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A Study on Rice Marketing System and Price Policy in Bangladesh*

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1. Introduction

In spite of growing urbanization, Bangladesh remains mainly an agricultural country [Chowdhury 1992], with about 33% of its GDP still coming from agriculture. Agriculture is the largest sectorial source of income and employment in the total economy. About 80% of the agricultural output originates in the crop sector, of which rice accounts for the lion's share [Chowdhury 1992; Zaman 1999].

Rice production in Bangladesh contributes significantly to the agriculture and constitutes almost one fifth of Bangladesh's GDP. Although the relative shares of both the agricultural and rice sectors in the country's GDP has fallen, these two sectors are still contributing significantly to the economy of Bangladesh.

The rice sector is the single largest employment and income earning sector in Bangladesh. Thirty-five percent of households are generating income from the rice sector. On the expenditure side, rice absorbs the largest share of household expenditure [Chowdhury 1992]. The poorest households devote much more of their expenditures to rice consumption than the well-off groups.

1.1 Production and Marketing of Paddy/Rice

Practically, rice is grown in three seasons in Bangladesh. These *are aus*, aman and *boro*[1]. Of these, *aman* and *boro* are the main crops, making up about 90% of the total rice production. After harvesting and drying, growers marketed paddy either to the government-buying center or to the private traders. The private sector mainly controls the paddy/rice marketing in Bangladesh. More than 95% of the market surpluses are traded through the private sector.

1.2 Statement of the Problem

Rice is the main staple food in Bangladesh. Almost all the producers, irrespective of category, cultivate paddy as their main crop. Rice production, compared to the 60s and 70s, has increased in the 90s. The technological breakthroughs of the '80s and gradual changes in government policies can be credited for this success. Increased rice production has had a positive influence on the marketed surplus. The increased surpluses have widened the marketing chain, hence participation of the growers from different strata as well as the number of new traders at the village, *upazila*[2] and city/urban areas has also increased.

Public intervention in the food grain market is prevalent in most developing countries. The government procures food grains from growers, distributes to consumers, sets procurement and distribution prices, strives to maintain price floors and ceilings in the market, and regulates private trade [Ahmed 1989]. Huge volumes of capital are, however, required to support these activities. The debate for and against the intervention of government in the rice market is a major concern for the policy makers.

The supporters of public intervention in food grain marketing are seriously criticizing the present role of the government in supporting the growers. They have been lobbying for more government involvement in the rice market, while the campaigners for a free market under the guidance of the World Bank and USAID have been calling for the withdrawal of government support to make the market more competitive. This dilemma forces the government to give serious thought to its role. Different governments have tried different procurement strategies to provide support to growers during their terms in power.

The private sector, on the other hand, has been doing a great job in marketing rice. In fact, it is the main marketing channel of paddy/rice in Bangladesh. More than 95% of the marketed surplus is distributed through this channel.

Whether growers benefited from the changing government policies remained uncertain in the 90s. Furthermore, the role of all members of the private marketing channel is also an important area that needs to be studied. In addition, who does benefit from policy changes and the present marketing system is not yet recognized. These issues will be explored in this study.

1.3 Review of Literature

The appearance of literature on Bangladesh's rice market over the last 40 years has been quite spasmodic. More has been written on the performance and constraints on Bangladesh's rice production system but much less has been delineated on marketing and distribution or the impact of public policies on the conduct of the market [Chowdhury 1992].

Farruk did the first of these in 1970. He did a detailed examination of the effects of the organization of rice marketing on the costs of private processing and storage, the formation of spatial and temporal margins, and spatial market integration using the method of correlating coefficients to reveal the degree of market connection [Chowdhury 1992]. The real point of Farruk's study was to identify whether the price differentials were large enough to weaken and distort the proper role of price as a resource allocator and a distributor of income.

Islam et al., 1987, did the first comprehensive study after liberation. Their research mandate was to document and evaluate the gains of different traders in the market chain. One of the major assumptions of the study was that rice production in Bangladesh had been retarded, because the middlemen in the marketing system had been making exorbitant profits. The study found that this was not true. The farmers received between 71 and 80% of the retail price of rice; thus, they concluded that intense competition exists in Bangladesh in all phases of grain marketing. This study however, did not recognize seasonal variations in price, nor did it explain who stores the crops and who reaps the benefit of price increases in the off-season.

The focal consideration of Crow and Murshid's [Crow 1989; Crow and Murshid 1992] studies was the hypothesis that credit and the rice market are interlocked in a way that facilitates the exercise of monopoly powers by merchants, often at the expense of farmers. These studies have come out of data, purposively collected from one area with a surplus and two areas demonstrating deficits. Using the available data, Crow argued that the repayment contracts of credit (usually repaid in paddy) essentially charge farmers high interest rates. He therefore, concluded that the rice market is competitive in Bangladesh might not be the last word on the nature of the rice market.

Most of the studies conducted earlier focused mainly on marketing margins,

while very few researchers included analyses on policy issues, such as support price policies, procurement policies, or the cost of food subsidies at the government level. In addition, none of these studies focused on the comprehensive role of the rice millers and rice wholesalers, two important channels of the rice marketing system in Bangladesh. And, all of the studies were completed either in the 70s or in the '80s; none of the studies were conducted in the 90s. So, the implication of these studies are very clear: We need more studies on the role of private traders as well as government policies, and their impact on the rice marketing system in Bangladesh.

1.4 Objectives and Organization of Dissertation

The main objective of this research is to explore who benefits from the rice policy, including price policy and present rice marketing system in Bangladesh, and to suggest policy options based on the findings in order to improve the present situation for growers. The specific objectives are to review the effectiveness of procurement and price support policy in Bangladesh (Chapter 2); to examine the price stability of paddy/rice, and to identify the prospects of gain or loss of storing paddy/rice by growers and intermediaries (Chapter 3); to analyze the roles of different channels of rice marketing based on the field research data (Chapter 4); To identify the return to the growers and other intermediaries in the marketing systems (Chapter 5), summaries and conclusions are presented in Chapter 6.

1.5 Sources of Data and Methodology

Both primary and secondary data have been considered in this study. Primary data were collected from every member of the paddy and rice marketing channel. They include, growers, rice millers, wholesalers and other assemblers. Growers' data were collected from the Dinajpur and Sherpur districts, the two paddy surplus areas of Bangladesh. Data about other assemblers and rice millers were also collected from the same sample areas. Because of inadequate information from assemblers and millers in the Dinajpur district, analysis on the role and profit margins of these members has largely been on the information collected from the Sherpur district. Analyses on the role of wholesaler-cum-*aratdar* and their profit margins were made on the basis of the information collected from 3 wholesale markets of Dhaka City, the capital of Bangladesh. The data were collected in two periods. Information on the growers of Sherpur and Dinajpur, as well as rice millers and other assemblers of the Sherpur district and wholesalers of Dhaka City was collected from February to March, 2001. In addition to these, some relevant information from wholesalers and rice millers was also collected from time to time. Secondary data were collected from the Department of Agricultural Marketing (DAM), Bangladesh Bureau of Statistics (BBS), and the Handbook of Agricultural Statistics. In addition, other important

published database sources and research reports were reviewed for relevant information for this study.

In general, tabular and graphical analyses employing the simple mean, percentages and ratios have been carried out to derive relevant results. Also, the 12-month moving average method and mathematical expressions were also applied, where needed, in order to get significant results.

2. Procurement and Price Support Policy of Paddy/Rice in Bangladesh

The main purpose of this chapter is to discuss the success and failure of the procurement and price support policies for paddy/rice in Bangladesh on the basis of the historical data. Following the introduction, a brief description on the supply of rice is discussed in section 2.1 and 2.2 before entering the main discussion of this chapter. The background of the procurement and price support policy of *aman* and *boro* paddy are discussed in section 2.3 and 2.4. This will be followed by a detail discussion on the effectiveness of the price support program in section 2.5. The cost of government for rice marketing is discussed in section 2.6.

2.1 Rice Supply from Domestic Production

Based on its harvesting time and growth period we can classify cultivated rice into three varieties [Farruk 1970]. They are *aus*, *aman* and *boro*. *Aus* has a short growing period of 90 to 120 days. It covers an average of 6.1 million acres (24%) and contributes 16% to the total rice production. Both the local and high yielding varieties (HYV) of *aus* crops are cultivated in Bangladesh. The contribution of *aus* to the total rice production and acreage distribution has been in decline in the country during the last two decades.

Although rice production since 1976/77 has been increased in Bangladesh, vagaries of nature have caused year-to-year fluctuations and quite uneven production levels in the country. While *boro* production and its acreage distribution have increased steadily, *aus's* has declined sharply. During the last 23 years, the production and acreage distribution of *boro* and *aus* have changed greatly while moderate changes have been observed for *aman* in the same period.

The rice supply has steadily increased from 1977/78 to 1998/99. It increased by 53% from 1977/78 to 1998/99. Domestic production is the major reason for the steady increase in rice supply. During this period, domestic production increased by about 54% while the amount supplied by public distribution has declined by about 12%. The Ministry of Food (MOF) and the Ministry of Relief and Rehabilitation (MORR) made the public distribution. MOF collected food for distribution to targeted groups from the domestic procurement, commercial imports and food aid.

2.2 Rice Supply from Import

Because domestic production cannot meet the total demand of the country, every year Bangladesh has to import huge volume of rice from international sources to feed her people. Rice imports depend on the level of domestic production, stocks and demand for rice in the particular year in the country. After independence, the population in Bangladesh has increased continuously; food production growth rates could not keep pace with the population growth rate, which resulted in huge volume of imports from different countries. An average of 229 thousands tons of rice was imported by the public sector over the last two decades, and 832 thousands tons of rice was imported by the private sector from 1993/94 to 1998/99 in Bangladesh. The private sector has contributed significantly to the total imports of rice since 1993/94.

The share of the public sector in total rice imports has started declining since 1993/94. The share of imported rice of the total availability is presented in Table 2.1. The table shows that the average share of publicly imported rice was less than 2% for the last 23 years. The share for the private sector, on the other hand, was 4.4% of the total available rice. The average share of imported rice

Table 2.1. Rice Production and Availability in Bangladesh

Year	Net Rice Production (000 ton)	Rice Procurement (000 ton)	PFDS Distribution (000 ton)	Private Import (000 ton)	Total Availability (000 ton)	% of Public Import in Total Availability	% of Private Import in Total Availability	% of Import in Total Availability
	A	B	C	D	E=(A+C+D)-B	F	G	H
1977-78	11,674	466	600	–	11,808	2.6	–	2.6
1978-79	11,564	291	570	–	11,843	0.5	–	0.5
1979-80	11,466	257	695	–	11,904	6.0	–	6.0
1980-81	12,602	754	514	–	12,362	0.7	–	0.7
1981-82	12,311	271	772	–	12,812	1.1	–	1.1
1982-83	12,837	167	496	–	13,166	2.4	–	2.4
1983-84	13,077	135	503	–	13,445	1.3	–	1.3
1984-85	13,225	132	399	–	13,492	5.2	–	5.2
1985-86	13,534	219	372	–	13,687	0.3	–	0.3
1986-87	13,865	138	495	–	14,222	1.8	–	1.8
1987-88	13,872	288	468	–	14,052	4.2	–	4.2
1988-89	13,989	363	690	–	14,316	0.4	–	0.4
1989-90	16,070	918	675	–	15,827	1.9	–	1.9
1990-91	16,066	727	971	–	16,310	0.1	–	0.1
1991-92	16,427	940	759	–	16,246	0.2	–	0.2
1992-93	16,507	233	476	–	16,750	0.1	–	0.1
1993-94	16,237	148	350	74	16,513	0.0	0.4	0.5
1994-95	15,150	150	329	583	15,912	1.4	3.7	5.1
1995-96	15,918	353	593	650	16,808	2.9	3.9	6.8
1996-97	16,995	513	739	15	17,236	0.1	0.1	0.2
1997-98	16,976	303	529	1,007	18,209	0.5	5.5	6.1
1998/99	17,918	440	530	2,660	20,668	1.9	12.9	14.8
Average	14,467	373	569	832	14,890	1.6	4.4	2.8

Note: i) Net production is calculated by deducting 10% from the total production
ii) PFDS= Public Food Distribution System
iii) % of Public import data were calculated from Dorosh (2000)
Source : Dorosh (2000), FPMU (1999) and Hamid (1990)

(public and private) of the total available rice was 3%. It can be said from the table that, except in some years, the share of rice imports does not have a significant effect on the availability of rice in Bangladesh.

2.3 Procurement Policy

There was a definite change in the policy from 1975/76 when public procurement became an important aspect of food budgeting policy and it was extended from only aman rice to other rice and wheat crops (Rahman 1984). Decision on the domestic procurement price and quantity are made in the Food Planning Monitoring Cell (FPMC) and approved by the cabinet. Cabinet decisions on procurement price and quantity are made at least one month prior to harvest while FPMC decisions are made at least two months prior to harvest. The Food Planning and Monitoring Unit (FPMU) places the proposal before the FPMC. The former makes an assessment based on the available cost of production information and forecasts of domestic and world pricing; remaining, however, within a notional band permitted by budget allocations and the band is susceptible to change. Before placing the proposal to FPMC, FPMU obtains consent from the Food Ministry and Secretary. Currently, the perceived band of procurement is in the range of 0.25 to 0.35 million metric tons of milled rice (equivalent) per crop season, with an aggregate of around 0.55 million metric ton of *aman* and *boro* rice.

Previous period summer rice (*aus*) was also under the purview of procurement activities due to its high moisture content and low keeping capacity; government has been compelled to keep this crop out from the procurement since 1986/87. Therefore, the discussion here will be limited to *aman* and *boro* rice.

2.4 Procurement of *Aman* and *Boro* Rice

Table 2.2 reveals yearly procurement of *aman* and *boro* rice from 1977/78 to 1999/00. It can be seen from the table that the procurement of rice has declined over the years but this trend has been irregular. The average procurement of rice was 3.1% of the net production. Procurement was high in 1980/81 followed by 1989/90 and 1991/92. Procurement in those years exceeded more than 6% for all crops and more than 9% for *boro* rice. The reasons for the highest procurement in those years are difficult to explain because the trends of the data do not follow any single pattern. However, higher procurement in those years may be seen as an excessive reaction of the government, more for the purpose of replenishing public stocks than to support a floor price [Goletti et al 1991].

Procurement patterns by crop show a different trend from the average. While the procurement of *aman* rice has declined over the years; procurement of *boro* rice has increased during the same period. The average procurement of *aman* and *boro* rice was 2.06 and 4.68% respectively. The highest procurement was found in 1980/81 for both the *aman* and *boro* rice when the net production

Table 2.2. Procurement of *Aman* and *Boro* Rice from 1977/78 to 1999/00

Year	Procurement of *Aman* Rice (000 ton)	Net Production of *Aman* Rice (000 ton)	% of Procurement (Aman Rice)	Procurement of *Boro* Rice (000 ton)	Net Production of *Boro* Rice (000 ton)	% of Procurement (Boro Rice)	Total Rice Procurement (000 ton)	Net Rice Production (000 ton)	% of Rice Procurement
A	B	C	D=(B/C)*100	E	F	G=(E/F)*100	H	I=C+F	J=(H/I)*100
1977-78	428	6,787	6.31	38	2,048	1.86	466	8,835	5.27
1978-79	209	6,793	3.08	82	1,764	4.65	291	8,557	3.4
1979-80	191	6,678	2.86	66	2,219	2.97	257	8,897	2.89
1980-81	501	7,168	6.99	253	2,381	10.63	754	9,549	7.90
1981-82	120	6,489	1.85	151	2,832	5.33	271	9,321	2.91
1982-83	93	6,843	1.36	74	3,190	2.32	167	10,033	1.66
1983-84	84	7,141	1.18	51	3,036	1.68	135	10,177	1.33
1984-85	76	7,142	1.06	56	3,578	1.57	132	10,720	1.23
1985-86	139	7,686	1.81	80	3,303	2.42	219	10,989	1.99
1986-87	23	7,440	0.31	115	3,609	3.19	138	11,049	1.25
1987-88	49	6,920	0.71	239	4,258	5.61	288	11,178	2.58
1988-89	58	6,171	0.94	305	5,248	5.81	363	11,419	3.18
1989-90	419	8,282	5.06	499	5,550	8.99	918	13,832	6.64
1990-91	163	8,250	1.98	564	5,721	9.86	727	13,971	5.20
1991-92	363	8,342	4.35	577	6,124	9.42	940	14,466	6.50
1992-93	141	8,712	1.62	92	5,927	1.55	233	14,639	1.59
1993-94	16	8,477	0.19	132	6,095	2.17	148	14,572	1.02
1994-95	0	7,654	0.00	150	5,884	2.55	150	13,538	1.11
1995-96	51	7,911	0.64	302	6,499	4.65	353	14,410	2.45
1996-97	201	8,597	2.34	312	6,714	4.65	513	15,311	3.35
1997-98	1	7,965	0.01	302	7,323	4.12	303	15,288	1.98
1998/99	–	8,402	–	440	7,739	5.69	440	16,141	2.73
Average	158	7,539	2.1	222	4,593	4.6	373	12,132	3.1

Source: Production and Procurement data were taken from Hamid 1990, Begum 1997, FPMU 1999, Homepage of Ministry of Food 2000

increased from the preceding years. The lowest procurement period was not the same for these two crops. The lowest procurement period of boro rice was in 1992/93 when the net production had declined from the preceding year, but that for the *aman* rice was 1994/95 and 1998/99. The reason for lower procurement of *aman* rice in those years might be because the open market price in those years had shot up due to a short fall in production in 1994/95 and heavy flooding in 1998/99. As a result, the open market price was higher than the procurement price, so the government had decided to stop procurement of *aman* rice and allowed the growers to get the higher price from the market. Furthermore, it can be added that the procurement program was difficult to launch in 1998/99 because of the post flood rehabilitation program of the government. Also, budget constraints and changes in decisions at the government level could be other reasons for which procurement volumes change from time to time.

