source: DGF data; price data are wholesale wheat price made available by the Directorate of Agricultural Marketing (DAM) deflated by the index of wholesale price of manufacturers.

**Table 17 -- Millage by Class of Mills, the Year through
March 1993**

All quantity in 000 MT	
(A) Wheat millage by class of millers	
Class of mills	
Major/compact	905
Rollers	264
Atta Chakkis	428
Total	1597
(B) Sources of Wheat millage	
Monetized	
Flour mills (FM) channel	115
Other monetized channel	211
Palli chakki	48
Subtotal: all monetized	374
Nonmonetized	
"Leakage" from FFWP	136
"Leakage" from VGD	24
"Leakage" from other nonmonetized	16
Subtotal: all nonmonetized	176
Private import	360
Total imported wheat	910
Marketed surplus of domestic wheat	592
Total ^a	1502

Notes: a) Leakage estimates from FFW and VGD include both program or structural leakage and monetization by beneficiaries (Box 2). The total would be 1570, instead of 1502, if we assume only that 75% and not 50% of the FFWP wheat leak out into the market. Also, our estimate of leakage out of VGD understates.

Source: IFPRI Wheat Market Survey, 1992/93; DGF data on wheat offtakes; author's estimates.

Because there are some uncertainties about some of the underlying data, one should not read fine print here. For present purposes, it will suffice that domestic wheat, privately imported wheat, leakages from the PFDS and public wheat allotment to recognized mills have, in that order, sustained the operation of the milling industry during the survey year.

Table 18 deaggregates wheat millage by four grades. It shows, first of all, that domestic wheat is, in purely volume terms, the variety in keenest demand. Hard wheat comes a close second. Other wheat grades, called "Dudhia", "Dhepa" and Australian wheat bring up the rear, at 28%. However, this aggregative view is misleading: in fact there are certain technological specificities in terms of the hardness or otherwise of the wheat milled. This is shown in Table 19.

The following conclusions may be aptly made about Table 19. First, of the demand by the major/compact mills, about 61% are meant for hard red wheat. Significantly, over one-fourth of the atta chakkis, the second most important class of wheat buyers, have sixty three percent of their demand being for domestic wheat, while the residual is for "Dhepa", "Dudhia" and the like. Third, roller mills mainly demand wheat that is soft but free from refractions: Australian wheat meets this requirement. The roller mills therefore are heavily weighted toward "other" types of wheat. Significantly, more than three-tenths of even roller mills' requirements are for domestic wheat.

Table 18 -- Distribution of Wheat Millage by Major Grades

Grades/Varieties	Total millage	% of total
Hard red winter	170	10.6
Hard red spring	386	24.1
Hard wheat	556	34.8
Other imported	450	28.1
Domestic	592	37.0
Total	1598	

Source: IFPRI Wheat Farm Survey, 1992/93;
 IFPRI Wheat Market Survey, 1992/93

Table 19 -- Distribution of Wheat Millage by Technology and by Wheat Grades/Variety

(Quantities are 000 MT)

Total	Name of wheat variety	Estimated millage	% of total (for the technological class)
Roller mills	HRW	2	0.7
	HRS	7	2.6
	Domestic	82	31.0
	Others	173	65.5
	Subtotal	264	100
Major/compact	HRW	168	18.6
	HRS	378	41.8
	Domestic	240	26.5
	Others	119	13.1
	Subtotal	905	100
Atta chakki	HRW	-	-
	HRS	1	.2
	Domestic	270	62.9
	Others	157	36.8
	Subtotal	429	100

Source: IFPRI Wheat Market Survey, 1992/93

Table 20 reports on wheat millage per establishment for three classes of establishments during three different seasons of the study year.⁷²

The point of the table is to address whether wheat milling is a regular, yearround enterprise or a seasonal activity. We examine the information at two levels. First, we ask about the proportions of establishments that remained in the act of milling any wheat during each month taken separately.⁷³ Second, we examine the cross-month variability of wheat millage, as measured by the coefficient of variation (Appendix Table 1).

The data lead us to suggest that the industry is anything but seasonal;⁷⁴ that the rate of wheat millage registers a fair degree of stability within the months in the study year for virtually all imported types of wheat.⁷⁵

⁷²If it is a regular yearround business, it is more nearly comparable with milling of rice. In that case, the market in which wheat millers sell their produce can be compared against standard stereotypes of foodgrains markets. If, however, the marketing activities are overly spasmodic and/or seasonal, depending only on the availability of public wheat allotment, then they should not even be compared against the structure and conduct framework of analysis.

⁷³Cent percent of the establishments on IFPRI Wheat Market Survey 1992/93 was open for milling during each of the months.

⁷⁴This is not to deny that it has some marked seasonal ebb and flow regarding the volume of business. See Appendix Table 1.

⁷⁵Seasonal variability is by far the greater for domestic wheat. This is to be expected, because seasonality of the millage of domestic wheat rigidly mirrors the

(Footnote continued)

It is notable but not surprising that the millage of domestic wheat --- the trade in which is perfectly legal --- is much more seasonally variable than is that of imported wheat, private trading in a large component in which is *de jure* forbidden: the market "supplies" of the latter are thicker than can be said for domestic wheat. The wheat markets are open for business all round the year.

Table 21 reports on average prices (Taka per quintal) at which six grades of wheat are purchased by three classes of mills. For our purposes, it is sufficient to note that (a) cross-month variability in price does not appear to be excessive for any of the imported wheat varieties, with regard to the roller and major/compact units; (b) cross-month variability is significantly larger for domestic wheat (Appendix Table 2).

seasonality of its production, and the latter is quite marked, there being only one annual wheat crop. It is known that even private imports arrivals, not to speak of millage based thereon, were not month wise continuous but were fitful. The significantly low month-wise variability noted in the text is due to allotted wheat, and PFDS "leakages".

Table 20 -- Wheat Millage by Season, Mill-type, and Wheat Grade, the Year through March 1993
(Quintal; per establishment)

Wheat Variety	Type of Business	March-June	July-October	November-December
Hard Red Winter	R3 Miller	103	90	89
Hard Red Spring	R3 Miller	141	137	145
Australian White	R3 Miller	221	227	214
Dudhia	R3 Miller	469	444	439
Dhepa	R3 Miller	163	181	170
Local	R3 Miller	448	380	276
Hard Red Winter	Major & Compact	1705	1349	1336
Hard Red Spring	Major & Compact	1142	1266	1417
Australian White	Major & Compact	455	455	421
Dudhia	Major & Compact	915	824	1058
Dhepa	Major & Compact	494	406	348
Local	Major & Compact	2083	1820	1392
Hard Red Winter	Atta Chakki	0	0	0
Hard Red Spring	Atta Chakki	0	0	0
Australian White	Atta Chakki	40	31	27
Dudhia	Atta Chakki	0	0	0
Dhepa	Atta Chakki	30	50	50
Local	Atta Chakki	209	256	111

Note: Custom milling has been omitted in these estimates. The number of establishments are 98 R3 units, 43 major/compact mills and 16 atta chakkis.