Procurement by crop showed that while the procurement of *aman* rice declined in the 90s, procurement of *boro* rice increased. The average procurement of *aman* rice in the 90s was 1.72% compared to 1.91% in the 80s. For *boro* rice, it was 4.15% and 5.41%, respectively in the 80s and 90s. The higher rate of growth in net production of *boro* rice in the 90s suggested that procurement ratio of *boro* rice also increased more in the 90s than in the 80s (Table 2.2). The table

further suggests that the higher rate of procurement of *boro* rice replaced the procurement of *aman* rice and in the process the procurement of *aman* rice declined in the 90s.

2.5 Price Support Policy

The Directorate of Food declared the output support price every year for *aman* and *boro* paddy/rice, and wheat to provide incentive to the growers. This price is fixed for the whole country. The growers voluntarily sell crops to the Food Department's purchasing center. The directorate considers the following criteria for fixing the support price. These are: i) cost of production plus 10 to 15% profit margin; ii) amount of income from competing crops; iii) international market prices; iv) import cost of rice and wheat; v) open market price of paddy, rice and wheat. Considering these criteria, the support prices of *aman* and *boro* rice which have been fixed during the last 23 years are presented in Table 2.3.

Data for support prices of *aman* and *boro* rice were obtained from Begum (1997) and FPMU (1999 and 2001) while the market price (harvest price) of both crops were obtained from the Department of Agricultural Marketing (DAM) and

Table 2.3. Relationship between Support price and Market Price of Rice (Taka/quintal)

Year	Support Price (SP) for Winter Rice A	Market Price of *Aman* Rice B	Support Price & Market Price Ratio of *Aman* C =/B	Support Price (SP) of *Boro* Rice D	Market Price of *Boro* Rice, E	Support Price & Market Price Ratio of *Boro* F = D/E
1977-78	354	336	1.05	354	317	1.12
1978-79	354	366	0.97	375	316	1.19
1979-80	456	487	0.94	456	493	0.92
1980-81	469	437	1.07	469	441	1.06
1981-82	509	579	0.88	469	418	1.12
1982-83	563	599	0.94	563	607	0.93
1983-84	603	663	0.91	563	591	0.95
1984-85	662	764	0.87	603	740	0.81
1985-86	697	704	0.99	662	639	1.04
1986-87	710	880	0.81	697	768	0.91
1987-88	793	941	0.84	825	888	0.93
1988-89	867	925	0.94	825	848	0.97
1989-90	907	832	1.09	866	856	1.01
1990-91	908	1,049	0.87	908	925	0.98
1991-92	1,010	969	1.04	990	977	1.01
1992-93	867	784	1.11	1,010	953	1.06
1993-94	871	900	0.97	955	768	1.24
1994-95	911	1,093	0.83	919	985	0.93
1995-96	1,125	1,146	0.98	1,125	1,142	0.99
1996-97	1,050	836	1.26	1,150	868	1.32
1997-98	1,070	1,073	1.00	1,100	860	1.28
1998/99	1,200	1,323	0.91	1,200	900	1.33
1999/00	NA	NA	NA	"1,200 "	965	1.24

Note: i) 1 quintal = 100 kg, ii) market price of 1998/99 and 1999/00 are average price of 3 districts, taken from Jaim (2001) iii) 1 US $ = 58 Taka.

Source: Support Price data were taken from Begum 1997, FPMU 1999 and BBS 1999
Data of market price were taken from DAM, and Jaim 2001

Jaim (2001). It is noted here that the price of coarse rice varieties have been considered for both crops to keep consistency with the support price because the support price declared by the government is the price of the coarse varieties. Due to the inadequacy of data on the harvest price of rice, paddy price was converted to rice price by multiplying by 1.5 (1 kg rice=1.5 kg of paddy). Thus, the harvest price of rice obtained is presented in Column B and E of Table 2.3. The Market price (harvest price) of *aman* rice was constructed from the average price between November and March and that for the *boro* rice was calculated from the average price between May and August.

It can be seen from Table 2.3 that, except for five years, the support price of *aman* rice was lower than the prevailing market price in all other years. This is not true for *boro* rice. Out of 23 years, the procurement price was higher than the prevailing market price for 12 years. This indicates that the support price program is more favorable for *boro* rice than *aman* rice. The ratio of support price and market price for both crops was more than a unit higher in most of the years in the 90s than the 80s and late 70s. This might be because the production of both crops in the 90s increased at a much higher rate than in the previous years. So, the government maintained a higher support price in order to support the growers. In other words, price fixing for the purpose of providing incentives to growers seems to have been tried more in the 90s than in other periods.

The historical data further reveals that government was successful of maintaining the support price at a higher price than the market price even in the higher production years. For example, when *aman* rice production increased in 1980/81, 1992/93, 1996/97, and *boro* rice production increased in 1993/94, and from 1996/97 to 1999/00, support prices in those years were higher than the market price. This implies that the government is concerned with providing incentives to growers in the higher production years. However, previous analysis in the procurement section showed that the grower's participation in the procurement program was not encouraging in the 90s or in the 80s. Thus, growers were deprived of the higher support price. As such, they did not benefit even though the support price was higher than the market price in those years. This will be discussed in the following section.

2.6 Effect of Price Support

There has not been much of an in depth analysis to trace how price support affected the growers' income. But, based on the historical support price and growers price data, it is possible to evaluate the program. Tables 2.4 and 2.5 show the net income of growers from *aman* and *boro* rice production. Methodological expressions of these tables are important to note. Growers' income from *aman* and *boro* rice is actually the harvest price that growers receive when they are selling on the market. Grower's prices are calculated following the method-expressed in Table 2.3. Estimating net income for a particular crop depends on

Table 2.4. Income (Taka) of Growers from *Aman* Rice Production,

Year	Support Price (SP) (per quintal) A	Cost of Production (per quintal) B=A/1.15	Growers Income (per quintal) C	Income as % of Cost D=C/B	Income as % of Cost, if Incentive is 10%	Net Income If Support Price Received (per quintal)	Net Income For Receiving Market Price (per quintal)
1977–78	354	308	336	1.09	1.04	46	28
1978–79	354	308	366	1.19	1.14	46	58
1979–80	456	397	487	1.23	1.17	59	90
1980–81	469	408	437	1.07	1.02	61	29
1981–82	509	443	579	1.31	1.25	66	136
1982–83	563	490	599	1.22	1.17	73	109
1983–84	603	524	663	1.27	1.21	79	139
1984–85	662	576	764	1.33	1.27	86	188
1985–86	697	606	704	1.16	1.11	91	97
1986–87	710	617	880	1.43	1.36	93	263
1987–88	793	690	941	1.36	1.30	103	251
1988–89	867	754	925	1.23	1.17	113	171
1989–90	907	789	832	1.06	1.01	118	43
1990–91	908	790	1,049	1.33	1.27	118	260
1991–92	1,010	878	969	1.10	1.06	132	91
1992–93	867	754	784	1.04	0.99	113	30
1993–94	871	757	900	1.19	1.14	114	143
1994–95	911	792	1,093	1.38	1.32	119	301
1995–96	1,125	978	1,146	1.17	1.12	147	167
1996–97	1,050	913	836	0.92	0.88	137	–77
1997–98	1,070	930	1,073	1.15	1.10	140	143
1998–99	1,200	1,043	1,323	1.27	1.21	157	279

Note: Data of 1998/99 and 1999/00 was estimated from Jaim (2001). It is the average data of 3 districts of Bangladesh
Source: Support price data were taken from Begum 1997, FPMU 1999, and Growers Income (growers price) were taken from DAM and Jaim 2001

Table 2.5. Income of Growers from *Boro* Rice Production

Year	Support Price (SP) (per quintal) A	Cost of Production (per quintal) B=A/1.15	Growers Income (per quintal) C	Income as % of Cost D=C/B	Benefit-Cost Ratio if Incentive is 10%	Net Income If Support Price Received (per quintal)	Net Income For Receiving Market Price (per quintal)
1977–78	354	308	317	1.03	0.99	46	9
1978–79	375	326	316	0.97	0.93	49	–10
1979–80	456	397	493	1.24	1.19	59	96
1980–81	469	408	441	1.08	1.03	61	33
1981–82	469	408	418	1.02	0.98	61	10
1982–83	563	490	607	1.24	1.19	73	117
1983–84	563	490	591	1.21	1.15	73	101
1984–85	603	524	740	1.41	1.35	79	216
1985–86	662	576	639	1.11	1.06	86	63
1986–87	697	606	768	1.27	1.21	91	162
1987–88	825	717	888	1.24	1.18	108	171
1988–89	825	717	848	1.18	1.13	108	131
1989–90	866	753	856	1.14	1.09	113	103
1990–91	908	790	925	1.17	1.12	118	135
1991–92	990	861	977	1.13	1.09	129	116
1992–93	1,010	878	953	1.09	1.04	132	75
1993–94	955	830	768	0.92	0.88	125	–62
1994–95	919	799	985	1.23	1.18	120	186
1995–96	1,125	978	1,142	1.17	1.12	147	164
1996–97	1,150	1,000	868	0.87	0.83	150	–132
1997–98	1,100	957	860	0.90	0.86	143	–97
1998/99*	1,200	1,043	900	0.86	0.83	157	–143
1999/00*	1,200	1,043	965	0.92	0.88	157	–78

Note: Data of 1998/99 and 1999/00 was estimated from Jaim (2001). It is the average data of 3 districts of Bangladesh
Source: Support price data were taken from Begum 1997, FPMU 1999, and Growers Income (growers price) were taken from DAM and Jaim 2001.

the cost of production of the crop and gross income received by the growers for selling that crop on the market. Time series data on cost of production were not available. An alternative approach was followed to obtain time series data on cost of production for *aman* and *boro* rice. It was calculated by dividing the support price by 1.15 and presented in Column B of Table 2.4 and 2.5. It is noted that the support price is calculated on the basis of the cost of production plus 10 -15% incentive to the growers.

It is showed that (from both tables) the growers could have earned more profits if they had sold rice at the procurement price. The profits could have been more, in the 90s. Growers obtained higher profit by selling *aman* rice on the market. The reason is that *boro* is more cost intensive than *aman* rice is. Market price is determined by the demand-supply relationship. When supply exceeds demand, the price of rice declines on the market and vice versa. It does not take into account the cost of production of a particular product. There always remain a risk of loss or a chance of gain from the market price.

The support price, on the other hand, is fixed; supply and demand has little effect. Furthermore, it considers the average cost of production plus an incentive price. Therefore, there is always a chance that the growers can profit if they can sell at the support price rather than selling at the market price. For example, in 1996/97, when the supply of *aman* rice exceeded demand growers incurred losses. They could have profited if they had received the support price for that year. In the ensuing years, growers were profitable.

For *boro* rice, the situation was more discouraging. Growers incurred losses in 1993/94, and from 1996/97 to 1999/00. In these years, the supply of *boro* rice increased on the market as a result, the market price of *boro* rice fell even below the cost of production. Consequently, the growers could not be profitable in those years.

Tables 2.4 and 2.5 exhibit that growers' net gains for selling *aman* rice on the market exceeded Tk. 250 per quintal in 1986/87, 1987/88, 1990/91, 1994/95 and 1998/99. The highest net gains were in 1994/95 followed by 1998/99. Because the production was largely affected by a fertilizer crisis in 1994/95, production declined sharply in that year. The demand-supply law forced the rice price in an upward direction for that year. This resulted in higher profit for the growers. And in 1998/99, production of *aman* rice increased that year compared to the preceding year. The fear of a price rise due to the flood might have heightened the harvest price so the growers earned higher incomes. Growers' revenues from the *boro* rice for selling on the market was not as high as that for *aman* rice. Growers received substantial revenues in 1984/85 when Bangladesh was close to being in a famine situation.

2.7 Cost of Government for Rice Marketing

An attempt has been made here to identify the cost of marketing rice in the

government sector and the contribution of different sources to total costs. Procurement cost, import costs and subsidies for distributing through non-monetized channels (relief) and monetized channels have been considered for analysis. Aggregate data of the cost of procurement were not available, so this was estimated from the volume of procurement and the procurement price of *aman* and *boro* paddy. Data for import costs and subsidies were obtained from the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food (MOF) and BBS. It is assumed that the cost of storage, transportation, and salaries and wages of employees were included in the subsidy.

The analysis (Table 2.6) showed that the costs of procurement and import have not changed during the last 12 years regardless of any fluctuations we have observed. Costs for subsidies, on the other hand, have declined during the same period. The average costs of procurement was Tk 4,031.5 million while the average costs for imports and subsidies were Tk 1,426.4 and Tk 3,409.3 million, respectively, from 1986/87 to 1997/98. Since separate information for rice and wheat is not available, subsidies of both rice and wheat are considered. The average share of wheat is the highest (68%) in total food grains distribution during the last 12 years. It is worthwhile to note that the cost of subsidies could have been less, if the cost of subsidizing only rice had been considered.

The highest costs for procurement were in 1991/92 and the lowest were in 1986/87. Import costs were the highest in 1995/96 because imports were the highest in that year, and the lowest costs for imports were in 1996/97 when bumper domestic production reduced the import volume. And for subsidies, the highest costs were observed in 1988/89, it was the year when Bangladesh experienced its worst flood in 50 years and huge volume of food grains were distributed

Table 2.6. Cost of Rice Distrbution in the Public Sector

Year	Cost of Rice Procurement (Million Tk)	Import Cost (Million Tk)	Subsidy On Food Distribution (Million Tk)	Total Cost of Rice Distribution (Million Tk)
1986-87	965	863	5,000	6,828
1987-88	2,360	3,830	1	6,191
1988-89	3,019	193	6,440	9,652
1989-90	8,122	2,964	5,960	17,046
1990-91	6,601	58	3,810	10,469
1991-92	9,379	224	3,440	13,042
1992-93	2,152	126	1,530	3,808
1993-94	1,400	1	1,670	3,071
1994-95	1,379	2,492	2,730	6,601
1995-96	3,971	5,083	2,990	12,045
1996-97	5,699	101	3,450	9,249
1997-98	3,333	1,182	3,890	8,404
Average	4,032	1,426	3,409	8,867

Source: Cost of rice procurement is estimated from procurement volume and procurement cost import cost and subsidy of food are taken from FPMU, 1999.

through the non-monetized and monetized channels. The lowest costs for subsidies were observed in 1992/93. The lowest subsidies of that year can be attributed to its bumper rice crop and stable weather conditions. It is worthwhile to note that while the procurement costs represent the support to the growers, imports and distribution subsidies delineate support to consumer. Obviously, the aggregate support to growers is less than the support to consumers. Even though the cost of procurement consumes a significant portion of the government budget, growers are not obtaining the direct benefits of the procurement policy as was shown in the previous sections.

3. Analysis of Paddy and Rice Prices

In this chapter, the historical price performance of rice in the 90s is examined. This performance is evaluated through long-term price movements and intra-year price variations of retail prices. In addition, the potential profit or loss to growers and traders will also be examined here by analyzing inter-temporal price variations.

It must be kept in mind that the price of rice price differs depending on variety and quality. Examination of rice price movements is only meaningful when the same variety of milled rice is compared. Prices of coarse milled rice is examined here because this rice represents about 80% of the total rice production in Bangladesh.

Time series data of retail and wholesale rice prices, and harvest paddy prices were used in this chapter. Monthly price data are not easily available in Bangladesh because there are few sources where monthly price data can be obtained. Therefore, data for harvest prices of paddy were obtained from a report by Begum [1997]. The Bangladesh Bureau of Statistics (BBS) collects monthly data of wholesale and retail prices of rice from only seven of sixty-four districts. Average prices for these areas have been used for this study. Since the price behavior of all the markets in Bangladesh are similar [Sabur and Haque 1993], results based on price analysis of these seven districts can be applied to all markets in the country.

To estimate retail, wholesale and paddy prices, 12-month moving average method and seasonal indices were used. All data was seasonally adjusted.

The long-term movement of domestic prices is discussed in section 3.1. A detailed discussion of seasonal variations of rice prices is in section 3.2. The seasonal rice price range is analyzed in Section 3.3, and the growers' and wholesalers' potential for profit or loss is discussed in section 3.4.

3.1 Long-term Movement of Domestic Prices

The long-term movement of the domestic retail price of coarse milled rice in Bangladesh is shown in Figure 3.1. Some significant changes were observed here.

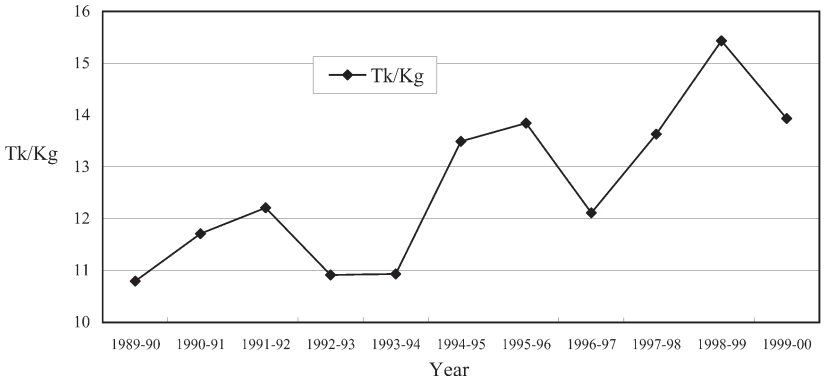

Figure 3.1. Retail Rice Price Trend in Bangladesh (estimated by 12-months moving average method)
Source: Calculated from various issues Monthly Statistical Bulletin.