Source: IFPRI Wheat Market Survey 1992/93

Table 21 -- Wheat Prices by Season, by Mill-type and Grade, the Year through March 1993

		(Tk./Quintal)		
Wheat Variety	Type of Business	March-June	July-October	November-December
Hard Red Winter	R3 Miller	750	744	725
Hard Red Spring	R3 Miller	797	791	772
Australian White	R3 Miller	786	803	785
Dudhia	R3 Miller	769	768	744
Dhepa	R3 Miller	722	725	712
Local	R3 Miller	668	711	711
Hard Red Winter	Major & Compact	794	821	729
Hard Red Spring	Major & Compact	796	779	738
Australian White	Major & Compact	788	754	733
Dudhia	Major & Compact	754	754	741
Dhepa	Major & Compact	728	722	705
Local	Major & Compact	809	717	702
Hard Red Winter	Atta Chakki	0	0	0
Hard Red Spring	Atta Chakki	0	0	350
Australian White	Atta Chakki	731	733	690
Dudhia	Atta Chakki	0	738	680
Dhepa	Atta Chakki	665	640	376
Local	Atta Chakki	612	691	687

Source: IFPRI Wheat Market Survey 1992/93

VI Performance of Wheat Markets

Performance of markets is usually measured in terms of (i) the marketing margin⁷⁶; (ii) the rates of returns marketing agents earn relative to some intuitive norms.

Presently, we address the issue of performance with regard to (i) above alone.

Previous studies of Wheat marketing margins⁷⁷

Not a great deal of written output about wheat marketing margin exists. FPMU/IFPRI (1992) estimated that wheat's gross marketing margin in 1992 averaged at 36%, when componential margins related to flour mills and atta chakkis are appropriately weighted (Table 22). This particular study also showed the presence of a relatively large component of invisible costs as part of flour mills' marketing margins (Table 23). This study, utilizing the results of a Rapid Rural Appraisal (RRA) method, should, however, be deemed a first cut in lighting upon at that time a somewhat shadowy market. A 1988 report estimated cost of

⁷⁶How keenly marketing agents, under the force of competitive behavior, price their services is a key aspect of the performance of a functioning market. If barriers to entry do not skew the supply of new enterprise, and if the balance among existing set of market participants with regard to credit, information and technology is essentially equal, the marketing margin should be equal to the cost of real resources of performing marketing services plus some normal profit mark up.

⁷⁷Marketing margins refer to the difference between weighted average unit retail prices of each of wheat's derivatives, including byproducts, and unit price of wheat at the farmgate (in the case of domestic wheat) or at the unit price at which PFDS wheat is monetized, the difference being prorated with respect to the latter (Chowdhury, 1992).

marketing atta in rural areas on the part of atta chakkis at 46%, using 1986/97 data (Chowdhury et al. 1988).

Present estimates of marketing margins

In the year through March, 1993, we estimate the marketing margin to be about 41% (Table 24).⁷⁸ This estimate is based upon data related to 350 establishments in the wheat industry.

Wheat's marketing margin, at 41%, is significantly higher than for rice (Chowdhury, 1992), and this has been reported before. In the main, wheat marketing runs up some invisible costs which do not show up in rice marketing: the

⁷⁸We estimate absolute marketing margin (AMM), in Tk./md, for each of five stages of marketing, viz. faria, wholesaler, wheat miller, flour wholesaler and flour retailer. Towards this end, AMM for wheat millers is miller defined as follows:

$$AMM = \left[p^f - (p^w/\alpha) + \left(\sum_{i=1}^4 p^i * q^i \right) \right]$$

where, for, say 100 quintals of wheat,

- p^f = Total value, at wholesale prices, of flour produced from 100 quintal wheat
 p^w = Total cost of purchase of 100 quintal of wheat
 α = flour-to-wheat ratio
 p^i = unit wholesale price of i^{th} byproduct, $i = 1, 2, 3, 4$
 q^i = total quantity of i^{th} byproduct produced from 100 quintals of wheat

Similarly, for wheat traders, AMM will merely be equal to unit sales price net of unit purchase price. For flour wholesalers, AMM will be equal to the difference between unit sales price and purchase price in wheat equivalent unit. When AMMs per unit of wheat are aggregated over the five marketing stages, and the sum prorated to the unit price of wheat, one gets the proportionate marketing margin.

Table 22 -- Gross marketing Margin for Wheat and Rice

Heads	Flour Mills		Atta Chakkis	Rice
	North Bengal	Chitta- gong		
Wheat Price at primary level (Tk/kg)	6.76	7.1	-	-
Ex-Mill Wheat Price (Tk/kg)	7.01	7.67	-	-
Processing Margin (Tk/kg)	0.8	0.8	-	-
Cost of finished product (Tk/kg)	8.69	8.91	-	-
Wholesale price of flour (Tk/kg)	11.35	-	-	-
Retail price of flour (Tk/kg)	11.75	12.5	-	-
Market Margin (%)	41%	42%	28%	25%

Note: Market margin is computed using following formulation for flour mills: $\{P_F - P_W\} + V_B$, where P_F = flour retail price in Tk/kg, P_W = cost of wheat of equivalent quantity (Q) and V_B = value of by-products produced by Q. For atta chakkis, margins are calculated, noting that no by-products are at issue, and atta extraction rate is 95%.

Source: FPMU/IFPRI RRA on wheat marketing, 1992

Table 23 -- Transparent and Invisible margins in Wheat Distribution, 1990/91

Heads	Taka per Kg. of Finished Products
Transparent Margins:	0.56
Primary Market to Miller Cost	
Process Cost and Normal Profit, Miller	0.8
Flour/atta Wholesaler's Gross margin	0.28
Retailer's Margin	0.4
Subtotal:	2.04
Gross margin (low estimate)	2.80
Gross Margin (high estimate)	2.98
Invisible Cost (low estimate)	0.76
Invisible Cost (high estimate)	0.94

Source: FPMU/IFPRI RRA on wheat marketing, 1992

wheat dealer is in the business of "smuggling" goods across a public jurisdiction, however tenuous, and this occasions the payment and the acceptance of rent. A second reason wheat marketing margin is higher is that, unlike for rice, the spatial grid of wheat's market is more truncated. Most wheat, that is to say, appear headed for most of the time for either Chittagong or Dhaka or Feni or Sylhet.⁷⁹ The marketing chain harbors greater centralization of routes and destination. This, coupled with the congestion of market supply of domestic wheat in the two months after the harvest, translates into greater concentration, too.

⁷⁹While, in contrast, for rice there is a much more extensive spatial distribution grid (Chowdhury 1992).

Table 24 -- Distribution Margin in Wheat Marketing in Bangladesh, the Year through March 1993

Marketing stages	Absolute marketing margin (Tk./md.)	% of total
Faria	16.2	14.8
Wholesaler	11.0	10.0
Wheat millers	64	58.6
Flour wholesaler	8	7.3
Retailer	10	9.1
Total margin	109.2	
Unit user cost of wheat/md.	264	
Percentage marketing margin	41.3	

Source: IFPRI Wheat Marketing Survey, 1992/93

VII Policy Issues⁸⁰

Two broad classes of food policy issues are implicated by the foregoing results, viz. food aid monetization, and the role of wheat in domestic cereal production. Both have been mooted before.⁸¹ In the following, we mainly address the first set of issues. The approach we follow is that we construct the case for and against monetization. We then confront the case for kind distribution in FFW-type targeted program against the prevailing realities of the wheat market. We say nothing about the VGD in this section.

The Case against monetization

Argument 1: Direct delivery of a less preferred food or grain has a greater degree of self-targeting (at very poor households) than in a cash wage regime. Paraphrased in the Bangladesi context, "the food wage in the Food for Work (FFW) is a more effective self-targeting system than if there were a cash wage regime". (GOB, para 4.42, p.49).⁸²

Argument 2: A significantly large proportion of the absolutely poor households live in remote areas, where

⁸⁰We invoke policy issues in this report with a strong caveat: this is an on-going work, and what we say in the following must be regarded as very preliminary. After the data generated by IFPRI/CIMMYT collaboration have been fully analysed, our policy reflection may well become more definitive.

⁸¹Monetization was comprehensively discussed in 1989 (GOB, Ministry of Planning). the second has been discussed in World Bank. 1992 and IFPRI/BIDS collaboration, 1993.

⁸²This is true a fortiori if the grain at issue is wheat, which is regarded as a less than perfect substitute for rice. Wheat self selects the poor better than cash.

foodgrain markets, being scarce or, even worse, nonexistent, through their own underdevelopment establishes the rationale for direct targeting of foodgrain, and for keeping for the public sector the logistical burden and cost of food handling.⁸³

Argument 3: Kind distribution would induce a shift in the rice-wheat balance in the diet of the rural poor in favor of wheat. This is equity-enhancing, because wheat-calories are cheaper than for rice calories, due to greater ratio of edible content per unit of expenditure.⁸⁴

The case for monetization

Argument 1: A significantly high proportion of wheat already finds its way into urban markets, reducing its availability in rural areas. The market chain relative to imported wheat in the PFDS conduits is well-developed. De facto monetization is already the norm for a significantly large proportion of targetted food aid.

Argument 2: The unit costs of retrading a part of FFW wheat wage are unlikely to differ significantly between the poorest and the relatively better-off among prospective, and typically male, workers in FFW schemes. Because income loss from retrading of FFW wheat is not to be counted upon as a

⁸³A closely related argument can be cast in terms of the foodgrain markets being not well-integrated with regard to temporal margins during the FFW season. Then, wheat wage may in theory translate into larger command over foodgrain than monetization would.

⁸⁴Box 3 puts several other arguments for kind distribution in context.

Box 3 -- Project Food Aid: Distribution in Kind Versus Monetisation

Conditions under which MONETISATION is the preferred option

1. The objective of the project is a general income transfer, not specific food supplementation; where food supplementation is the objective, cash funds can be reliably expected to be transferred to food expenditures.
2. Targeting within households (e.g. to women or children) is possible using cash transfers.
3. Social traditions remunerate in cash.
4. Food is available to buy: local food markets or distribution mechanisms (e.g. fair price shops) function, or can be expected to adjust or be established in response to increased purchasing power; there are no serious distortions in local food markets.
5. Government bureaucratic managerial capacity is adequate for deposit/transfer/expenditure/auditing of cash funds; no particular risk of diversion of funds.
6. Additionality of cash payments and their targeting on the poor assured or possible to arrange without violating Government budgetary/fiscal policies or procedures.
7. Cash-supplementation of specific target groups (e.g. civil-service staff) acceptable; no particular dependency/phase-out problems that argue against cash; risk of undesirable taste changes through direct distribution of food.
8. Monetisation, i.e. arrangements for sale and deposit/programming/auditing of cash funds, more cost-effective than distribution in kind.

Conditions under which DISTRIBUTION IN KIND is the preferred option

The project objective is an increase in food intake which will not result from cash transfers.

Targeting within households can only be successful with food.

Social traditions allow remuneration in kind

Food is unavailable (drought, civil disturbance, inadequate logistics, seasonal shortage) or over-priced (traders making supranormal profits or not serving remote areas); and government interventions using food aid cannot improve the functioning of the market.

Government bureaucratic managerial capacity is more suited to handling food in kind than cash funds; risk of diversion of food less than of funds.

Additionality and targeting on the poor more easily assured for food than for cash, given Government budgetary/fiscal policies or procedures.

Government prefers food as a temporary addition (topping-up) to e.g. civil service salaries, rather than cash; food is preferred because it is easier to phase-out, particularly during structural adjustment programmes; no risk of taste changes through distribution of food.

The cost-effectiveness of direct distribution (overall administrative/logistical costs against net local value of food transferred) is more favourable than monetisation.

self-selector, cash and wheat wage, for male workers at any rate, are equivalent.⁸⁵

Wheat Markets and Monetization

How do the pros and cons of monetization of wheat measure up against the insights from the wheat markets?

The IFPRI Wheat Market Survey 1992/93 clearly show that wheat's marketing channel on a yearround basis supplies all manners of imported wheat --- not counting the privately-imported wheat --- to wheat mills during the survey year. Traders' wheat sources suggest the eminence of wholesalers as the single-most important conduit of the supply of foreign but other-than-privately-imported wheat. Because the privately-imported wheat was mostly mediated to the millers directly by the importers, and because the traditional class of wholesalers have remained wheat suppliers of choice, there is a strong presumption that the domestic wheat milling industry has fed off the PFDS. In the specific circumstances of the year through March 1993, by far the greater share of that utilization owed to the monetized channels: dry-season FFW schemes paid rice, and not the customary, wheat wage, during November-March. However, the putative total leakages from the three targeted channels (FFW, TR, VGD) were not unimportant. In effect, the degree of monetization may well be higher than merely two third by weight, claimed by the Task Force report cited earlier.

⁸⁵This argument assumes that both poorest and not-so-poor workers know that wheat is a cheaper source of calories than is rice.