Rice price only fell sharply in 1992/93 (11%), 1996/97 (12.5%) and 1999/00 (10%) after increasing in the previous years. This can be explained by the fact that the per capita availability of rice in those years had increased due to the increased domestic supply from *aman* paddy in 1992/93, *aman*, *boro* and *aus* paddy in 1996/97, and *aman* and *boro* paddy in 1999/00. Favorable weather conditions and stable input supplies [Drorsh 2000] contributed to increased domestic supplies in those years. A sharp increase in prices was observed in 1994/95, 1997/98 and 1998/99. The fertilizer crisis, due to mismanagement, in 1994/95, a drought in 1997/98, and record-breaking floods in 1998/99 resulted in a sharp price increase in those years.

3.2 Seasonal Variation of Rice Price

3.2.1 Seasonal High and Low Periods

The average seasonal index of retail prices of coarse rice in Bangladesh follows the pattern shown in Figure 3.2 with low periods in December and high periods in April. The seasonal index of an individual year shows almost the same pattern as the average seasonal index for the period of this study. This finding varies from the data of Ahmed and Bernard [1989], and Ali and Mikuni [1998] Ahmed and Bernard [1989] found that the wholesale price of coarse rice was low in January from 1960 to 1984 while the high price periods were July and May. Where July was the high price period from 1960 to 1970; May was the high price time from 1972 to 1984. Ali and Mikuni [1998] observed that the wholesale price of *aman* paddy was low in November and high in April. However, the present analysis indicates that the seasonality of rice prices changed in the 90s. The difference between the present study and Ahmed and Bernard's can be explained by the time period. On the contrary, the difference with Ali and Mikuni's (1998) study might be a result of the crop chosen to be studied. Ali and

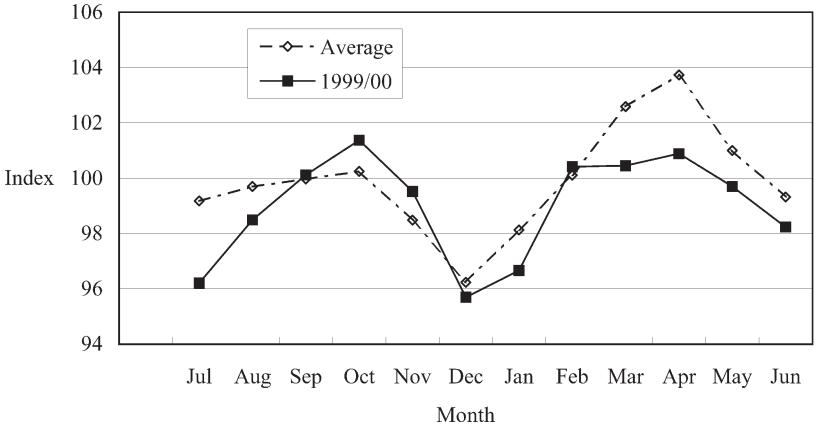

Figure 3.2. Seasonality of Rice Price in Bangladesh (estimated by 12-months moving average method)
Source: Calculated from various issues of Monthly Statistical Bulletin.

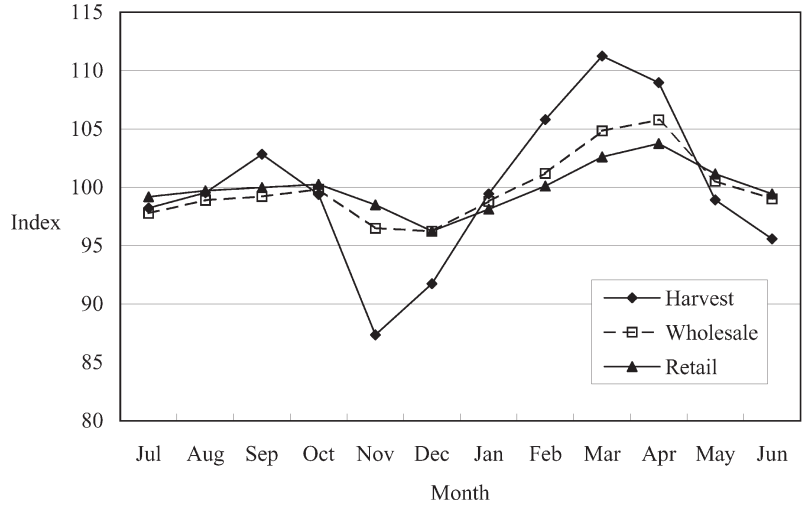

Figure 3.3. Seasonal Variation of HYV Paddy and Coarse Milled Rice (Wholesale and Retail) Prices in Bangladesh for the Year 1989/90 to 1999/00
Source: Calculated from various issues Monthly Statistical Bulletin.

Mikuni (1998) investigated the paddy price of *aman* paddy, whereas in this study the retail price of coarse rice was examined.

3.2.2 Seasonal Variation of Rice and Paddy Prices

Average seasonal variations of paddy prices, and retail and wholesale coarse rice prices (Figure 3.3) reflect somewhat different patterns. The seasonal index of paddy reaches its low in November reflecting the early maturing of *aman* paddy. Its high is in March before the harvest of local *boro* paddy in April. The retail and wholesale milled rice prices in Bangladesh reach their peak in April

and their lows in December. This difference reflects the processing and transport time from rural to urban areas.

3.3 Seasonal Price Range

Intra-year differences between prices in the peak and low marketing months of the major harvest season are an important indication of the viability of the rice economy. However, the average seasonal price range over many years provides only part of the information needed to make an informed decision. Micro-economic evaluation suggests that the seasonal price range within a single year is apt to be more useful [Mears 1981]. The price ranges are determined from seasonally adjusted data. The seasonal price range is one way of judging the government's success in maintaining its objective of price stability for consumers and producers.

Table 3.1 illustrates the yearly seasonal price ranges for paddy and coarse rice, after removal of fluctuations over the years for which each price series is available. The paddy price range was considerably higher than the retail rice prices. This is explained by the fact growers, because of storage and financial difficulties, cannot regulate supply to demand, and must sell most of the paddy at harvest time. The comparatively small range in retail rice price fluctuations reflects the degree of concern the government has to satisfy politically important urban areas.

Table 3.1 also shows the range of seasonal indices for wholesale and retail rice prices of coarse rice. The range of wholesale prices is greater than in the retail markets. The retailer's low price range can be explained by the fact that they sell on a cash and carry basis so they have lower costs. The higher wholesale price range could have been caused by hoarding or it could reflect the

Table 3.1. Seasonal Price Range of Paddy and Rice from 1989/90 to 1999/00

Year	Paddy Price Range (%)	Wholesale Price Range (%)	Retail Price Range (%)
1989/90	46.8	18.0	13.1
1990/91	21.6	10.6	3.7
1991/92	31.3	14.2	9.5
1992/93	39.7	15.5	13.6
1993/94	31.3	19.4	12.8
1994/95	32.4	16.1	12.2
1995/96	35.1	11.2	6.9
1996/97	30.6	14.7	12.1
1997/98	51.0	24.0	19.5
1998/99	27.7	16.0	17.0
1999/00	N/A	11.8	6.0

Note; N/A=Not available.
Source: Calculated from raw data those collected from issues of Monthly Statistical Bulletin.

higher risk and financial costs of storage.

3.4 Profit and Loss for Holding Paddy and Rice

It is commonly believed that growers and traders could benefit from storing paddy and rice. Growers sell the bulk of the marketed volume immediately after the harvest because of storage and financial constraints, so they are unable to take advantage of the off-season price increases. Conversely, traders (here wholesalers), who deal with a bulk volume of rice and have storage facilities profit handsomely from off-season price increases. This area, however, needs further analysis.

In order to examine the price differences from one month to another it is necessary to estimate the cost of storing paddy and rice. A modified formula of Mears[3] [1981] has been used here to estimate the monthly cost of holding paddy and rice for growers and wholesalers in Bangladesh. The following equation was used to estimate the monthly cost of holding paddy and rice:

$$\mathbf{CH = [PHP(SL + IR)/N] + SC} \qquad \textbf{(3.1)}$$

Where, CH = Monthly cost of holding paddy or rice;
PHP = Price of paddy or rice per ton during base month
SL = Storage loss (%) during storage period (month)
IR = Interest rate (%) during storage period (month)
SC = Storage cost (Tk/ton/month)
N = Number of months stored (for *aman, boro, aus* are 5, 4, 3 months, repectively)

Estimation of expected selling price (EP) is necessary to calculate the potential of profit and loss of growers and wholesalers. It was estimated by following the equation 2.

$$\mathbf{EP = PHP + CH_m} \qquad \textbf{(3.2)}$$

Where EP = Expected selling price
CH_m = storage cost of month(s) m; i.e., Ch_m^*

Gain, if $PPR_m > EP$ and Loss, if $PPR_m < EP$

Where, PPR_m is the Price received by the farmer/traders in a month m.

Mears [1981] used the formula to estimate the cost of holding paddy and rice by growers and traders in Indonesia. He considered N equals 12 to assess the monthly cost of holding of paddy and rice in Indonesia. In this analysis, different values of N have been considered. Mears [1981] assumed that growers or traders store paddy or rice for 12 months once it was harvested and purchased. In Bangladesh, paddy is harvested three times a year, so Mears' [1981] assumption might not be fully applicable here. In Bangladesh the storage period in relation to the harvest season would be five months for *aman* paddy/rice, four months for *boro* paddy/rice and three months for *aus* paddy/rice. *Aman* paddy/rice arrives on the market in November and remains till March, *boro* paddy/rice starts arriving in April and lasts until July, and *aus* paddy arrives in July-August

and carries through October. A further presumption is that growers or traders don't want to store paddy/rice before the harvest of the next crop mainly because:

i) they might not get a higher price once the next crop is harvested, and

ii) their storage facilities are not adequate.

Growers usually store paddy in their house in *macha, gola, ber*[4], jute bags etc, so long-term storage isn't possible considering the humid weather, the possibility of theft, or damage due to pest and rat infestations. Traders in the urban areas (wholesalers) have their own storage facilities with cement floors and roofs, where they keep paddy in jute or plastic bags. Long-term storage, however, is not possible mainly due to inferior building construction. These traders, like the growers, do not store rice beyond the harvest of the next crop for the fear of humid weather, pest and rat infestation. Besides, storage in inferior facilities results in undesirable odors and colors of the paddy and rice. Quality is one of the main drawbacks of a poorly stored product, which results in a lower price. Assuming N needs different values depending on the period would be appropriate. The result of the analysis would only reflect the potential for profit or loss for the farmer and wholesaler, if they could store paddy or rice.

Both normal (1996/97) and abnormal years (1994/95) were considered here to understand the possibility of profit or loss for growers and wholesalers in each period. The results of two different periods would provide a better understanding of the situation for policy decisions. Details of the costs are shown in Table 3.2.

Growers' costs were estimated in two different ways. Column A (Table 3.2) represents the costs of the storage credit program of the Bangladesh government; commonly known as the Crop Storage Credit Project (SHOGORIP) managed by the Department of Agricultural Marketing (DAM). Growers owning less than 2.02 hectares of land are eligible for this program. Producers used to sell paddy immediately after harvesting due to storage and financial constraints. Under this program, to take advantage of the high price period, growers are able to store paddy for up to 9 months and can get loans against the crop stored. The stored

Table 3.2. Basis of Cost of Holding

	Using SHOGORIP Data	Using Data of Storing at Own Home	Begum & Field Survey	Varying Only Interest Rate
Rate of Loss (%)/year	4	5	0.168	–
Interest Rate (%)/year	12	–	15.5	20
Storage Cost (Tk/maund/month)	3.7	–	1.3	–

Note: 1 maund=37.32 kg.
Source: Chowdhury (1992), Begum (1997), Field Survey.

crop can be withdrawn any time the farmer desires. They must repay the loan, which carries an interest rate of 12%, and the storage costs before the crops can be withdrawn from storage. Monthly storage costs are calculated at the rate of 10 Taka[5] for 100-kg of paddy. Storage loss was estimated as 4% for growers. This was estimated on the basis of the information collected from growers and warehouse managers of SHOGORIP.

In Column B, storage costs and interest rates were omitted because the farmer usually stores paddy on the farm and assumes that it is done at no cost, although there may be an opportunity cost for the space in the house used for paddy storage. In this case, opportunity cost was excluded on the assumption that growers who have used their own funds to finance production have no alternate use for funds at harvest time that requires the sale of paddy. For them, the financing of post-harvest storage of paddy can be considered free. Column C and D represent the storage costs of wholesaler's. In column D the same costs were considered except for the interest rate. From interviews with wholesalers, two kinds of interest rate were identified. Wholesalers could get a loan from public or private banks. The interest rate between the two sectors (public and private) varies, so two interest rates were considered here to assess the potential

Table 3.3. Chances of Gain and Loss of Farmers if they Can Store Paddy

Year	Categories	Conditions	Base Month	12	1	2	3	5	6	7	9	10
1996/97	Growers	12% interest rate, 4% storage loss, and Taka 10/ quintal storage costs	November (*aman*)	L	G	G	G	–	–	–	–	–
			April (*boro*)	–	–	–	–	L	L	G	–	–
			August (*aus*)	–	–	–	–	–	–	–	L	L
1996/97	Growers	0% interest rate, 5% storage loss, and 0 Taka storage costs	November (*aman*)	G	G	G	G	–	–	–	–	–
			April (*boro*)	–	–	–	–	L	L	G	–	–
			August (*aus*)	–	–	–	–	–	–	–	G	G
1998/99	Growers	12% interest rate, 4% storage loss, and Taka 10/ quintal storage costs	November (*aman*)	G	G	G	G	–	–	–	–	–
			April (*boro*)	–	–	–	–	L	G	G	–	–
			August (*aus*)	–	–	–	–	–	–	–	L	L
1998/99	Growers	0% interest rate, 5% storage loss, and 0 Taka storage costs	November (*aman*)	G	G	G	G	–	–	–	–	–
			April (*boro*)	–	–	–	–	G	G	G	–	–
			August (*aus*)	–	–	–	–	–	–	–	G	G

Note: i) G=Gain L=Loss; ii) 12= Dec. 1 Jan 2 Feb 3=Mar 5= May 7=Jul 9=Sept 10=Oct.
Source: Calculated from data of Begum and formula provided in the text.

Table 3.4. Chances of Gain and Loss of Wholesalers if they Store Rice

Year	Categories	Conditions	Base Month	1	2	3	4	5	7	8	10	11
1996/97	Wholesalers	15.5 interest rate, 0.168 storage loss, storage costs 4 Taka/ quintal	December (*aman*)	L	G	G	G	–	–	–	–	
			May (*boro*)	–	–	–	–	L	L	L	–	–
			September (*aus*)	–	–	–	–	–	–	–	L	L
1996/97	Wholesalers	20% interest rate, 0.168 storage loss, storage costs 4 Taka/ quintal	December (*aman*)	L	L	G	G	–	–	–	–	–
			May (*boro*)	–	–	–	–	L	L	L	–	–
			September (*aus*)	–	–	–	–	–	–	–	L	L
1998/99	Wholesalers	15.5 intere strate, 0.168 storage loss, storage costs 4 Taka/ quintal	December (*aman*)	L	L	L	L	–	–	–	–	–
			May (*boro*)	–	–	–	–	L	L	L	–	–
			September (*aus*)	–	–	–	–	–	–	–	L	L
1998/99	Wholesalers	20% interest rate, 0.168 storage loss, storage costs 4 Taka/ quintal	December (*aman*)	L	L	L	L	–	–	–	–	–
			May (*boro*)	–	–	–	–	L	L	L	–	–
			September (*aus*)	–	–	–	–	–	–	–	L	L

Note: G=Gain L=Loss
Source: Calculated from data of Monthly Statistical Book and formula provided in the text.

for profit or loss for them under different situations. Other costs of wholesalers for holding were estimated from secondary sources.

Table 3.3 and 3.4 show the profit or loss of growers and traders (also, see appendix Tables). Some generalizations can be made from these tables. Growers' potential for profit from holding paddy is larger than that of the wholesalers. This potential increases in abnormal years, and in zero opportunity costs and zero storage costs periods. Wholesalers' opportunity for profit for holding rice is found to be almost negative here except in a few cases. *Aman* paddy provides a larger opportunity for profit in both normal and abnormal periods. Growers also could profit from holding *aus* paddy and this potential increases in abnormal years, and without opportunity costs and storage cost periods.

However, the conventional wisdom is that a trader profits from holding rice was not proven in this analysis. It is the astute traders who might gain from holding rice but, in general, a trader's potential for profit from holding rice is very small in Bangladesh.

4. Role of Growers and Intermediaries

Including the growers, large numbers of paddy assemblers, rice millers, wholesalers-cum-*aratdar* and retailers are engaged in the paddy/rice trading business in Bangladesh. Each of the members of the marketing channel has an important role. A detailed analysis of these intermediaries and growers will be carried out in this chapter.

Data for the study were collected from all members of the marketing channel. Growers'

data were collected from two areas, the Sherpur and Dinajpur districts. These districts are areas with a rice surplus. It should be noted that *aman* and *boro* paddy are the main crops in the studied areas. Moreover, few growers cultivate *aus* paddy in these two areas. Therefore, all data collected from the gowers relate to *aman* and *boro* paddy. Data for paddy assemblers and rice millers were also collected from these two areas.