A clear pattern of technological specificity relative to milling preference translates into the situation that much of the foreign wheat being milled within the relatively modern mills, of which a lion's share is located in urban areas in general and the major cities in particular is sourced from PFDS. The atta chakkis, the staple of the rural milling scene, primarily mill domestic wheat. The rural-urban balance relative to foreign as opposed to domestic wheat is driven by the capacity to pay, but also by the existence of a regional, if not national, flour and bran market which feeds off the urban milling industry. Even if the BBS data, showing that more than 75% of all wheat product consumption is in "rural" areas (including in the not-so-rural thana headquarters) of the country, is correct, perhaps its major share is sourced by mills located in urban areas.

There is little evidence that wheat markets even in remote regions are nonexistent. If high costs of transportation translate into high retail price in remote regions, they could also compare very unfavorably with infrequently-revised transportation allowances for foodgrains in public distribution: this was a major impetus a major impetus for monetization of targeted deliveries (Ahmed, 1992). Food Directorate's local storage depots (LSDs) that are located in relatively remote regions may face stockouts more frequently (CARE, 1993), due to much the same thing.

A particular aspect of the case for targeted delivery of wheat is rendered questionable by the results we have reported. Wheat's market chain, sustained by labor-intensive and populous classes of *farias* and *beparis*, get the usually premium-grade (relative to domestic) wheat out of

the targeted channel and into mainly urban market streams. Leakages out of not only the monetized channels but also out of directly-targeted ones (like the FFW and, to a lesser degree, the VGD) are shipped out of rural areas --- where processors are not fitted out to mill hard wheat --- and into urban, including port, areas, which have, technologically, a leg-up to mill the wheat grades at issue. To put it candidly, much of the PFDS wheat is shipped from the ports up the country at public expense, only to make a return trip to major cities and populous eastern towns on private marketing agents' account. To monetize the wheat, at the two points, after creating an enabling participation environment with regard to credit etc.⁸⁶ and then to pay cash wages to build rural infrastructure an idea whose time may have already come.

Especially so, as monetization frees up what would otherwise have been defrayed on transportation and storage, thus effectively adding to resources available for development. And, it is more neutral to domestic wheat production incentives. These comments apply targeted deliveries of grains related to programs like FFW, TR and Canal Digging.⁸⁷

⁸⁶We must add that the prerequisites to just such an environment are well outside the scope of the present study.

⁸⁷The case for targeted deliveries in VGD is perhaps stronger on grounds of powerlessness. The circumstances of very poor and powerless women, who may utterly lack mobility and cash security, help make the case for kind distribution stronger than for cash distribution. (But, even here, dogma may be a sin.)

With the country well on its way toward "self-sufficiency" in rice and with a national, competitive rice market, food is indeed available to buy. And it is doubtful that government bureaucratic managerial capacity is more suited to handling food in kind, with the "system loss" --- the proportion of system throughput that is written off due to "losses" --- is at a high of 4.5% (Lynton John-Evans, 1986). And the track record of food and administration in Bangladesh is with some worthwhile, if still limited, exposure to what it takes to pay cash wages to empower very poor women to buy more food.

Appendix - I

A Typology of Wheat Processors

There are, basically, four types of wheat processors in the country, viz. major mills, compact mills, roller mills and *atta chakkis*. An understanding of the supply side of the wheat market turns on the relative productive roles of these processing types. Before looking at data about relative shares, it is apt to briefly describe each type, in the above order. Because the roller mills were the first specimen of mechanized devices to mill wheat of which more advanced machines were latter-day reincarnations, we start with them. And because particular technologies evolved over time, the ensuing discussion is at times historical in flavor.

Roller mills represent man's first attempt to harness the power of steam à la James Watt for the purpose of moving rollers in milling wheat. More tellingly in technological evolution terms, rollers represented the first step forward from stone-grinding of whole wheat: instead of grinding, roller mills had their trademark in reducing the kernel slowly into flour fragments, separating the bran. In South Asia and South-east Asia, probably the first exporters of any significance of roller machinery (for milling flour) in the 1950s were India and China. However, it is from China that the first batch of roller mills that Bangladeshi millers set up were imported in 1962.⁸⁸ Typical cost in 1962

⁸⁸In 1962, about 30 roller mills were set up in the erstwhile East Pakistan. All were Chinese machines. The adversarial trade relations between India and Pakistan, of
(Footnote continued)

of a Chinese roller mill (with 4 units and a daily output of 33-37 quintal) was US \$ 3400.

Currently, there are 445 roller mills with 2130 units within the wheat allotment mandate of the Director General of Food (DGF). For every two roller units on the DGF allotment list, there is at least one roller unit not counted. Roller units, therefore, total at 3195 (2130 x 1.5). Roller mills output flour, atta and bran on a 68:16:16 ratio.

Compact mills:

These represent a cross between improved semi-automated designs of the kind laid out in foreign machinery-makers' sales literature and the fabricating and moulding prowess of the frequently self-schooled domestic engineering industry. The two came together in response to an window of opportunity that opened. The first so-called compact mill in Bangladesh was set up in Chittagong in 1972 --- one out of three --- and it was fabricated by a Chittagonian

which Bangladesh was then a part, was a contributory factor in the choice of Chinese machines, although relative costs and active salesmanship of local machinery dealers representing Chinese parastatal machinery makers were the key factor. Salesmen representing Dhaka-based machinery-dealers fanned out in major markets in Bangladesh, made convincing sales pitches before prospective entrepreneurs about the payoff of investing in Chinese roller mills, erected mills they supplied under free supervision and received payment only after customer was satisfied. It is in 1962 that wheat imports into Bangladesh increased drastically (Berlage, 1972), who also stated, "the offtake of more wheat [in that year] was assured by lowering the rationing price by 25%" (p. 12). The window of private opportunity --- the precursor to this particular episode of technological upgradation of a so far antiquated industry -- came clearly from changes in the inflow of aided wheat.

engineering company, which modeled it on a prototype cryptically presented in sales literature obtained free from vendors of Chinese machinery. In 1972, the first year of an warravaged Bangladesh as a sovereign country, humanitarian wheat aid was high as never before. Domestic milling capacity was dwarfed, and this created space for a scaling-up of capacity. Local engineering industry responded with the "compact" mill. Some adaptive but low-tech "engineering" has been an integral part of what Byerlee called "investment in specialized milling [and baking] industries" within developing country wheat economies (Byerlee, 1983, p. 1).⁸⁹ In 1992, there were 196 compact flour mills in Bangladesh, virtually all counted on DGF allotment list. On one-shift-a-day basis, these mills rate unit wheat allotment of 225 metric ton (MT) per month (Table AI.1). Compact mills output flour, atta, bran and filter on a 65:11:22:2 ratio.