Because rice is transported mainly to Dhaka from the areas studied, data for wholesalers and rice assemblers were collected from two markets; namely from Badamtali, Babubazaar, and Badda of Dhaka City. These are the important wholesale markets of the capital, Dhaka. Rice wholesalers are also functioning in the other parts of the country. Due to limitations of time, it was difficult to collect data from other districts. All data were collected from the 2nd week of February to the 3rd week of March 2000. However, when needed, some of the respondents were contacted for more data through an enumerator in the months of August and September 2000. Some of the wholesalers were also contacted over telephone from Sapporo when needed.

Most of the respondents were reluctant to spend time on such an exhausting job. In many cases, respondents did not cooperate adequately as was necessary. In some cases, interviewers were asked to provide documentation to prove the validity of their assignment, especially while interviewing the wholesalers and millers. These and several other reasons led the author to find alternative ways of data collection. Some case studies of 1 to 2 respondents from each group were included to make up for data limitations.

4.1 State of the Growers in the Surveyed Areas

A total of 70 growers were initially selected for the study. Due to inconsistencies in the information gathered in some of the scheduled interviews, 63 growers were retained for the final analysis. Of the total study, 33 and 30 samples represent from Sherpur and Dinajpur district respectively. Details of the analyses are as follows.

The basic information obtained from the respondents is summarized in Tables 4.1 to 4.5. The average size of the farm household is 6.5 persons. Across the districts nationwide, this average varies from 6 to 7 persons per family. Respon-

Table 4.1. Frequency Distribution of Family Size of the Respondents

	1–4 persons	5–8 persons	9–12 persons	More than 12 persons	Average Size of Household
Sherpur	36.4	54.5	6.1	3.0	5.8
Dinajpur	10.0	63.3	20.0	6.7	7.2
All	23.8	58.7	12.7	4.8	6.5

Source: Field Survey February-March 2000.

Table 4.2. Distribution of Land Area of the Respondents

	Homestaed (ha)	Pond (ha)	Own Cultivable Land (ha)	Per Household Homestaed Area(ha)	Per Household Pond Area (ha)	Per Household Own Land (ha)	Per Capita Homestaed (ha)	Per Capita Pond (ha)	Per Capita Own Land (ha)
Sherpur	5.40	1.72	62.65	0.16	0.05	1.90	0.03	0.01	0.32
Dinajpur	3.58	1.21	55.16	0.12	0.04	1.86	0.02	0.01	0.26
Total	8.98	2.93	117.81	0.14	0.05	1.87	0.02	0.01	0.29

Source: Field Survey February-March 2000.

Table 4.3. Operating Status of the Respondents in the Surveyed Area

	Aman (1999–00)		*Boro* (1999)	
	Owner Operator (No.)	Owner-cum tenant (No.)	Owner Operator (No.)	Owner-cum tenant (No.)
Sherpur	30 (90.9)	3 (9.1)	25 (75.8)	8 (24.2)
Dinajpur	28 (93.3)	2 (6.7)	28 (93.3)	2 (6.7)
Total	58 (92.1)	5 (7.93)	53 (84.1)	10 (15.9)

Note: Figures within parentheses indicate percentages
Source: Field Survey February-March 2000.

Table 4.4. Cropping Pattern of the Respondents

	Pattern 1	Pattern 2	Pattren 3	Pattern 4
Sherpur	–	*Aman*-Potato-*Boro*	*Aman*-Mustard-*Boro*	–
Dinajpur	*Aman*-Wheat-*Boro*	Aman-Potato-Boro	*Aman*-Mustard-*Boro*	*Aman*-Others-*Boro*

Source: Field Survey February-March 2000.

dents in the Dinajpur area have the biggest families. A frequency distribution shows that most of the respondents (58.7%) have families of 5 to 8 persons (Table 4.1).

Table 4.2 shows the distribution of land areas of the respondents. It is evident in the table that the respondents from Sherpur possess more land than those from Dinajpur. More than 84% of the growers were found to be owner-operators in both areas and the rest were owner-cum-tenant operators. The percentage of owner-operators in all seasons were the highest in Dinajpur (Table 4.3).

There were four kinds of cropping patterns practiced in the research areas. Two of the patterns were common to both areas, ***aman*-potato-*boro*** and ***aman*-mustard-*boro***. Growers in Dinajpur are more diversified compared to the growers in Sherpur (Table 4.4).

4.2 Production, Disposal Pattern, Sell and Price of Paddy

4.2.1 Production and Disposal Pattern of Paddy

The aggregated production of paddy in two areas is about 236 ton and the yield rate is 3.0 ton per hectare (Table 4.5). Across the district, Dinajpur has the highest yield rate for both paddy. The yield rate was found to be higher when compared to the national average, but consistent with the findings of Dorosh (1999), and Shahabuddin and Islam (1999). Dorosh (1999), observed that the yield rate of *aman* paddy varies from 1.55 to 2.46 ton per ha in the Mymensingh/ Sherpur area, and in the Dinajpur area that it varies from 2.19 to 2.94 ton. According to Shahabuddin and Islam (1999), the per hectare yield of *boro* paddy in the Dinajpur area is 4.9 ton.

Figures 4.1 and 4.2 show the disposal pattern of *aman* and *boro* paddy. Figure 4.1 shows that the growers hold 31% of the total production of *aman* paddy for consumption and sell the bulk of the volume (63.3%) after the harvest. Between the districts, growers in Sherpur hold less for consumption and sell more when compared to the growers of Dinajpur.

The disposal pattern of *boro* is presented in Figure 4.2. It is evident from the figure that the growers sell about 69% of the total production while holding 27% for consumption. Between the districts, the sales ratio was the highest in Sherpur (79%). The consumption ratio of *boro* was observed to be lower when compared to the consumption ratio of *aman* paddy. It was true for both areas.

4.2.2 Selling Pattern and Prices Received by the Growers

Tables 4.6 and 4.7 show the sales volume at different times and the prices received by the growers in those periods. It is worthy to note that we could not collect the required information on this from the Sherpur area; data from the Dinajpur area are presented here. It is evident from the table that the major

Table 4.5. Production and Yield of *Aman* and *Boro* Crops in the Surveyed Areas

	Aman Production (ton)	Yield (ton/ha)	*Boro* Production (ton)	Yield (ton/ha)
Sherpur	83.7	1.7	172.4	3.5
Dinajpur	90.6	2.2	125.7	4.3
Average	87.2	2.0	149.1	3.9

Source: Field Survey February-March 2000.

Table 4.6. Average Sell (ton) by the Respondents in different Time

	Selling Quanitity		Cumulative % of Sell	
	Aman (ton)	*Boro* (ton)	*Aman*	*Boro*
1st time	14.5	33.2	26.7	45.0
2nd time	31.5	25.2	84.6	79.1
3rd time	8.4	15.4	100.0	100.0

Note: Figures within parentheses indicate percentages
Source: Field Survey February-March 2000.

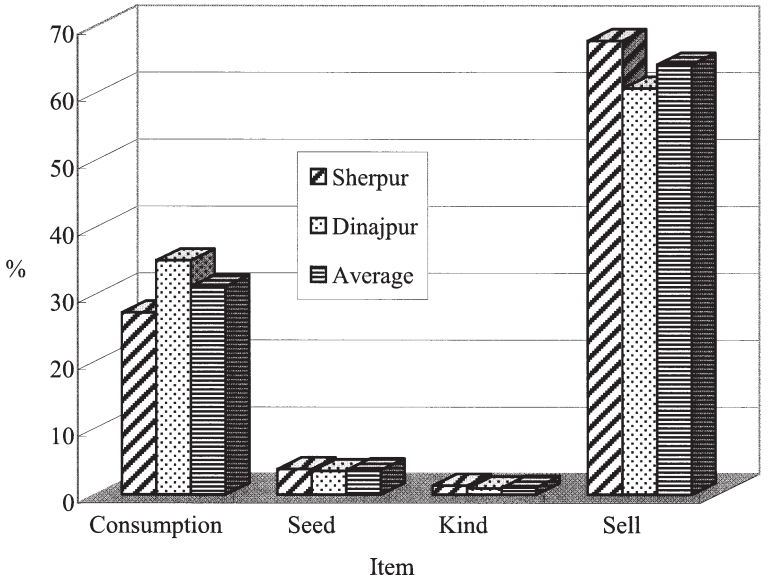

Figure 4.1. Disposal Pattern of *Aman*
Source: Field Survev. Februarv-March 2000

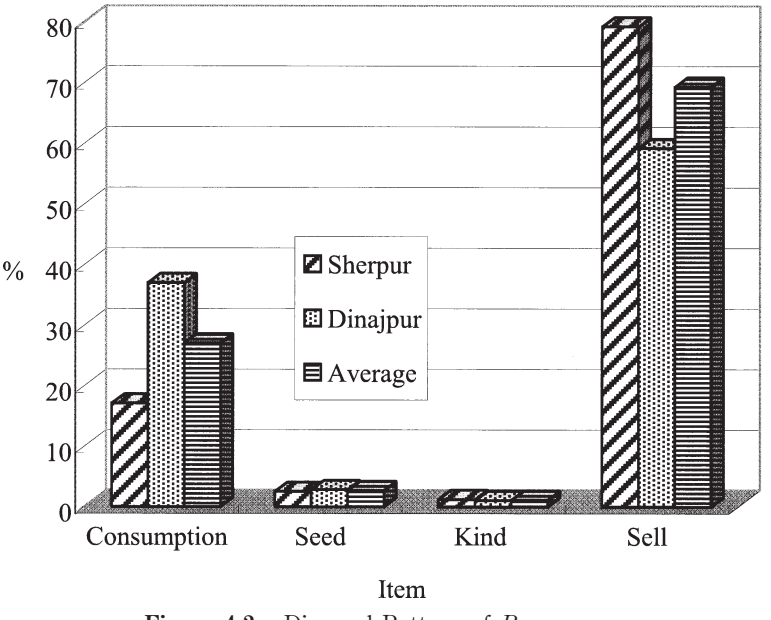

Figure 4.2. Disposal Pattern of *Boro*
Source: Field Survey, February-March 2000

Table 4.7. Selling Price of Paddy by Variety Received by the Growers (Tk/ton)

	Aman				*Boro*	
	BR 11 (Coarse)	Sarna (Medium)	Pajam (Medium)	Katari (Fine)	BR 3 (Coarse)	Parija (Coarse)
1st time	6,432.0	6,700.0	6,968.0	10,452.0	5,654.8	5,984.4
2nd time	6,973.4	7,225.3	7,504.0	12,060.0	6,657.0	6,788.4
3rd time	7,504.0	7,772.0	8,576.0	–	7,270.8	7,726.3

Source: Field Survey, February-March 2000.

portion of the quantity is sold in the 2nd period (84.6% of *aman*, and 79.1% of *boro*); and small quantity remains for sale in the 3rd period. As we could not collect sales information by month, it is difficult to identify sales percentages by month. A recent study of Jaim (2001) revealed that growers sell 25 to 42% of *aman* paddy within 15 days of harvesting, and 64 to 87% of paddy within 45 days of harvesting. As for *boro* paddy, the situation is slightly different. They sell 67 to 84% of this paddy within 70 to 75 days of harvesting. Since the behavior of all growers in Bangladesh is more or less similar all over the country, and assuming that the Jaim's case is relevant in the present study areas, it can be said

that growers have little on hand to sell in the latter period. Thus, they cannot benefited from the conditions in the latter period. Few growers can take the advantage of the latter high prices.

Table 4.7 shows the sales prices of paddy, by variety, received by growers in different period. It is understood that considering the prices by variety would be more useful in comprehending how paddy prices vary in Bangladesh depending on variety. As is evident from the table, in both seasons there was a positive relationship between paddy prices and time of sale. This was true for all varieties. It is further evident from the table that the prices of all varieties were not the same. Price differences are more prominent when we shift from the coarse to medium or fine variety. Presumably, prices for the coarse variety were the lowest and the prices for the fine variety were the highest. The table also illustrates that the price variation in the *boro* season was higher compared to the *aman* season.

4.2.3 Reasons for Bulk Selling and Re-purchase of Paddy

In the preceding section it was observed that growers sell the bulk of their crop volume within a short span of time and cannot obtain the benefit of a higher paddy price through delayed sales even though it would give them a much higher return. In this section, we shall look for the reasons that growers sell paddy within a short time span after the harvest. As is evident in Table 4.8, 44.7% of the growers responded that they need cash to purchase strange input for the next crop, so they sell the bulk of the crop volume immediately after the

harvest. About 25% of the respondents mentioned that they needed cash to repay loans.

About 18% of the respondents suggested that they sold paddy within a short

Table 4.8. Reasons for Bulk Selling (%)

	Loan Repayment	Input Purch.	Labor Payment	Inadequate Storage
Sherpur	36.4	39.4	24.2	–
Dinajpur	13.4	50.0	–	36.6
Average	24.9	44.7	12.1	18.3

Source: Field Survey, February-March 2000.

Table 4.9. Average Repurchase of Paddy and Price Paid by the Respondents by Month

	Quantity (ton)					Price/Kg				
	January	February	March	October	Total	January	February	March	October	October*
Sherpur	0.56	–	0.36	0.60	1.52[.80]	8.8	–	9.5	8.8	12.5
	(6.0)	–	(9.1)	(12.1)	(27.2)	–	–	–	–	–
Dinajpur	0.16	0.28	–	–	0.44[.34]	6.7	8.0	–	–	–
	(6.7)	(3.3)	–	–	(10.0)	–	–	–	–	–
All	0.72	0.28	0.36	0.6	1.96[.61]	–	–	–	–	–
	(6.4)	(1.6)	(4.8)	(6.4)	(19.0)	–	–	–	–	–

Note: i) *Two respondents took loan 80 and 120 kilogram of Paddy from a village mahajan during October. For which they have to repayed cash against paddy. Each Kg price of paddy was Taka 8.81 inthe open market.
But they have to repayed @Taka 12.5 for each kg of paddy. So they paid 42% for taking paddy as loan.
ii): Figure within ( ) indicate percentages of respondents re-purchased and figures within [ ] indicate percentages of quantity re-purchased.
Source: Field survey February-March 2000.

span of time because of inadequate storage facilities. The table confirms that majority of growers sell paddy mainly for cash needs (81.7%).

Re-purchasing paddy is a common phenomenon among the rice growers of Bangladesh. Many of the growers sell the bulk of their paddy immediately after the harvest due to the need for cash to purchase input, repay loans, pay labor costs, provide for family needs, etc. They cannot meet their own demand for consumption with their available stock for a long time, so they buy paddy or rice on the open market, and sometimes take paddy as a loan from the large growers or local *mahajan*. The prices the growers pay are often higher than those in the selling period whether they buy on the open market or taking a loan. The conditions of loan repayments (paddy) are hard. They have to repay their loans in cash at costs higher than the market price.

Table 4.9 shows the average re-purchase of paddy by season and the price paid for it. As is evident in the table, about 19% of the respondents bought back paddy either on the market or as loans for consumption. They bought 1.3, 0.5, 0. 6 and 0.4% of all paddy sold in the months of January, February, March and October respectively. Between the two districts, growers in the Dinajpur bought back smaller quantities compared to the growers in Sherpur.

It is further evident in the table that two respondents in the Sherpur area took paddy as loans in the month of October from local *mahajan*. They took 80 and 120 kg of paddy respectively when they were in need of it. The price of the paddy was generally high at the time of re-purchase, this price increase even

further when the paddy was taken as a loan. It was found that the actual price the borrower repaid was 1.42 times higher than the market price. In this way, the lender receives a premium above the market price and also makes savings in dealings, storage and handling costs. The risks and costs of marketing are transferred to the borrower [Crow 1994].

4.2.4 Selling Price versus Re-purchase Price

Table 4.10 illustrates the sale and repurchase price of paddy. Differences between these two prices can influence the growers' income if the buy-back volume or the price difference is considerably high. It is evident in the table that growers paid 24.2 and 31.3% more for buying back *aman* and *boro* paddy respectively. Comparing the two districts, the growers of Sherpur paid a higher re-purchase price compared to the growers of the Dinajpur area.

Table 4.10. Selling Price versus Re-purchase Price

	Aman			*Boro*		
Area	Selling Price (Tk/kg) A	Purchase Price (Tk/kg) B	Percentage Increased C=B/A*100	Selling Price (Tk/kg) A	Purchase Price (Tk/kg) B	Percentage Increased C=B/A*100
Sherpur	7.3	9.1	24.7	6.7	8.8	31.3
Dinajpur	6.8	8.2	20.6	-	-	-
All	7.0	8.7	24.2	-	-	-

Source: Field Survey February-March 2000.

4.3 Where and Whom the Growers Sell Paddy

4.3.1 Place of Transaction

Table 4.11 presents the quantity of *aman* and *boro* paddy marketed by the growers in the surveyed areas. As is evident in the table, there were large variations in the proportion of paddy sold when comparing the districts. In the Sherpur district, the major places of sale, in terms of quantity, were the village/upazila markets (87.9% for *aman* and 89.2% for *boro* paddy). In the Dinajpur district, the majority of sales were done at the farm/homestead (95.4% for *aman* and 78% for *boro* paddy).

Table 4.11. Paddy Sell from Home and in the Market by the Respondents (%)

	Sherpur		Dinajpur	
	Home	Market	Home	Market
Aman	12.1	87.9	95.4	4.6
Boro	10.8	89.2	78.0	22.0
All	11.5	88.5	86.7	13.3

Source: Field Survey February-March 2000.

4.3.2 Who buys Paddy from the Growers

Table 4.12 shows the marketing channels of paddy by location. Almost the

Table 4.12. Percentage of Respondents Sold Paddy to the Intermediaries and Government Center

	Sherpur				Dinajpur			
	Faria/Bepari	*Aratdar*	Rice Miller	Government Center	*Faria/Bepari*	*Aratdar*	Rice Miller	Government Center
Aman	92.9	3	4.1	–	87.7	10	2.3	–
Boro	86.7	9.1	3.2	–	94.3	3.3	2.4	–
All	89.8	6.1	3.7	–	91	6.7	2.4	–

Source: Field Survey February-March 2000.

same pattern was followed in both areas. The most important channel was selling directly to the *faria/bepari*. About 90% of the respondents in the Sherpur and 91% respondents in the Dinajpur areas reported that they sold paddy directly to the *faria/bepari*. The second most dominating channel was selling directly to *aratdar*, commission agents, who generally operated for millers. It was learnt that, after the harvest, some of the growers sent salable quantities to the warehouses of the *aratdar* and millers directly with a tacit understanding that the *aratdars* or millers could be asked for cash during times of emergency for the growers. All parties acknowledged that this procedure did not create problems during cash transactions.

4.4 Access to Credit and Repayment Condition

4.4.1 Access to Credit

Growers need capital for crop production. As the growers of Bangladesh have little cash in hand, they need cash from other sources to cultivate their crops. Other than their own resource, they borrow (money) either from formal institutions such as banks, NGOs, etc or from informal sources like friends, relatives, neighbors and village *mahajans*. Both formal and informal sources have been playing a crucial role in the agriculture in Bangladesh. An attempt is made here to identify the financial sources that grower can depend on for their agricultural operation.

As is evident from Table 4.13, 40% of the respondents in Dinajpur and 42% of the respondents in Sherpur have taken loans from formal and informal sources for cultivating both *aman* and *boro* paddy. A great degree of variation in the sources of credit was observed between the two districts. While informal credit was prominent in the Sherpur area, formal credit was the main source of capital in the Dinajpur area. It should be noted that, mainly, small and medium-sized growers in the Sherpur area accepted informal credit. Of those

Table 4.13. Access to Credit of the Respondents (%)

	Formal		Informal
	Bank	NGO	
Sherpur	9.1	–	33.3
Dinajpur	25.0	15.0	–

Note: Growers belong to small and medium type have accepted informal credit
Their land area range from 0.40 to 1.62 hectare. 80% of them are small and 20% are medium type growers.
Source: Field Survey, February-March 2000.

receiving informal credit, 80% are small growers and 20% are medium-sized growers. Their average area ranges from 0.40 to 1.62 hectare.

Comparing the districts, growers in Dinajpur received the highest amount of credit from banks. Growers in Dinajpur also received credit from NGOs. In the Sherpur district, though informal credit was common, the average credit was higher from formal sources. The growers in Sherpur did not receive any credit from NGOs. The table further reveals that the growers also received credit in kind (paddy) from informal sources in the Sherpur area. The annual interest rates of bank loans were the same in both areas but the interest rates of NGOs were relatively high (20%). The interest rates were the highest in the informal sector. It was 120% per annum (Table 4.14). Why do the growers take loans from informal sources even though the interest rates are high? The reasons are many. It was learnt during interviews in the Sherpur area that bank personnel and the local bank *dalals*' (commission agents) often harassed poor growers (loan applicants). A respondent complained that in 1999 he took a loan of Taka (Tk) 5,000 from the agricultural bank for *boro* cultivation. He paid 20% of the total loan amount to the bank personnel as a bribe for receiving the loan. After deducting bribe to the bank personnel the net loan amount stands at Tk 4,000 yet the interest rate stood of Tk 5,000. So, he decided not to go to the bank for further loans. Besides this, there are many other factors which cause growers to prefer informal credit to formal credit. These are:

Table 4.14. Average Loan (Taka) taken by the Respondents and Annual Interest Rate of Loan

	Formal		Informal	
	Bank	NGO	Cash	Kind (kg)
Sherpur	5,000.0 (13%)	–	1,562.5 (120%)	120
Dinajpur	14,222.2 (13%)	5,000.0 (20%)	–	–
All	9,611	5,000	1,563	120
			–	–

Note: Figures within parentheses indicate annual interest rate of loan.
Source: Field Survey, February-March 2000.

i) Growers do not get bank loans in time, ii) the cumbersome process of bank loans (i.e., the poor and illiterate growers do not understand the procedures for a bank loan), iii) they need to show a high collateral value of assets, iv) the presence of corrupt bank personnel and the domination of commission agents in the bank areas, etc. have diverted growers in the Sherpur area from formal credit to informal credit. In other words, it can be said that the problems of getting formal credit are forcing the growers to rush to sources of informal credit to cultivate their crop. Thus, they are trapped in the vicious of informal credit cycle and cannot get out of it (Figure 4.3).

4.4.2 Repayment Procedure of Informal Credit

Several repayment methods are followed in the Sherpur area. These are, i)

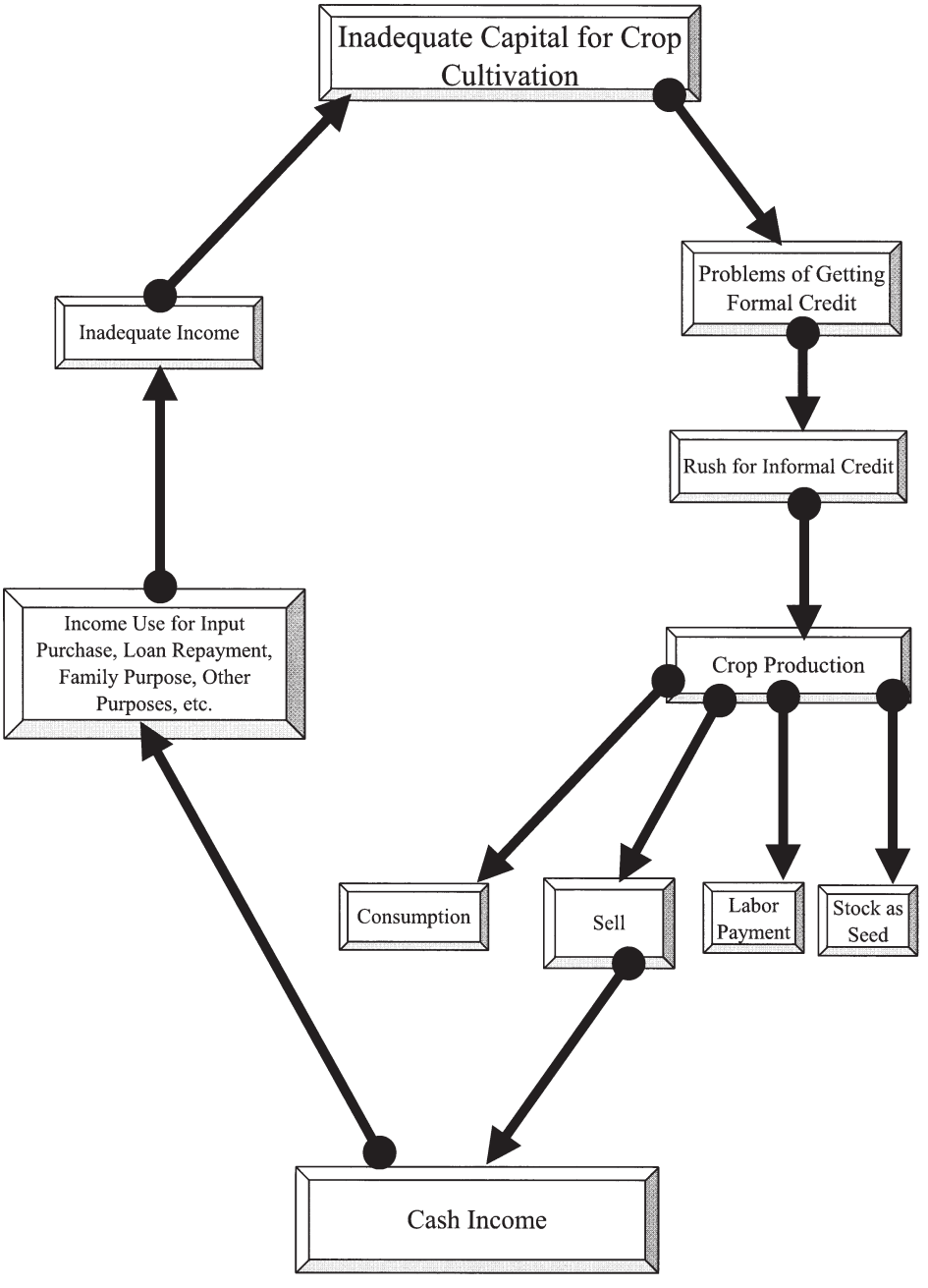

Figure 4.3. Vicious Circle of Informal Credit in Bangladesh
Source: Field Survey, February-March 2000

borrowing cash and repaying with 10% interest rate per month, ii) borrowing cash and repaying principal amount plus 40 kg of paddy, iii) loan in kind and repayment in cash. The two-repayment processes that were found prominent for taking out loans were loans in kind and repayment in cash. These are, repayment should be made at fixed rate. The borrower should repay Tk 500 for 40 kg of paddy. The other repayment process is that the borrower should repay loan at the highest prevailing price in season. As for example, one of the respondents borrowed 160 kg of paddy at the rate of Tk 8/kg during necessity but repaid Tk 1,600 for 160 kg of paddy because the highest price of paddy was Tk 10/kg at the time of repayment. Repayment period varies from one to four months from the loan period.

There is another repayment method of cash loan prevailing in the area that should be noticed here. One of the respondents owns *rickshaw*. Besides farming, he pulls *rickshaw* to maintain family. This respondent took loan from a village *mahajan* during a crop season. Because of the conditions of repayment, the respondent took the *mahajan* in a *rickshaw* wherever the *mahajan* wanted to go for free until the loan was repaid. Some of the respondents reported that sometimes the *mahajan's* interest calculations compounded the difficulties of repaying their loans. It can be portrayed that many of the growers in Bangladesh are stuck within the vicious circle of informal credit. It was learnt during interview that the number of people using informal credit is increasing within the Sherpur district. Most of the credit recipients are from the lower strata of the farming society. Generally, the large growers are lending capital to the small and medium type growers in the research area. These moneylenders besides farming, also have other secondary business. They supply capital to the borrower mainly from own source. However, it was learnt during the interview that these moneylenders also utilized the capital, which he borrowed from bank for paddy cultivation, for lending to small and medium type growers.

4.5 Intermediaries in the Paddy/Rice Marketing and their Characteristic

Chains of intermediaries are working in the paddy/rice marketing of Bangladesh. They are *kutials*, *faria*, *bepari* and paddy *aratdars*, rice millers, assembler, wholesalers and retailers. Detail analysis of these agents may benefit students of agricultural marketing. As enough information is not available on these intermediaries however, some major issues concerning them is discussed for the understanding of the role and importance of these intermediaries in the marketing channel. The following discussion is mainly based on the data of Sherpur and Dhaka City.

4.5.1 *Faria/Bepari*

Faria/bepari: In Bangladesh/South Asian literature on food marketing, there is a slight distinction between *farias* and *beparis* which is based on their scale of operation [Baulch et al 1997]. In some studies they are categorized as

different kinds of agents, and in some studies, they are classified in the same category. There is no particular guidelines from the Department of Agricultural Marketing (DAM) on their function for us to follow. For the simplicity of this discussion, the term will be used as *faria/bepari* to mean the same type of paddy assemblers.

Faria/bepari are the non-licensed small-scale paddy assemblers operating mainly in the village market. They do not have permanent business premises, travel from village to village and purchase paddy from the growers directly. Sometimes they also buy paddy from the village market. Some members of this group also work as agents for the paddy *artadar*. On average, they need Tk 4, 000 monthly to operate. Generally, they operate their business with their own capital. They use *rickshaws* and vans for transporting paddy from the grower's house to their own house and from their own house to the market. There is a general complaint against them that they adopt unfair weighing methods while purchasing paddy from the growers and are able to keep a profit margin even selling and purchasing at the same price [Baulch et al 1997]. They store paddy from two to eight days at their house. The monthly transactions of these paddy assemblers vary from 1 to 1.5 ton of paddy.

4.5.2 Paddy *Aratdar*

Paddy *aratdar*: Paddy *aratdars* are the commission agents who generally work for the millers. However, there are some paddy *aratdars*, who do not act as millers' agents, they work independently. Both categories have permanent business premises in the upazila market. Generally, they purchase paddy from the upazila market. Some of the *aratdars* buy paddy directly from the growers on the understanding that the growers can ask them for cash any time when desired.

In general, *aratdars* get capital from the millers. They supply paddy to the millers within 3 to 7 days of taking an advance. Those *Aratdars* who work for millers have little freedom in their purchasing and selling decisions. They follow the decisions of the millers. On average, they get Tk 50,000 in advance from the millers for purchasing paddy and the rest, if any, they receive after delivering the full quantity of paddy. Millers bear all the expenses of buying paddy. They come to the *aratdars* premise for taking paddy for delivery. In return for the service, *aratdars* receive Tk. 4 for each 40-kg of paddy as commission. Those, who do not act as agents of millers, utilize their own capital for the business and act independently.

The *aratdars* store paddy for a few days, if undelivered, at their business premise. The average period of storage varies from 3 to 7 days. They handle more than 900 ton of paddy annually.

4.5.3 Rural Retailer

Rural retailers: They are the seasonal rice retailers. These small traders purchase paddy from the growers directly at the village market. Parboiled and

dried at the home yard by family labor. The dried paddy is then taken to the small rice mills situated nearby close to the village market for milling. After milling, they sell the rice to the village consumers during the weekly (hat) and daily bazaar days. Their monthly transactions vary from 0.9 to 1 ton of paddy. In general, marginal and landless growers, and rickshaw or van pullers are involved in this type of business. These rice retailers also work for the *aratdars* as daily laborers.

4.6 Role of Rice Mills

4.6.1 Rice Millers as Paddy Purchaser

Table 4.15 shows the sources of paddy supply to rice mills by area. The table suggests that, in both areas, commission agents mainly supply paddy to rice mills. A detailed discussion on the millers' pattern of paddy purchasing is discussed below. It is worthwhile to note that the following discussion is mainly based on the Sherpur area. It would have been worthwhile if Dinajpur had been also included in the discussion. Because of time constraints we could not collect detailed information on the pattern of paddy purchasing in the Dinajpur area. Nevertheless, the following discussion should provide some ideas about the role of rice millers in the paddy/rice marketing system.

Table 4.15. Sources of Supply of Paddy to Rice Mills (%)

Locations	Growers	*Fari*/*Bepari*	*Aratdars*/Commission Agents
Sherpur	9.8	20.6	69.6
Dinajpur	14.5	24.3	61.2
All	12.1	22.5	65.4

Source: Field Survey, February-March 2000.

Rice millers in the Sherpur area are the most significant members of the marketing system. In fact, they play a vital role in paddy purchasing and selling operations. They buy paddy either directly or through their agents in the markets. In our case, we found that all the millers bought paddy through the *aratdar*, a commission agent, who has a permanent business shop in the upazila market. These commission agents get capital in advance from the millers for supplying paddy to the mills. The amount of money varies from mill to mill. *Aratdars* supply paddy to the mill within 7–15 days of receiving money. How much paddy will be purchased and at what price is the decision of the millers and is controlled by them, *aratdars* have little freedom in these matters.

After receiving their money, *aratdars* are ordered to maintain contact with the millers for necessary directions on the paddy purchase process. Millers closely follow the price of paddy and the transaction volumes in nearby markets. This information helps the millers to direct their suppliers about further courses of action.

Based on the directions received, *aratdars* supplied the desired quantity of paddy to the millers. For providing this service, suppliers received a fixed commission from the millers. Generally, millers bear all the purchasing costs. Purchasing and delivering the paddy to the mill gate involves no risk for the *aratdars*. The only risk they have is to deliver 81-kg of paddy in a bag. If they fail to deliver this quantity, millers might reject the transaction. The standard measurement of one bag is 80-kg in the study area. It should be mentioned here that the *aratdars* will not be awarded with extra money for supplying an extra one-kg of paddy, he will receive the price that is equivalent to 80-kg. This is a well-established practice in the area interviewed. To maintain the standard of 81-kg per bag, the *aratdars* follow unfair weighing methods when they buy paddy from other paddy assemblers or farmers. On the other hand, the assemblers who purchase paddy from the farmers might use the same weighing method that the *aratdars* usually practice and deceive the farmer in order to maintain their profit margin. We heard this complaint from the farmers during the interviews. However, this complaint was not crosschecked with other parties. From the above discussion, it can be safely said that the rigidity of supplying 81-kg of paddy in a bag to the millers must certainly force the traders to adopt discriminatory weighing practices when they procure paddy from the primary suppliers. This indicates that the growers incur losses as primary suppliers of paddy due to discriminatory weighing methods.

4.6.2 By-product Generation

Rice mills can produce three kinds of by-products; these are rice husk, rice bran and broken rice. The ratios of these by-products are also different. The ratios of head rice, rice husk, rice bran and broken rice vary by mill types. On average, the surveyed husking mills could generate 63.0, 17.5, 15.0 and 4.5 per cent of head rice, rice husk, rice bran and broken rice respectively while automatic mills produced different proportions of head rice, husks, bran and broken rice (Table 4.16). The price of these by-products is not the same and could differ depending on the type. It was reported that the by-products of automatic mills have higher market value because the products produced by these mills are of good quality. The quantity of by-products produced by a mill and their market value could influence the profit margin.