Major mills:

These mills represent the apotheosis of the evolution of flour milling technology, taking advantage of modern processes in (a) cleaning the wheat (by using aspirators, disc separators, scourers, magnetic separators and finally washer - stoners); (b) conditioning the wheat for grinding (by adding moisture to the wheat, sometimes by subjecting it

⁸⁹Technological evolution far from being a continuum of splendid breakthroughs of generalized relevance, is often a matter of the accetion of "grubby and pedestrian forms of knowledge", the utility of which is grasped by men in overalls working on the shopfloor (Rosenberg, 1983).

to steam under low pressure);⁹⁰ (c) breaking and removing unsound kernel (by hurling the wheat against finger-like pins); (d) and finally by grinding wheat by passing it through a series of rollers - sifters - purifiers - rollers, until the maximum amount of flour is separated. Bangladesh has 53 major mills of a varying degree of automation and technical virtuosity all of which are covered on the DGF's Flour Mills (FM) program. On one-shift-per-day basis, allotment per mill per month in 1992 was at 422 MT. Major mills output flour, *atta*, bran and filter in 65:10:23:1 ratio.

The mills associated with these three types that are mainly located in urban areas. There remains a fourth type of wheat processors located in both urban and rural areas, called *atta chakki*. These are Engleberg - type hullers which essentially grind wheat down by having two steel hullers, rotating inward at different speeds to each other, and scraping gently along the surface of wheat grains. These devices come on with virtually no wheat preparatory processes. Their output, called *atta*, is akin to stone-ground whole flour. This sells at a higher price than for mills' byproduct with the same name.

⁹⁰The dampened wheat is held in a bin for between eight to 24 hours, depending on the type of wheat. The outer layer of the wheat berry tend to be brittle, and tempering toughens the bran coat to permit more complete separation of the endosperm. Within the kernel, tempering also conditions the endosperm so that floury particles break more freely in milling. In Bangladesh, only major mills possess facilities for tempering wheat. This is one (among several) aspects conferring higher technical efficiency on major mills.

A fairly large proportion (69% on our sample) of *atta chakkis* only custom mill farmers' and *faria's* wheat, and does not operate as a commercial miller. Depending upon price relativities, *chakki*-owners would doubtless frequently find it worth while to simply sell the Delivery Orders (DOs) at a profit. In those circumstances, the buyers of the DOs would often be agents representing flour mills. To sell DOs is a relatively soft option: though *ultra vires*, the market in DOs is active nevertheless. Their alternative is to mill the wheat inhouse, supervise workers and ensure quality, find a buyer for the ensuing *atta*, and negotiate a deal that allows some profit after meeting costs. Amid rising rice prices, which typically mean rising *atta* prices, this alternative may be attractive for some *chakki*-owners. However, when both rice and *atta* prices are both tumbling, the allottee will not either lift at all, or will use the soft option by monetizing his wheat DO. The point remains that during 1992/93, a large proportion of *chakki*-owners probably monetized their DOs for use by the compact and major mills. Our trade sources estimate that as much as three quarters of the lifting of wheat in Pourashava *chakki* program are recycled into the wheat market. For Palli Chakki, the proportion of "leakage" have often been put at 40% or so. In order to give the benefit of doubt to the *atta chakki* system, we assume that forty percent of *pourashava chakki* allotment and 30% of *Palli chakki* allotment are recycled into market arrival. These assumptions are factored into the following table.

Table AI.1 reports on the relative importance of the four prevailing types of wheat processors. The information, while certainly not overwhelming, is probably adequate for lighting upon broad relativities in terms of the size of the classes of technologies at issue. And the product mix

between the mills *per se* and the typically custom milling *chakkis* in terms of the associated income and cross price elasticities of demand is perhaps different. This has some relevance for what to make out of shortterm changes in wheat prices. Therefore, even rough and ready orders of magnitude regarding the structure of supply have some value. Twenty percent (.54/2.71) of all wheat millage capacity are absorbed by major mills. Compact mills absorb another 39%. Therefore, close to three-fifths of all wheat requirements stem from just 2% of the establishments in the industry. Eleven per cent of the capacity are accounted for by roller mills. In all, sixty three of all wheat millage are carried on within the industry segment that produces flour as the principal product and *atta* and bran as byproduct. The remaining 37% of capacity are absorbed by *atta chakkis*, producing *atta* alone. This *atta* is of a much higher protein content than can be said for *atta* turned out by other, more recent-vintage, mills: it therefore sells at a relative premium. Also, it mainly has a market in rural areas. When rice price falls, this segment is the first to adjust output downward. In the year through March 1993, *chakkis*' combined millage has, by common consent, fared a lot lower, percentage-wise, than shown in Table AI.1.

Products and byproducts

Industries are often classified with regard to the economic similarity of products. When an industry outputs a variety of outputs, with one major product and more than one byproduct with differing elasticities, knowing about those elasticities matters to cogent interpretation of shortterm economic changes, and thus to policy formation. Food characteristics of the various wheat derivatives in broadbased consumption become a moot issue.

Table AI.1 -- Who's Who in Bangladesh's Wheat Processing Industry, 1992

Type of mills	No. of units	(Million MT)				
		Milling capacity		% of productive capacity		
		One-shift basis ^a	Two-shift basis ^a	Flour	Atta	Bran
Major	53	.27	.54	.35	.06	.12
Compact	196	.53	1.06	.69	.12	.23
Roller	445	.15	.30	.20	.04	.04
Atta chakkis	11287	.54	.81	0	.81	0
Total	11981	1.49	2.71	1.24	1.03	.39

Notes: (a) Milling capacity data on one-shift basis for four types are from DGF's allotment files. It has been assumed that for all classes of mills, DGF comprehends all establishments. For roller mills and atta chakkis, some operating units are outside the purview of the Palli and Pourashava chakki channels. But, in the present state of our knowledge, it will be hazardous to guess. We have left this omission alone. Milling capacity on two-shift basis is arrived at by scaling up by a factor of two for all types except the atta chakkis. For them, a factor of 1.5 is used for *pourashava chakkis*. Chakkis located in rural areas can scarcely operate a second shift.

A major proportion of Bangladesh's wheat output is consumed as flour. All processors but the *atta chakkis* have flour as their main product. Bakeries, biscuit factories, restaurants and eateries use flour commercially. Their number has risen significantly since 1986 according to trade estimates, due to rapid urbanization, significant increases in geographical mobility of people. Flour is also an important ingredient for the preparation of several forms of table food on a broad basis. Flour looms important in the mass processing of many food forms, and because, as incomes grow, people tend to move to processed food, flour demand would likely be fairly income elastic (with an elasticity in the range of 0.4 - 0.5). The own and cross price elasticities of flour are also likely to be quite low. All this implies that nearly two-thirds of the flour mills' output is more responsive to longer run forces like structural changes, urbanization, employment - related mobility, and female labor force participation and the like. Technologically the more efficient establishments in this industry are, relatively speaking, insulated from demand or price fluctuations that might nag the producers of "freak" food, where consumption substitution possibilities may abound. The point is not that real flour prices do not occasionally fall, which should be obvious enough, but that prices tend to be relatively sticky.

Atta, a close second in importance, is a main product for *atta chakkis*. But it is also a byproduct for all other wheat processors. As stated already, the *atta* from *chakkis* is superior in food value to the *atta* that is a byproduct. Conventional wisdom has it that it the former that the bulk of the rural people who are deficit in cereals consume the former during periods of seasonally high rice prices (e.g. March-April and August-October) in order to stretch their

food budget.⁹ By implication, it ought to be during these periods within the year that *atta chakkis* ought to experience demand peaks. In addition, we expect that during the harvest months (November through February) rural consumers would shift *en masse* to seasonally cheaper rice, thus subjecting *atta chakkis* to demand slump. If *chakkis' atta* is a good substitute for coarse rice for relatively poor rural and urban households, we expect *atta chakkis* to regard the lean months to occasion demand peaks, and the harvest months to occasion demand troughs. However, if demand peaks seem to crop up during months which feature harvests both of rice and wheat, we should conclude that coarse rice and *chakki's atta* are not good substitutes, but that, however low be rice prices, many extremely poor households will still consume the *chakkis' atta*. This is a hypothesis we return to shortly.

Bran is only produced by other than *atta chakki*. It is widely used as cowfeed in relatively urbanized area. Geographically developed marketing channels explain why, for example, Comilla should receive a lion's share of the bran that are produced by mills in Chittagong/Noakhali/Cox's Bazar area. However, it does not pay to ship bran from major urban production or distribution centre (Chittagong and Comilla respectively) into the countryside: the size of demand is not upto it.

⁹Major and compact mills are all located in urban areas, while the roller mills are also mostly located in urban areas. Virtually all the *atta* derived by these mills are consumed in urban areas where these mills are located. It does not pay to ship this low-grade (i.e. small-ticket) *atta* over virtually any sizeable distance. This *atta* is mainly consumed in urban areas, largely as human food and, at times, as animal feed.

Seasonality, and Foodgrain Markets

Seasonal peaks and trough in demand

It is a safe presumption in this industry that current production is finely adjusted to match final demand (for use): i.e., agents scarcely invest in product inventories. Under this circumstance, it may be apt to use seasonal fluctuations in establishments' volume turnover as proxies of corresponding changes in demand. There is an intricate seasonality of rice production and prices in the economy, presented below (Ahmed and Bernard, 1988; Chowdhury 1992). And the country is passing through a serious rice price turbulence at present. Whether the recent tumbling of rice prices --- and the continued prospects of declining rice prices --- translate into a sizeable shift out of wheat, and into rice has become a moot issue, although, as we shall see, it remains quite elusive. Some idea on the stylized seasonality of demand for wheat, arrayed by the alternative technologies at issue, will, we hope, be germane to the issue of consumption substitution between wheat and rice. Where the cross-price substitution effect sufficiently strong, we should expect wheat prices to be at a low seasonal ebb whenever rice is so, and vice versa. It may even be that, nothing that rice is a preferred cereal relative to wheat --- at least that is the conventional wisdom --- wheat's price seasonality would follow rice's only in the downward direction but not conversely. These are hypotheses which, for lack of suitable demand data, we address in this admittedly limited seasonal analysis.

Table AII.1 reports on seasonal ebb and flow of wheat demand, proxied by the percentage of establishments reporting greater-than-average briskness with respect to the months during the year through March 1993. Each value is the proportion of subsample-specific establishments reporting the month at issue as occasioning "above-average" turnover volume. In a somewhat *ad hoc* manner, we rate 50% as being the cutoff for identifying when demand is at a seasonal high. Though still quite evidently crude, the procedure is likely to shed some rough light on the admittedly knotty issue of measurements (i.e. regarding consumption substitution, etc.) that we are confronted with.

The table prompts the following observations. First, among millers, seasonal variability is the least for major and compact mills. The roller mills come next, while *atta chakkis*' registered the largest demand variability. Because one of the sources of seasonal demand variability for wheat owes to substitution towards rice, this evidence is consistent with *atta chakkis* output being the most price responsive, while the relatively modern mills remain the least price responsive. *Atta chakkis* register a seasonal demand peak in April and May --- a season of abundant marketing of domestic wheat.⁹² Second, for both major mills and roller mills, seasonal demand peaks during July through September. Domestic wheat remains a source of residual importance. Therefore, even though wheat prices seasonally

⁹²Domestic wheat is harvested in March and April, and begins arriving in the market from March onwards. Domestic wheat has become a major player in determining the seasonal level of activity in this market. This is also due to there being no restrictions on the trade in domestic wheat.

Table AII.1 -- Seasonality of Demand in Wheat Industry and Trade, Bangladesh (stylized)

Type of establishment	(% of establishments)												Variability
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	
<u>Flour mills</u>													
Rollers	30	18	11	12	28	32	30	22	38	58	63	47	15
Major/compact	23	14	21	18	23	21	14	21	58	70	63	47	14
<u>Atta chakkis</u>	26	9	4	4	35	61	57	39	39	26	35	30	25
<u>Traders</u>													
Farias	2	2	5	2	91	95	81	31	5	2	2	0	37
Wholesalers	17	14	19	16	51	59	52	28	25	24	25	24	30

Note: Establishments were asked to point at which month in a year has typically registered "above average" in terms of turnover volume. This table reports the ensuing proportions for each month. Variability is measured by the standard deviation of the proportions.

Source: IFPRI Wheat Marketing Survey 1993.

slip during March through May, this does not translate into a possible substitution for major or roller mills' products. The millers' peak during months of seasonally high rice prices probably represents a for-wheat substitution by relatively poor people and a seasonal peaking of bran and atta demand for cattlefeed. This peaking in milling is probably sustained by taking advantage of government allotment during these months.

Seasonality in Wheat Prices

The numbers in box 4 report on the wheat seasonality factors for two periods (viz. mid-1970s and late-1980s) separated by about fifteen years.⁹³ Three findings follow. First, wheat prices, in both periods, are seasonally high in the months September through the following January. Second, in both periods, April through June are a season of low prices. Third, the last period has witnessed a fall off in the seasonality factors for both March and August: price stress has been converted into a price break. A few tentative explanations now follow.

First, the entire period September through January represents growing seasonal scarcity of domestic wheat, as its harvest period recedes further in the past. Market arrivals, mostly representing drawdowns of private stocks, count towards thin total supplies. In those circumstances, spot prices can plausibly tend to be higher than where they

⁹³The months registering factors less than 100% occasion seasonal fall in prices, and conversely. The method at issue is described more fully in box 2.

are expected to be due to longterm trends.⁹⁴ Also, the grain is worth more, due to storage. But this would not apply to the earlier period, because then domestic wheat output was inconsequential. Commercial wheat users (e.g. in the Flour Mill channel) would at the time source their requirements by availing of their own allotments. Also, in the first period, wheat market supplies, predominately comprised imported wheat of the kind brought in via aid channels, for distribution as part of administered targeting. Somewhat surprisingly, those prices registered the kind of regular, well-behaved price seasonality associated with profit-seeking behavior amid private markets. This evidence is consistent with the presence, even in the earlier period, of a *market for public imported wheat*. This is true, *a fortiori*, of the more recent period.