Table 4.16. Milling Outturn and By-products Generation by Mill Types for 40 Kg of Paddy

Mill Type	Milling Outturn (Kg)	Husk (Kg)	Rice Bran (Kg)	Broken Rice (Kg)
Husky	25.2	7	6	1.8
	(63.0)	(17.5)	(15.0)	(4.8)
Automatic	26.4	6.2	5.7	1.7
	(66.0)	(15.5)	(14.3)	(4.2)

Note: Figures within parentheses indicate percentages.
Source: Field Survey February-March, 2000.

All the by-products that a mill produces have several possible applications. For example, bran and broken rice are useful feed for poultry, livestock and fish, while rice husks have been utilized as fuel for millers and the rural community. Millers generally use husks as fuel for steaming. A miller needs roughly 7,200 -kg of husks to steam 40,000-kg of paddy. The rests of the husks, if any, they sell either to the villagers or to other millers. Villagers utilize the husks for cooking. On the other hand, millers who purchase husks from other millers or from the market make charcoal sticks (those used as fuel) by heat pressure in a different machine. Villagers and small city dwellers purchase these sticks for fuel.

4.6.3 Distribution of Milled Rice

The millers generally market the milled rice through private commercial channels. When a miller enters the market, he sells the product directly to the assembler or wholesaler-cum-*aratdar* at the terminal market, or sells to the visiting traders from outside the local market [Rahman 1998]. In our case, we found that millers are mainly selling rice to the wholesaler-cum-*aratdar* or to the rice assemblers of Dhaka, Chittagong and Choumuhani. The average distance between the millers and these areas varies from 200 to 680 kilometers (km). Rice is transported by truck in those areas because of good road conditions.

Figure 4.4 shows the seasonal (average) procurement of *aman* and *boro* paddy by the millers. Figure 4.5, on the other hand, shows the typical dealings of paddy and rice by a miller in the study areas. Both figures produce almost similar transaction pattern.

4.6.4 Employment Generation

The level of employment provided by this industry is an important indicator

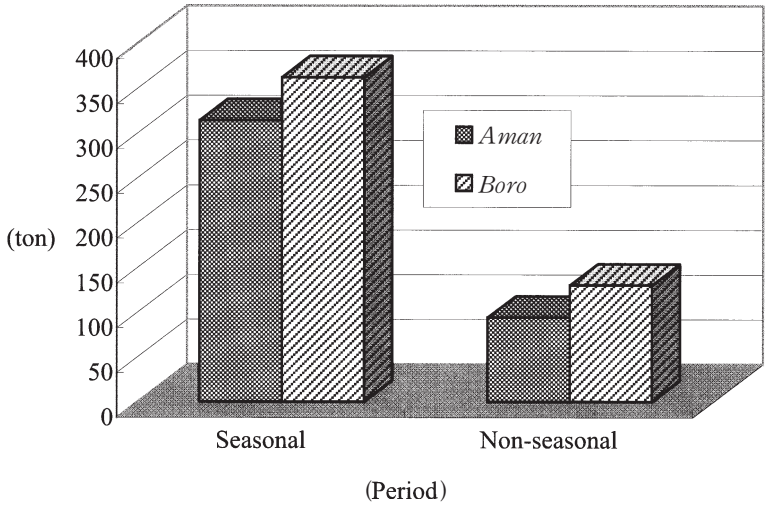

Figure 4.4. Paddy Procured by the Rice Millers in the Study Areas
Souece: Field Survey, February-March,

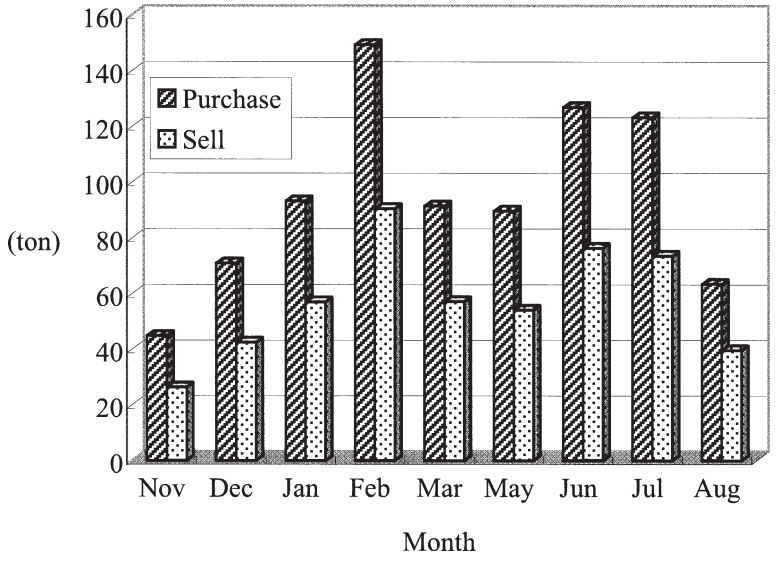

Figure 4.5. Monthly Transaction of Paddy and Rice by the Rice Millers
Souece: Field Survey, February-March,

Table 4.17. Number of Labors Working in the Rice Mills in a Day and their Average Wage Rate (Taka/day)

	Male	Female	Total	Per Mill	Male (Wage)	Female (Wage)
Husky (25)	161.0 [38.0]	268.0 [62.0]	429.0 [100.0]	17.2	48.2	31.5
Auto (2)	11.0 [44.0]	14.0 [56.0]	25.0 [100.0]	12.5	55.0	40.0
All	172.0 [38.0]	282.0 [62.0]	454.0 [100.0]	16.8	51.6	35.8

Note: Figure within ( ) indicate sample no & figure within [ ] indicate percentages. Labor no. are shown in aggregate and wage in average
Source: Field Survey, February-March 2000

of its performance. According to the report of BBS 1989, obtained both directly and indirectly, 16,448,000 workers were employed in the rice industry. It should be mentioned here that the ministry concerned has not done a recent study on this issue [Rahman 1998].

We tried to identify the level of employment generated by the sample millers. Those are shown from Table 4.17 to 4.19. This discussion is mainly based on the data of Sherpur area. Twenty-seven mills have provided employment for 454 daily wageworkers of which 62 per cent are female. The daily wage rate however, varies by sex. Female laborers get 69 percent of the wages of the male laborers (Table 4.17).

Table 4.18 shows that these mills have provided 118 permanent jobs, of which

Table 4.18. Number of Permanent Staffs Work in the Mill and their Average Salary (Taka/month)

	Manager	Machine Man	Field Supervisor	Night Guard	Cook	Purchaser	Total
Husky (25)	24 (2269.5)	25 (2250.5)	19 (1691.0)	25 (1384.0)	2 (900)	– –	95 [3.8]
Auto (2)	3 (3333)	14 (3029)	1 (4000)	4 (1800)	–	1 (3000)	23 [11.5]
All	27	39	20	29	2	1	118 [4.4]

Note: Figure in ( ) indicate sample no. and average salary of the corresponding staff & figure within [ ] indicate average number of employee. No. of staffs are shown in aggregate
Source: Field Survey, February-March 2000

Table 4.19. Annualy Employed daily Labor (no.) in the Rice Mills by Sex and their Average Income (Taka)

Location	No. of Male Employed	No. of Female Employed	Total	Income * (Male)	Income * (Female)
Husky (25)	43,470 (38.0)	72,360 (62.0)	115,830 (100.0)	13,000 [241.7]	8,505 [157.5]
Auto (2)	2,970 (44.0)	3,780 (56.0)	6,750 (100.0)	14,850 [275.0]	10,800 [200.0]
All	46,440 (37.9)	76,140 (62.1)	122,580 (100.0)	13,925 [257.9]	9,653 [178.8]

Note: No. of employed labor & annual income are calculated by assuming that a mill is operated 270 days a year. * income of a labor for 270 days.
Figures within ( ) indicate sample no. & percentage & figures within [ ] indicate income in US $.
1 US $=Taka 54.0
Source: Field Survey, February-March 2000

80.5 percent are in husking mills and the remaining jobs are in the automatic mills.

Table 4.19 shows the annual employment of daily wageworkers and their annual income by sex. In all, 27 mills provide jobs for 122,580 daily workers in a year, of which 46,440 are male and 76,140 are female (see the note in the table for estimating the number of annual workers). The average income of male laborers was Tk 13,925 (258 US dollars) while the income for the female laborers was Tk 9,653 (about 179 US dollars).

We do not have a related study to compare the employment situation of rice mills with other industries. So, in order to show the importance of rice mills in the overall employment scope, we have compared our results with published data from the Ministry of Planning [BBS 1996]. We understand that this comparison will reflect the important place of rice mills in providing employment . Referring to Figure 4.6, it can be deduced that, except the apparel sector, none of the other industries could provide a scope of employment as wide as the rice mills. The number of jobs provided by rice mills would have been more if all the rice mills had been included in this analysis.

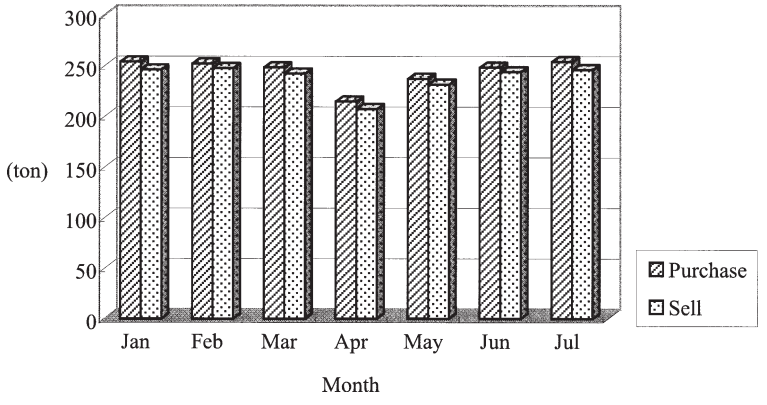

Figure 4.6. Monthly Transaction of Rice by the Rice Wholesaler cum Aratdar in Bangladesh Source: Field Survey, February-March,

4.7 Role of Rice Wholesaler-cum-*Aratdar* and Retailers in Rice Marketing

4.7.1 Wholesalers-cum-*Aratdar*

These traders are important channels in the rice marketing in Bangladesh. Wholesalers-cum-*aratdar* usually buy rice on their own premises from the rice assemblers and millers. They supply rice to the retailers and distant wholesalers taking commissions from both parties. Being commission agents, they also take commissions from the millers when the wholesalers sell rice on behalf of the millers. They provide storage support to the millers when needed.

It is the responsibility of the wholesaler-cum-*aratdar* to pay all purchasing expenses when the wholesaler-cum-*aratdar* places orders to the assembler. As per condition, the rice assemblers bring rice to the wholesalers premises either by truck or boat or launch. On the other hand, when millers and rice assemblers request wholesalers or retailers to place orders for rice with wholesalers, the wholesaler plays the role of *aratdar* and charges commissions from all parties. They levy equal commissions on both sellers and buyers for a ton of rice. The average levy for a ton of rice is Tk 130 (Tk 65 + Tk 65). This commission can vary depending on the variety of rice. According to a wholesaler-cum-*aratdar*, he collects a commission of Tk 150/ton (Tk 75 + Tk 75) for coarse and medium rice from sellers and buyers, and Tk 250/ton for fine rice (Tk 125 + Tk 125) from sellers and buyers. Sellers will pay off their overhead costs including transportation, loading, bagging etc., and buyers will pay off the costs of unloading and product transportation.

Wholesalers-cum-*aratdar* store rice for 2 to 10 days either at their business premises or in a hired warehouse. Figure 4.6 shows the average transactions for rice by wholesalers in a month in Dhaka City. The figure reveals that the average total for monthly transactions for wholesalers is 192 tons and this varies from 90 to 360 tons among the traders. Figure 4.7 shows in more detail the rice

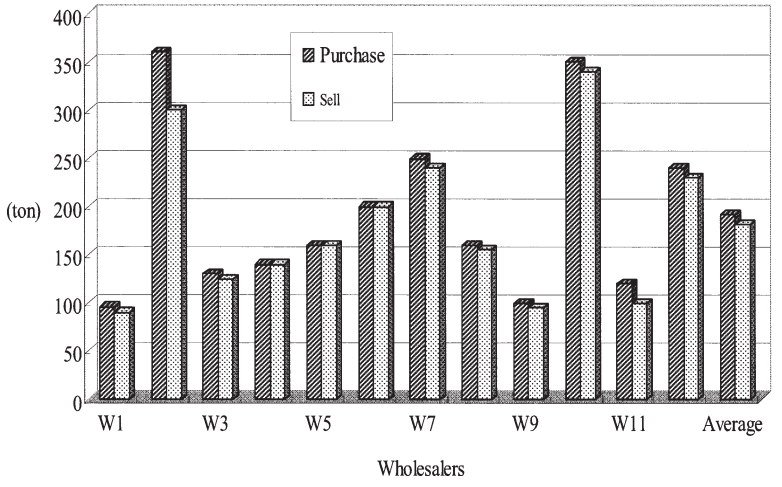

Figure 4.7. Average Transaction of Rice by the Wholesaler-cum-Aratdars in Bangladesh
Note: W1, W2, W3.....= Wholesalers
Source: Field Survey, February-March, 2002.

transaction (January to July) of one wholesaler-cum-aratdar. This data were taken from the bank statement of the trader. He had to submit this statement during a loan disbursement from the bank. Thus there could be some over-estimations in the report. The figure shows that the average monthly purchases and sales of the wholesaler-cum-*aratdars* are 244 and 238 tons respectively. This data does not vary significantly from the average data of Figure 4.6.

4.7.2 Retailers

Retailers are the last channels of the rice marketing system. They have permanent shops in the urban and metropolitan areas, purchase rice from the wholesaler-cum-*aratdar* and sell directly to the consumers. In the sub-urban areas, retailers buy rice directly from the millers and sell to the consumers.

One can follow the marketing channel of paddy/rice depicted in the previous discussion in Figure 4.8.

5. Profitability of Growers and Intermediaries

In the previous chapter we discussed in detail the role of different members of the paddy/rice-marketing channel in Bangladesh. It was observed in the chapter that every member of the channel, especially the growers, rice millers and wholesalers have been the key role in distributing paddy and rice from the primary markets to the consumers. Because they have been recognized as the key players in the distributing system it is important to know how are they benefiting from the distribution system. An analysis on the profit margins of growers, rice millers and wholesalers-cum-aratdars is carried out to know how much profit they are making from the business. The analysis covers: marketing

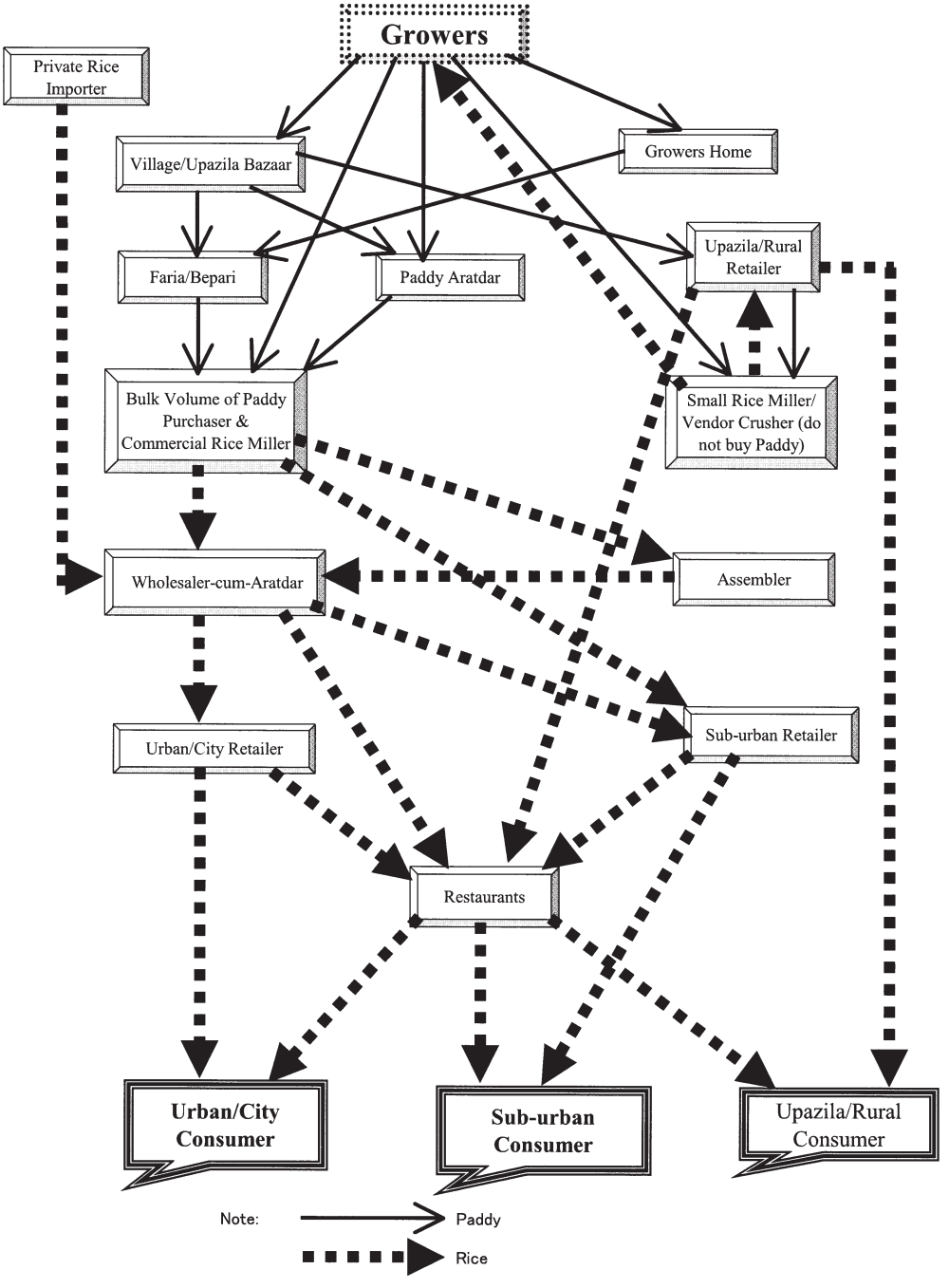

Figure 4.8. Private Sector Paddy and Rice Marketing Channel in the Surveyed Areas
Source: Field Survey, February-March 2000

margin, share of the growers in consumer's price, profit margins of the growers, millers and wholesalers.

5.1 Importance of Study Grower's Share and Marketing Margins of Paddy/Rice

Studies on grower's share and marketing margins of paddy/rice are important, for they reveal many facets of marketing and price structure, as well as the efficiency of the system [Acharya and Agarwal 1999]. The magnitude of grower's share and the marketing margins of paddy/rice relative to the price of the product indicate the efficiency of the marketing system. It refers to the efficiency of the intermediaries between the producer and the consumer in respect of the services rendered and the remuneration received by them. Such studies help in estimating the total cost incurred on the marketing process in relation to the price received by the producer and the price paid by the consumer. The knowledge ultimately helps us to identify the reasons for high marketing costs and possible way of reducing them. The knowledge of marketing margins helps us to formulate and implement suiTable price and marketing policies.

5.2 Estimation of Growers Share and Marketing Margins of Paddy/Rice

Grower's share for an agricultural product is the price received by the grower expressed as a percentage of the retail price. A marketing margin for an agricultural product is usually referred to as the price difference between what the consumer pays for the product and the price the producer receives for producing that product [Mears 1981]. Also it can be expressed in percentage. Marketing margins can be calculated between different levels of the marketing system but discussion in this chapter will concentrate on the overall farm to retail rice marketing margin. Marketing margins varies from commodity to commodity, depending on the amount of processing and handling process of the commodity [Acharya and Agarwal 1999]. Even for the same commodity, the margin may vary according to the variety of the commodity, place and time. A number of factors, such as the method of processing, the location of the market, the mode of transportation etc influence marketing margins and costs.

It is understood that analyzing the marketing margins can be fully meaningful only when the same milled rice or paddy varieties are compared. Looking at both macro and micro data, the marketing margins is examined.

5.2.1 Growers Share and Marketing Margins- Macro Data Analysis

Of the three types, *aman* and *boro* is the main paddy contributing more than 90% of the total production. Therefore the discussion is followed for *aman* and *boro*. Growers' share of the retail price for both paddy is calculated on the basis of their availability in the market. Availability of these paddy is defined on the following assumption. Aman paddy is harvested from November to January and available in the market until March, and *boro* paddy harvested from April to June

is available until August. Depending on their timing of availability grower's share (GS) and marketing margins (MM) of aman and boro rice were estimated by employing following formulas.

$$\mathbf{GS=(HPR/RPR)*100} \quad \textbf{(5.1)}$$

Where GS = Grower's Share
HPR = Harvest Price of Rice of a month
RPR = Retail Price of Rice of the corresponding Month

$$\mathbf{HPR=HPP*1.5} \quad \textbf{(5.2)}$$

Where HPP = Harvest Price of Paddy
0.5 = Convertion Ratio

Generally, it is assumed that 1.5 kg of paddy is required to processing 1 kg of rice.

$$\mathbf{MM=[(RPR-HPR)/RPR]*100} \quad \textbf{(5.3)}$$

Where MM = Marketing Margins

It is difficult to obtain monthly data of harvest and retail price. This data was obtained from different sources because all data was not available in a particular source. Data of harvest price was taken from Begum [1997] of Department of Agricultural Marketing (DAM), Handbook of Agricultural Statistics [1999] and Jaim [2001], and data of retail rice prices was taken from the various issues of Monthly Statistical Bulletin (MBS) published by the Bangladesh Bureau of Statistics (BBS). DAM and Handbook of Agricultural Statistics publish the average data of the country, and BBS compiles monthly data of retail price for the 7 main districts in Bangladesh. Data of these areas are compiled about different rice types: coarse, medium and fine, average data of these 7 districts have been used for analysis. Thus there may be some variations in the result nevertheless, the result will provide a guideline to understanding how growers share changes in Bangladesh depending on variety and season.

Tables 5.1 and 5.2 show monthly share of growers and marketing margins of *aman* and *boro* rice, respectively. It is evident from Table 5.1 that with one exception, growers share in *aman* is more than 75% in most of the years, and the

Table 5.1. Growers Share and Marketing Margin of Retail Rice Price(*Aman*)

	Growers Share(%)						Margin(%)					
	Nov.	Dec.	Jan.	Feb.	Mar.	All	Nov.	Dec.	Jan.	Feb.	Mar.	All
1991-92	76.2	81.5	84.9	86.3	90.6	83.9	23.8	18.5	15.1	13.7	9.4	16.1
1992-93	74.2	71.5	76.0	77.7	78.4	75.6	25.8	28.5	24.0	22.3	21.6	24.4
1993-94	77.2	80.0	86.6	92.3	92.9	85.8	22.8	20.0	13.4	7.7	7.1	14.2
1994-95	76.1	82.0	86.7	89.9	92.8	85.5	23.9	18.0	13.3	10.1	7.2	14.5
1995-96	68.6	76.7	83.4	85.2	85.6	79.9	31.4	23.3	16.6	14.8	14.4	20.1
1996-97	66.2	67.3	71.8	77.2	84.3	73.3	33.8	32.7	28.2	22.8	15.7	26.7
1997-98	65.8	78.2	80.4	83.0	82.9	78.0	34.2	21.8	19.6	17.0	17.1	22.0
1998-99	78.4	84.1	85.4	86.7	85.3	84.0	21.6	15.9	14.6	13.3	14.7	16.0
Average	72.8	77.7	81.9	84.8	86.6	80.8	27.2	22.3	18.1	15.2	13.4	19.2

Source: DAM(1997), Handbook of Agricultural-Statistics(1999).

Table 5.2. Grower's Share and Marketing Margin of Retail Rice Price(*Boro*)

	Growers Share(%)						Margin(%)					
	Nov.	Dec.	Jan.	Feb.	Mar.	All	Nov.	Dec.	Jan.	Feb.	Mar.	All
1991	66.2	69.4	72.6	82.9	81.9	74.6	33.8	30.6	27.4	17.1	18.1	25.4
1992	76.2	73.8	78.5	82.5	79.8	78.2	23.8	26.2	21.5	17.5	20.2	21.8
1993	66.5	63.4	64.4	62.9	68.0	65.1	33.5	36.6	35.6	37.1	32.0	34.9
1994	76.2	75.1	77.3	77.4	80.4	77.3	23.8	24.9	22.7	22.6	19.6	22.7
1995	80.8	72.2	73.4	82.0	82.7	78.2	19.2	27.8	26.6	18.0	17.3	21.8
1996	63.8	63.7	68.1	71.1	69.8	67.3	36.2	36.3	31.9	28.9	30.2	32.7
1997	–	66.5	69.0	90.8	–	75.4	–	33.5	31.0	9.2	–	24.6
1998	–	57.0	64.5	–	–							
1999	–	62.8	66.0	–	–							
Average	71.6	69.2	71.9	78.5	77.1	73.7	28.4	30.8	28.1	21.5	22.9	26.3

Note: indicates not available.
Source: DAM(1997), Handbook of Agricultural Statistics(1999).

average share is about 81%. It is the highest in 1994/95 when the production of *aman* paddy has declined from the preceding year, and is the lowest in 1996/97 the year of bumper production of *aman* rice. It is further stated in the Table that the growers' share is the lowest in the harvesting period (72.8%) and the highest in non-harvesting period (86.6%). This suggests that compared with retail price, growers' price increase at higher rate in the off-season, so the growers' share started to increase in the non-harvesting period and marketing margins started to decline in those periods. The average marketing margin is 19.2%. Across the month, the highest margin is in November and the lowest is in March. The analysis suggesting that the growers are receiving reasonably good share from *aman* rice, as the marketing margin is not high.

The average share of growers for *boro* rice is about 74%. The share remained almost the same in 1997 compared to 1991 although there were some fluctuations. The fluctuation was found because of changes in production of *boro* rice. The highest share is found in 1995 when the fertilizer shortages reduced the size of 1995 *boro* rice. The share was lowest in 1993. The seasonality of share shows that the share is the lowest in May the main harvesting time of HYV *boro*, and started to increase in June and the peak is in July. It started to decline in August because the *aus* rice started to come to the market in this period. The average marketing margins of *boro* rice is about 27%, and it is the highest in May. The analysis suggested that both in *aman* and *boro* season growers are able to get good share of the consumer price. Growers share is relatively higher for *aman* rice.

5.2.2 Growers Share and Marketing Margins- Micro Data Analysis

The status of growers' share and marketing margin were also worked out from field survey data. Growers selling price was obtained from some selected respondents from Sherpur and Dinajpur areas.

We could not collect data of retail rice price from the field survey due to reluctance of respondents of providing monthly data on rice types. In this case

Table 5.3. Seasonality of Growers Share and Marketing Margin in the Surveyed Areas

Area	Particulars	*Aman*(1999–00)			*Boro*(1999)		
		Nov.	Dec.	Feb.	May	Jun	July
Sherpur	Growers Share(%)	82.4	81.5	87.4	67.0	72.0	78.7
	Marking Margin(%)	17.6	18.5	12.6	33.0	28.0	21.3
Dinajpur	Growers Share(%)	80.0	79.0	85.0	59.0	64.0	–
	Marking Margin(%)	20.0	21.0	15.0	41.0	36.0	–
All	Growers Share(%)	81.2	80.3	86.2	63.0	68.0	78.7
	Marking Margin(%)	18.8	19.7	12.6	37.0	32.0	21.3

Source: Field Survey, February-Mrach, 2000.

the retail rice price was substituted by the published data of BBS assuming that there is little variation between the field survey data and published data. Following the formula of the preceding section, the estimated growers share and marketing margins are provided in Table 5.3. The Table shows that in both area growers share from *aman* rice is relatively higher from the *boro* rice. In both crops, the growers share increase with time. This suggests that selling in later periods increases the probability of getting higher shares to growers and reduces marketing margins. It may be because that the relative rate of increase of retail rice price is lower than the rate of increase of harvest price in those periods. The Table further revealed that the growers of Sherpur received higher share from both crops compared with the growers of Dinajpur. Transportation costs might be one of the main factors for which the growers of Dinajpur receiving relatively lower growers share. Dinajpur-Dhaka distance (396 km) is almost double the distance of Sherpur-Dhaka (200 km). Transportation charge of one ton of rice from Dinajpur to Dhaka costs about Tk 530 and the transportation charge from Sherpur to Dhaka costs Tk 375 for one ton of rice. The overall trends of grower's share and marketing margins of *aman* and *boro* in the study areas show the similar pattern of the macro data. Both macro and micro data supports that the growers of the Bangladesh attain good share of the consumer price so the marketing margins are not very high. However, the relative share from boro rice is lower for growers.

In the previous chapter it was observed that most of the growers are forced to sell bulk of the product within short period of harvesting because they need cash in hand for repayment of loan, purchasing of input, labor payment, etc. So they could not avail themselves of the high prices of paddy although delayed sale of paddy could give them much higher returns and higher shares of the consumer price.

5.3 Profit Margins of Growers, Rice Millers and Wholesalers-cum-*Aratdars*

The foregoing analysis showed that the growers of Bangladesh are able to get good share of the consumer price in the present rice marketing system. The

probability of getting higher share by the growers increase, if they could sell in later period. Marketing margins on the other hand is declined even if the rice is sold in latter periods. Thus it is clear that rice marketing system in Bangladesh is functioning efficiently. However, the higher or lower share does not portrait the extent of benefit of the growers. Further analysis on the profit margins of growers, rice millers and wholesalers is therefore necessary to ascertain the extent of profit margins they receive for marketing paddy or rice in the market. We shall now discuss here on the costs and net benefits of growers and other main rice traders.

5.3.1 Profit Margins of Growers

We have considered the open market price of paddy instead of the procurement price of the government because more than 95% of the paddy is sold in the open market. Government purchases few quantity from the growers directly. The cost of production of paddy varies from area to area. Because of time constraints and unwillingness of respondents, we could not collect data of the cost of production by item directly from the growers. In this situation we asked the respondents to provide data on the average cost of production but did not get satisfactory reply from them. So we decided to use data of other studies. The Food Planning and Monitoring Unit (FPMU) publish yearly data of cost of production. They collect data on the cost of production every year for determining the support price of growers. Thus the data of FPMU have reliability. We followed the data of Food Planning and Monitoring Unit (FPMU) in this case. Since information by area was not possible to attain, so the analysis of growers' benefit was done on the average of the two areas. Despite the fact that the sources of information are different; it is believed that the result would provide some understanding on the nature of growers' profit margins of the researched areas. Estimated average profit margins of growers are presented in Table 5.4 to 5.7.

The profit margin of growers is defined difference between the gross cost and the gross income of the growers. Growers' cost includes the cost of production, cost of re-purchasing of paddy, and benefit lost for kind payment to labor. Some of the growers have given paddy to labor for its service it is considered as growers lost for not selling in the market. Selling price is considered to estimating the value of benefit lost for labor payment. Gross income on the other hand is, income from sales proceeds, and market value of paddy kept for consumption and seed. Average selling price is considered in all cases for estimating gross income.

Tables 5.4 to 5.7 show that growers could benefit by producing *aman* but production of *boro* paddy does not provide benefit to growers. It could be because, generally, the coarse type paddy is produced in *boro* season, in recent times, the price of this type of rice remained low in the market because of bumper production. So the market price in many cases is low in the market and some-

Table 5.4. Growers Costs for *Aman* and *Boro* Production (per household)

Crop	Cost (ton/ha) Tk A	Total Production (ton) Tk B	Production Cost Tk C=A*B
Boro	6,620	2.4	15,888
Aman	6,539	1.4	9,155

Source: Calculated from the data of Field Survey and FPMU (1999).

Table 5.5. Gross Income of Growers from *Aman* and *Boro* (per household)

Crops	Consumption (ton) A	Income from Consumption (Tk) B=A*APS	Seed (ton) C	Income from Seed (Tk) D=C*APS	Sell (ton) E	Income from Sell (Tk) F=E*APS	Total Income (Tk) G=B+D+F
Boro	0.64	4,275	0.05	318.1	1.70	11,356	15,950
Aman	0.43	3,138	0.09	663.2	0.90	6,566	10,367

Note: APS=Average Selling Price of Paddy Received by the Respondents during the Field Survey.
Source: Field Survey, February-March, 2000.

Table 5.6. Other Costs Incurred by the Growers (per household)

Crop	Re-purchase (ton)	Re-purchase Price(Tk/ton)	Re-purchase Cost(Tk)	Payemnt in Kind(ton)	Cost of Payment(Tk)	Total Other Costs (Tk)
	A	B	C=A*B	D	E	F=C+E
Boro	0.01	8800.0	83.8	0.03	169.7	253.5
Aman	0.02	8700.0	174	0.01	104.6	278.6

Source: Field Survey, February-March, 2000.

Table 5.7. Net Income of Growers from *Aman* and *Boro* Paddy (per household)

Crop	Total Cost of Production (Tk) A	Total Other Costs (Tk) B	Gross Costs (Tk) C=A+B	Gross Income D	Net Income (Tk) E=D-C	Income as % Costs F=(D/C)*100
Boro	15,888	254	16,142	15,950	-191	99
Aman	9,155	279	9,434	10,367	933	110
All	12,522	266	12,788	13,382	371	104

Source: Calculated from Table 5.4, 5.5 and 5.6.

times this price fall below the cost of production, especially immediately after harvest. Growers have a shortage of money, so are they selling bulk of the volume instantly after harvest for repayment of loan, purchasing of input. As a result, they could not get higher price despite that the price increases in the latter period. Some news from the dailies suggested this is true for all over Bangladesh . Even in some areas growers are forced to sell paddy lower than the market price, because of the hard agreement of informal credit in *boro* season. Growers need more cash for *boro*, since it is a capital-intensive product.

On the other hand, it is exhibited in the Tables that *aman* could give positive

returns to growers. It could be because that the price of all types of paddy (coarse, medium, and fine) is included for analysis. Generally, grower produces coarse, medium, and fine type of paddy in this season. Price of medium and fine paddy prevail much higher from coarse paddy therefore the inclusion of all prices should have resulted positive margins to growers. These margins could have been much higher if growers could store paddy. They might have earned positive margins even from *boro* paddy, if they could store *boro*. But the reality is that growers have limited scope of storing paddy in Bangladesh.

5.3.2 Profit Margins of Rice Millers

Three types of rice mills are available in Bangladesh: husky, major, and automatic. The per-hour milling capacity of these mills is <1 ton, $>= 1$ but $<$ 2 ton and $>= 2$ ton, respectively. This paper hereafter refers to them as small, medium, and large mills, respectively. Medium-type mills were not found in the study area; therefore this analysis was confined to small and large rice mills. Three hundred and five (305) small and 2 large rice mills operate in the Sherpur district. For this investigation, 27 mill owners were interviewed in the year 2000 during February and March. On the one hand, 25 small mills were chosen randomly. On the other, the 2 large mills operating in the research area were both interviewed.