Second, wheat prices seasonally peak during the aman harvest (which is when rice prices are at their seasonal lowest). This has some negative implications. If the cross price between rice and wheat were indeed high as Goletti and Boroumand, 1992, have argued, and if the purely temporal spreads for wheat were not excessively high⁹⁵, one would

⁹⁴Also, so Montgomery (1983) argued, this period predates, the single largest cereal harvest, i.e. of aman crop. Anticipations regarding unfavorable production shocks to the aman crop carry with them the potentials for lean-season price increases (Rahman and Mahmud, 1986). This has nothing to do with the cost of performing the marketing functions.

⁹⁵Domestic wheat is harvested during March and April. For domestic wheat storage managers will likely reflect margins for cost of storage in determining supply prices for each month since the previous harvest. Imported wheat, when it affects market supply through resale or leakage, can only
(Footnote continued)

expect wheat's seasonality factors during these harvest months to follow, though not necessarily lockstep, those for rice. Because the opposite holds, either wheat and rice are, for, the most part, not close consumption substitutes or wheat's temporal margins are high enough to outweigh the effects of substitution in determining the seasonal price outcome. Perhaps both hypotheses have some grains of truth. Perhaps it does not much matter that we can not isolate the causalities very precisely; this is because we have the quite important *statistical* conclusion that movement of rice and wheat prices over short seasons do not constitute adequate bases for inferring whether consumers have or have not shifted from wheat into rice.⁹⁶ While still on the subject of cross price elasticity, this much can be said: *atta* represents the part of wheat demand at its most responsive with regard to rice prices, but *atta* absorbs perhaps about 37% of the wheat millage. Perhaps, then, substitution of seasonally cheaper rice for wheat does not appear to have enough leeway to reverse perhaps the more powerful supply-side tendency of wheat prices to rise under the weight of purely temporal spreads.

implicate "temporal spread" in one of two ways. Either, private storers get command over the leaked wheat, and then take arbitraging positions on it. This way, temporal spreads naturally are implicated. Or, the unit costs of private access to wheat nominally destined for *priority recipients* during the dry season may itself increase as the season progresses: low at the beginning but high later.

⁹⁶It cannot be gainsaid that, in the absence of some consensual evidence about the relevant elasticities, especially food aid planners have at times to acquiesce in that admittedly "soft option".

The fact that wheat prices at the lowest ebb of their seasonality April through June throughout the fifteen years at issue serves to thrust a historical precedent in the rationalization of wheat price data in the autumn and summer of 1993. Box 4 shows quite convincingly that the seasonal trough in the summer months will eventually make space for seasonal peaks later in the wheat market year.⁹⁷

Comparative Seasonality factors in Prices for Rice and Wheat, 1973/74 - 1989/90.

Box 4 presents the seasonality factors in coarse rice wholesale price in Bangladesh. A brief outline of the computation of these seasonal factors may be in order. First, 12-monthly centered moving averages were computed. For any month, these moving averages (MA) represent the long-run trend component implicit in monthly price series. Differences between actual monthly price and the MAs, when expressed relative to the latter, yield the seasonality factor. A value greater than one hundred indicates a positive seasonal component in the price series for that month, and vice versa. For each month, the seasonal factors are averaged over quinquennial periods in order to iron out random effects, and then expressed as percentages.

⁹⁷We do not intend to read too much in this evidence that is relevant to the food aid planners' exercise. Nineteen ninety three has witnessed paddy prices that are record lows. Many analysts believe that long run forces of rice supply are such as to light upon 1993 as the being the first of an evolving series of low rice prices. And this seems to be true of rice Asia in general (Asiaweek, may 26, 1993, pp. 45-50). The real question in 1993 is how much lower can rice prices go.

Several findings in this box are worth elaborating. First, between the first and the third quinquennia, the seasonal price dips in the three months comprising aman harvest, viz. November, December and January, have been ameliorated by the extent of between six and seven percentage points. Even so, rice prices seasonality slip during November through January.

Secondly the seasonality factors have fallen steadily through this period for each of May, June and July. The growing seasonal price dips during these three months is due to the compulsion to market greater quantities per capita out of the HYV harvests amid wet conditions (Chowdhury, 1992). Typical harvest per acre on HYV boro --- the staple germane to these months --- in the last triennium would be about three-fourths higher than harvest per acre on local boro --- the most likely alternative in the first quinquennium. Even after taking account of the greater input costs in HYV boro, the gains in returns to family labour in spite of seasonal price dips have been an important source of resiliency by small farms in staples production. Thirdly, March, April and October are seen in the table to harbour the most stubborn tendency of seasonal peaking of prices. Fourth, seasonal variability of rice prices has clearly narrowed, as the last row in box 4 shows.

Where does this evidence leave us versus rice-wheat substitution? During the crucial months of aman harvest, viz. November through January, rice seasonality is at odds with wheat's during the 1980s. The same applies to February through April. Judging by the discrepant behaviour of seasonality factors across grains, during these six months, foodgrain markets overall are not well integrated.

Seasonality of production rather than consumption substitution dominates. During the next six months, seasonality factors for rice and wheat, at least in the 1980s, do register a synchronous movements. Generally, for both grains prices seasonally slip. Seasonality of production, relative lack of physical mobility as well as consumption substitution all pile in.

Box 4 -- Seasonality in Rice and Wheat Prices, 1977, 1990

As well as being substitutes in consumption, rice and wheat are each important farm commodity. Like most farm goods, they register specific patterns of seasonalities. By tracking data on their comparative seasonal pattern, one may have some revealing clues about *whether* seasonal changes owe to *grain-specific* supply effect or due to *across-grain* substitution.

Table -- Seasonality Factors for Prices of Coarse Rice and Wheat

Months	Rice			Wheat		
	1974-77	'83-87	'88-90	1974-77	'83-87	'88-90
November	93	100	97	108	106	106
December	87	94	95	104	105	106
January	82	98	98	102	102	103
February	98	99	104	103	99	100
March	105	104	107	108	96	97
April	107	107	107	95	94	96
May	102	100	99	95	93	95
June	100	98	95	97	95	95
July	102	98	97	103	98	97
August	100	98	98	109	101	100
September	103	102	100	112	104	103
October	103	102	104	111	105	105
Range	20	13	12	17	13	11

Note: Twelve-monthly centred moving average (MAs) were subtracted from corresponding monthly prices and then prorated to the former. These factors, expressed in percentage forms, yielded the seasonality factors. A value greater than one hundred indicates a positive seasonal component in the price series for that month.

Key findings are the following. First, in the most recent triennium, rice prices take seasonal dips during months of aman and boro harvests, while March-April and September-October are seasonal price peaks. This seasonality pattern is explained by seasonal changes in supply and, simultaneously, in demand; but supply effect predominates. However, for wheat, all of the five-month period, viz. Sept through following January is a period of perhaps increasing seasonal price increase. For the most recent triennium, this is due to temporal margin on domestic wheat; imported wheat, albeit an imperfect substitute for domestic wheat, is not totally unresponsive to the economics of its storage.

Appendix - III

The Design of the Market Survey

After a careful search of the available literature related to the marketing behavior of the agents operating in wheat markets of Bangladesh, --- a very scanty literature indeed --- we found not a single study with results which could underlie an effort to determine a sample size for our own survey that would permit adequate statistical confidence in its results. Both time and financial resources available for the survey were limited. The study mandate for its effective carry-through called for seasonally deaggregate data on grade-wise marketing related to as many as six grades of wheat. Especially, internally consistent estimates of seasonal purchase, sales, stocks, prices, recovery etc. were the desideratum.⁹⁸ In effect, the questionnaire aimed at indepth interviews. This created the remit for a relatively small sample. We decided to interview about 400 marketing agents, and to select them from fifteen new districts of Bangladesh. The latter would have to be representative of both wheat-producing and wheat-deficit regions, port-terminal markets and nonport terminal

⁹⁸From past experience, we knew that, when data are generated on retrospective recall basis, to collect aggregative (i.e. annual) data can allow respondents to "get away" more easily with "devious" or "fabricated" answer: it is not easy to incorporate probes for cross-checks in an annualized interview structure. When the questions themselves have been deaggregated, and when respondents provide even selective access to their authentic books of record, one can put more "sensors" in the questions one asks. We had determined early on to make a resolute and honest effort to have confidential access to respondents' books of account.

markets, cities or towns with Statutory Rationing, as well as others. The following types of marketing agents were covered in the survey:

<u>Mills</u>	243
Major	46
Compact	41
R(3)	105
Atta chakkis	26
Bread and biscuit factories	25
<u>Traders</u>	154
Terminal market wholesalers	28
Assembly market wholesalers	44
Beparis/Farias	45
Flour wholesalers	22
Flour retailers	15
<u>Total</u>	397

In all 399 marketing agents were interviewed for the survey. Within each of the survey areas, the sample is self-weighted: towards this end, in every such area, a census of wheat market establishments was carried as out prerequisite to the sample survey.

Sample estimates, whenever necessary, were blown up. For mills, the blow-up factors were the number of milling establishments recognized by the Director General of Food. By common consent, the number of atta chakkis, major and compact mills and the R-3 mills on the books of the DGF understate the real number to a varying, albeit not to a significantly large, degree. Consequently, the blown up numbers --- for example, industry-wide wheat millage --- are more likely to underestimate reality.

Appendix Table 1 -- Wheat Millage by Grade by month, the Year through March 1993
(Quintal)

Wheat Variety	Mar'92	Apr'92	Mar'92	Jun'92	Jul'92	Aug'92	Sep'92	Oct'92	Nov'92	Dec'92	Jan'93	Feb'93	Avg.	CV
R3 Miller														
Hard Red Winter	117	103	90	89	95	97	94	59	140	105	102	75	98	20
Hard Red Spring	156	141	137	145	201	207	133	167	205	143	101	229	164	22
Australian White	241	221	227	214	195	187	190	193	184	192	138	230	201	13
Dudhia	493	469	444	439	458	471	466	493	446	422	392	384	448	7
Dhepa	165	163	181	170	170	158	152	148	137	122	121	233	160	18
Local	271	448	380	276	186	176	170	157	150	149	143	131	220	45
Major & Compact														
Hard Red Winter	1104	1705	1349	1336	1599	1336	1461	1650	2181	2020	379	1546	1472	30
Hard Red Spring	1159	1142	1266	1417	1456	1488	1236	1923	1720	2135	733	1633	1442	25
Australian White	570	455	455	421	407	461	394	406	561	669	520	498	485	16
Dudhia	1266	915	824	1058	1039	1127	1046	1018	1324	1389	1100	1031	1012	7
Dhepa	350	494	406	348	317	497	456	354	415	359	319	369	390	16
Local	1067	2083	1820	1392	618	765	694	451	438	396	493	1199	949	58
Atta Chakki														
Hard Red Winter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard Red Spring	0	0	0	0	0	0	0	0	10	0	0	0	0	332
Australian White	35	40	31	27	23	22	28	34	18	22	0	0	24	51
Dudhia	0	0	0	0	30	17	17	18	21	18	0	0	10	105
Dhepa	60	30	50	50	31	56	52	292	87	61	75	60	75	89
Local	262	209	206	111	57	20	197	200	172	71	47	44	137	61

Note: CV stands for coefficient of variation

Source: Author's computations using data from IFPRI Wheat Survey 1992/93

Appendix Table 2 -- Wheat Price by Grade by Month, the Year through March 1993

Wheat Variety	(Tk./Quintal)												Avg.	CV
	Mar'92	Apr'92	May'92	Jun'92	Jul'92	Aug'92	Sep'92	Oct'92	Nov'92	Dec'92	Jan'93	Feb'93		
R3 Miller														
Hard Red Winter	774	759	747	718	733	744	743	756	722	728	725	723	739	2
Hard Red Spring	816	794	791	785	800	780	779	784	773	770	765	774	786	2
Australian White	833	780	760	751	773	808	814	816	793	777	769	773	789	3
Dudhia	797	773	762	742	757	770	774	770	748	740	813	737	765	3
Dhepa	743	725	715	705	720	726	729	723	716	709	712	708	719	1
Local	676	655	666	673	699	709	719	716	716	707	709	708	696	3
Major & Compact														
Hard Red Winter	835	816	771	752	783	783	786	765	736	722	717	735	781	8
Hard Red Spring	840	793	787	766	773	785	786	772	746	730	734	737	771	4
Australian White	867	777	761	748	779	676	778	784	699	766	762	775	764	6
Dudhia	771	765	741	738	750	747	766	752	740	742	734	729	748	2
Dhepa	784	727	696	707	730	723	730	708	705	705	696	702	718	3
Local	719	693	706	709	689	712	734	732	706	697	699	690	741	15
Atta Chakki														
Hard Red Winter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hard Red Spring	0	0	0	0	0	0	0	0	700	0	0	0	58	332
Australian White	733	734	730	726	740	750	723	718	690	690	0	0	603	45
Dudhia	0	0	0	0	730	730	760	730	680	680	0	0	359	100
Dhepa	660	650	678	672	699	702	704	454	672	679	650	640	655	10
Local	581	603	607	657	686	710	681	687	686	686	703	720	667	6

Note: CV stands for coefficient of variation

Source: Author's computation

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