The goal of an entrepreneur is to obtain a reasonable profit margin from a business. However, it was difficult to collect business data, especially from those who avoided giving us access to this information. During interviews, the responses of millers led us to assume that rice milling is not a profitable business. In these scenarios, we computed the break-even selling price (BP) of millers by employing the formula presented below. The uniqueness of the method is that it considers the value of the by-products, which the millers often sell in the market for cash. This is an income received by the millers and could influence its margin. So the value of the by-products must be calculated to analyze the margin of the millers, and therefore the concept would be appropriate here. A miller's margin was estimated by deducting BP from the net selling price (NSP). The NSP was computed by deducting the transportation cost (TC) and commission agent cost (C) from the average selling price (SP) of rice. This was done by using the information obtained from the respondents. Thus the possibility of overestimating costs was eliminated from the analysis. We could not collect the seasonal selling price of rice because of the reluctance of the respondents; therefore the average selling price was used in this analysis. Although this price might have some limitations on predicting the millers' profit margins, the result will provide a rough idea on the margin that millers could obtain from the rice-milling business in Bangladesh.

Shepherd [1993] subtracted the value of by-products from the summation of purchase price and processing cost to estimate the break-even selling price. Notwithstanding, in our study we modified the formula by adding up the transpor-

tation cost and commission. This modification is based on millers in Bangladesh not only processing paddy, but also selling the processed rice to distant wholesalers and rice assemblers. So the millers must bear the transportation costs as well as the commissions of *aratdars* (commissioned agents who levy fixed commissions on sellers and buyers alike) when selling rice through them. Therefore the incorporation of transportation costs and commission of the intermediaries would be worthwhile in an estimation of the break-even selling price. If BP > NSP, it is an unprofitable business, if BP = NSP, there is no profit margin, and if BP < NSP, rice milling is a profitable business. The following formula was employed to estimate the break-even selling price and profit margin of the millers for 1 kg of rice by variety.

$$\mathbf{BP=[\{(PP+PC)-VBP\}*1.58]+TC+C} \quad \textbf{(5.4)}$$

Where BP=Break-even selling price PP=Paddy purchase price
PC=Processing costs TC =Transport cost of selling
C=Commission of aratdar
VBP=Value of by−products (Value of rice bran+Value of broken rice)
Value of rice bran=Price of 1 kg of rice bran multiplied by the conversion ratio
Value of broken rice=Price of 1 kg of broken rice multiplied by the conversion ratio
1.58=Conversion ratio (1.58 kg of paddy is required to produce 1 kg of rice)

Note that the FAO assumed 66 percent milling out-turn, but in this case the milling out-turn of small millers was 63 percent; thus the conversion ratio stands at 1.58.

$$\mathbf{M=NSP-BP} \quad \textbf{(5.5)}$$

Where M=Margin of the miller NSP=Net selling price of rice

In rural areas, rice bran and broken rice are used for feeding fish, poultry, and livestock, and the rice husk is used as an alternative source of fuel. Some bulk of the husk is used for steaming paddy in the mills, but the remaining husk and all the bran and broken rice are usually sold in the market. The appropriate volume of sold husk was difficult to quantify. Subsequently its value was excluded from the computation of the total value of by-products. Because the large millers were reluctant to cooperate, necessary information was obtained from the sample small millers to estimate the break-even selling price. Millers informed us that a 52 kg bag of bran was sold at Tk 40 (0.77 Tk/kg), and an 80 kg bag of broken rice was sold at Tk 210 (2.63 Tk/kg) at the time of interview. Thus the per kg aggregate value of the by-products after multiplication by their recovery ratios was estimated to be Tk 0.23. The recovery ratios of small mills were 63.0, 17.5, 15.0, and 4.5 percent for head rice, husk, rice bran, and broken rice, respectively. And for large mills, these were 66.0, 15.5, 14.3, and 4.2 percent, respectively.

Some methodological expressions of Table 5.8 are important to note. The millers stated that they purchase 80 kg bags of paddy from the suppliers. But according to some suppliers, generally, a supplier in the study area must usually supply an 81 kg bag of paddy to the millers instead of the normal 80 kg bag, receiving no pay for the extra kg. They call this procedure *Dhalta*. This practice was cross-checked with other millers, and they confirmed it. Therefore the purchase price of paddy was divided by 81 kg to estimate the 1 kg price of paddy. For other variables, the standard measurement of the research area (80 kg) was followed to estimate the costs and margin for 1 kg of rice. The purchase price of paddy includes transportation cost, commission of the supplier, and loading charge. The data of *boro* paddy was used in Table 5.8 and the analysis revealed that the millers had sold all varieties at higher values than the break-even selling price; their average profit margin was Tk 0.12/kg, oscillating from Tk 0.10 to Tk. 0.16, depending on varieties. BR-14 registered the highest margin and BR-26 the lowest. These margins are higher compared with the findings of Baulch et al. (1997) and Rahman (1998). The reason for our higher margin is because we included the value of by-products that the other studies have failed to recognize. Table 5.9 shows monthly profit margins of rice millers. It was estimated by multiplying the average profit margins/ton (Tk 120) with the monthly transaction of rice. The Table shows that the profit margins of millers vary from Tk 4,752 to 9,156. The average profit margins of millers are Tk 7,305.

Table 5.8. Average Costs, Break-even Selling Price, and Margin Obtained by All the Sample Small Millers from 1 Kg of Paddy & Rice by Variety

Items	BR-3** (Coarse)	BR-14** (Coarse)	BR-28** (Coarse)	BR-26** (Coarse)	All
1. Total Purchase Price of Paddy (Tk.)	6.42	6.67	6.41	6.17	6.42
2. Processing Cost of Paddy (Tk.)	0.49	0.49	0.49	0.49	0.49
3. By-product Value of Paddy(Tk.)	0.23	0.23	0.23	0.23	0.23
4. Net Purchase Price [(1+2)-3] Tk.	6.68	6.93	6.67	6.43	6.68
5. Net Price of Rice (4 * 1.58) Tk.	10.55	10.95	10.54	10.16	10.55
6. Transportation Cost (selling) Tk.	0.46	0.46	0.46	0.46	0.46
7. Commission (selling) Tk.	0.13	0.13	0.13	0.13	0.13
8. Break-even Selling Price (5+6+7) Tk.	11.14	11.54	11.13	10.75	11.14
9. Net Selling Price (Tk.)	11.25	11.70	11.25	10.85	11.26
10.Margin (9-8) Tk.	0.11	0.16	0.12	0.10	0.12

Note: **BR 3, BR-28 and BR-26 are the name of varieties those cultivated in boro and aus season.
Source: Field Survey, February-March, 2000.

Table 5.9. Monthly Income of Rice Millers in the Study Area

	May	June	July	August	Avarage
Transaction(ton)	54	76	74	40	61
Profit Margin/ton	120	120	120	120	120
Net Return	6,492	9,156	8,820	4,752	7,305

Sourse: Transaction was estimated from Figure 4.7 and Profit margin was estimated from Table 5.8.

Also, millers' margins can vary depending on the volume of transaction and profit margins by variety.

5.3.3 Profit Margins of Rice Wholesaler-cum-*Aratdar*

There are many wholesaler-cum-*aratdars* functioning in Bangladesh. They are scattered all over the country. As stated in Chapter IV that data of wholesalers were not collected from all over the country due to time constraints and other factors. Dhaka was chosen for sampling for the study because it is the main transit of rice distribution to all over the country. There are several numbers of wholesale markets in the Dhaka City and nearby areas. Major portions of processed rice after processing in the rice mills come to different wholesale markets of Dhaka for distribution to other wholesale markets of Bangladesh, and retailers of Dhaka and urban areas. So 18 sample respondents were interviewed from three wholesale markets of Dhaka for this study.

It is generally difficult to get data from these intermediaries by item. However, attempts were made to convince them to get reliable data for analysis. Data were collected in two stages. Firstly average data on rice purchase and selling, costs of business transaction etc were collected from all respondents, and secondly, some details information on seasonality of rice transaction, strategy of wholesale and *aratdar* business were collected from a sample respondent for computing profit margins of wholesaler-cum-*aratdar*. The analysis is therefore done in two stages to grasp the nature of profit margins of these rice traders. Though the sample respondents do not represent the country as a whole, nevertheless the result would provide some ideas on the profit margins of wholesalers cum *aratdar* in the research area. It could have been worthwhile if data of wholesale and *aratdar* business were collected. But reliable data of wholesale business, especially on the purchase price and selling price of rice were difficult to collect, so the profit margins of *aratdar* are calculated in this section.

Table 5.10 shows average costs per ton of wholesaler-cum-*aratdar*. It is suggested in the Table that the traders bear less cost when they are commission agents. They are not responsible for transportation and labor costs in this case. As commission agents', the main costs of traders are salary of permanent staffs (45.2%) and rent of the premise (41.7%). The transaction cost of a ton of rice calculated for *aratdar*'s is Tk 92.5.

Table 5.11 presents profit margins of *aratdar* (commission agents). The Table shows data of 18 wholesaler-cum-*aratdars*. On average traders' levy

Table 5.10. Average Costs (per ton) of Wholesaler-cum-*Aratdar* in Bangladesh

Particulars	Rent (Tk)	Telephone (Tk)	Electricity (Tk)	Salary (Tk)	Donation (Tk)	Tax (Tk)	License (Tk)	Total Transaction Cost(Tk)
	A	B	C	D	E	F	G	H=A+B+C+D+E+G
As *Aratdar*	38.6	5.3	3.9	41.8	0.5	2.2	0.2	92.5
Percentage	41.7	5.7	4.2	45.2	0.5	2.4	0.2	100.0

Source: Field Survey, February-March, 2000.

Table 5.11. Return of Wholesale-cum-Aratdar in Bangladesh

	Commission (Tk/ton)	Transaction Cost (Tk/ton)	Net Return (Tk/ton)	Monthly Average Sales (ton)	Monthly Net Return (Tk)
	A	B	C=A-B	D	E=C * D
As *Aratdar*	130	92.5	37.5	192.2	7,206

Note: Figure within parentheses indicate rante.
Source: Table 5.10 and Field Survey, February-March, 2000.

Table 5.12. Monthly Costs and Returns of a Wholesaler-cum-*Aratdar*

Role As	Particulars	Tk/ton	January (Tk)	February (Tk)	March (Tk)	April (Tk)	May (Tk)	June (Tk)	July (Tk)	Average (Tk)
	Transaction (ton)	-	134.0	129.0	97.0	90.0	97.0	91.0	104.0	106.0
Aratdar	Costs	92.5	12,395	11,933	8,973	8,325	8,973	8,418	9,620	9,805
	Commission	150.0	20,100	19,350	14,550	13,500	14,550	13,650	15,600	15,900
	Net Return	57.5	7,705	7,418	5,578	5,175	5,578	5,233	5,980	6,095

Source: Calculated from Table 5.10, and monthly transaction obtained from wholesaler cum aratdar during the interview.

commission both on rice miller and retailer at the rate Tk 65/ton. The aggregated commission is Tk 130/ton. Gross cost of transaction is Tk 92.5/ton. Net return after deducting from gross cost is Tk 37.5/ton. Multiplying net return with average sell 192.2 tons/month total net return of *aratdars* is Tk 7,206. However, total net return can be varied from Tk 3,375 to Tk 13,500.

Table 5.12 shows monthly net return of a wholesaler-cum-*aratdar* in 2000. Information was collected from one of the respondents. This respondent was very helpful during interview. As per request he sent the author some required information by surface mail. After receiving data in hand the author called the trader from Sapporo to Dhaka for some more information in the month of April 2001. The conversation was lasted for 70 minutes. During interview the respondent informed that there are some commission agents who levy different commissions for different varieties. According to him, the commission for coarse and medium rice is Tk 150/ton, and for fine rice is Tk 250/ton. Because of the variation of supply, they levy different commissions. The supply of coarse and medium rice is more than the supply of the fine rice, so the commission of coarse and medium rice is less than the commission of the fine rice. Because of inadequate data of fine rice, monthly profit of the wholesaler is estimated for coarse rice. Table 5.12 shows monthly net return of a wholesaler-cum-*aratdar* in the year of 2000. The calculated monthly income of *aratdar* varies from Tk 5,175 to 7,705. The average profit margin is Tk 6,095.

5.4 Growers Potential for Profit

In the preceding section, it was observed that the profitability of growers compared to the rice millers and wholesalers is low. The return from *boro* is negative. In this section, how benefit could be rendered to growers would be discussed. This approach is developed on the information obtained from some of the growers who are the members of the Crop Storage Credit Program (SHOGOR-

IP) in Dinajpur district of Bangladesh. This program is functioning only in some specified areas in the country. The aim of the program is to strength the marketing facilities of the small and medium growers up to 2.02 ha of cultivating land. These groups are supported with institutional credit for paddy, wheat, mustard, lentil, sesame, linseed etc. Growers are eligible to receive credit equivalent to 80 to 90% of the pre-defined purchase price (here procurement price) or market price that applied for the crop stored. According to the condition of the credit program, growers can receive 80 to 90% credit of the procurement price (because procurement price is the governments purchase price of paddy and wheat) for paddy and wheat.

On the basis of the credit disbursing rule of the program and information obtained from the growers under the program, showed that the growers could benefit more for storing paddy. Tables show that growers could benefit, if they could store 20 to 40% of paddy for 4 to 6 months. The benefit could be more to growers, if they were supplied credit at the market price, the storing period is about 6 months, and the interest rate of credit is 12% or less (Tables 5.13 and 5.14).

Procurement price and market price of *boro* were considered Tk. 320/*maund* (Tk 8,576/ton) and Tk 228/*maund* (Tk 6,110/ton), respectively. Paddy prices were Tk 300/*maund* and Tk 400/*maund* after 4 and 6 months of the harvesting period, respectively in the research area. The unit acre and *maund* are considered for analysis. It is noted that 1 acre=0.4084 hectare and 1 *maund* assumed 37.5 kg. The analysis is done for *boro* paddy on the assumption of yield 50 *maund* per acre or 4.6 ton per hectare. Details of the analysis are shown in Tables 5.13 and 5.14.

6. Conclusion

Rice sector is contributing significantly to GDP and employment in the country. Government has been trying to render benefit to growers through support price, but all of the procurement strategies have failed to provide direct support to growers. Growers have been deprived of getting direct support from the support price because of several conditions imposed by the local procurement depots on growers during the procurement period for which government could not buy paddy directly from growers. Rather paddy assemblers who have good understanding with depot officers take the benefit of the support price. This situation needs to be improved.

The foregoing analysis suggested that growers are able to get reasonable share of retail (consumer) price both from *aman* and *boro* paddy. The profit margin analysis showed that growers could benefit from producing *aman* paddy, while the return from *boro* is negative for them. This is a major concern because production of *boro* is increasing nowadays. No doubt that the increased production of rice will reduce the country's dependency on imports, but the negative

Table 5.13. Income Differences of Growers, if Paddy is Stored for 4-months after the Harvesting under different Conditions and different Interest Rates

	Conditions	Particulars		At 12% Interest Rate				At 15% Interest Rate				At 20% Interest Rate			
			If 100% is Sold *IAH	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter
Assumption	If Credit is	1. Income (Tk)	15,764												
A. Production 4.3	Disbursed at	2. Income for Selling	-	17,673	17,195	16,718	16,241	17,673	17,195	16,718	16,241	17,673	17,195	16,718	16,241
ton for 1 hectare	Procurement	after 4-months (Tk)													
B. 2.58 (60%) tonPrice		3. Income difference (2-1) Tk	-	1,909	1,431	954	477	1,909	1,431	954	477	1,909	1,431	954	477
available for sell															
		4. Cost of Loan (Tk)	-	674	447	337	169	743	557	372	186	857	643	429	264
C. Harvest Price		5. Gain (3-4) Tk	-	1,235	984	617	309	1,166	874	583	291	1,052	788	525	213
Tk 6110/ton															
D. Paddy Price															
Tk 8040/ton after															
4 months															
E. Prcourement															
Price Tk 8576/ton															
F. 3% storage loss															
G. Storage Cost															
Tk 100/ton/month															
H. Loan Disbursed@															
80% of the															
Procurement Price															
	If Credit is	1. Income (Tk)	15,764												
A. Production 4.3	Disbursed at	2. Income for Selling	-	17,673	17,195	16,718	16,241	17,673	17,195	16,718	16,241	17,673	17,195	16,718	16,241
ton for 1 hectare	Market Price	after 4-months (Tk)													
B. 2.58 (60%)		3. Income difference (2-1) Tk	-	1,909	1,431	954	477	1,909	1,431	954	477	1,909	1,431	954	477
available for sell															
		4. Cost of Loan (Tk)	-	596	371	298	149	644	483	322	161	726	544	363	181
C. Harvest Price		5. Gain (3-4) Tk	-	1,314	1,060	656	328	1,265	948	632	316	1,183	887	591	296
Tk 6	110/ton														
D. Paddy Price															
Tk 8	040/ton after														
4 months															
E. 3% storage loss															
F. Storage Cost															
Tk 100/ton/month															
G. Loan Disbursed@															
80% of the Market															
Price															

Note: i) *IAH=Immediately after the harvest.
Source: Estimated by authors on the basis of the average market price of paddy immediately after the harvest, and 4 months after the harvest.

Table 5.14. Income Differences of Growers if Paddy is Stored for 6-months after the Harvesting under different Conditions and different Interest Rates

				At 12% Interest Rate				At 15% Interest Rate				At 20% Interest Rate			
	Conditions	Particulars	If 100% is Sold *IAH	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter	40% Stored and Selling Latter	30% Stored and Selling Latter	20% Stored and Selling Latter	10% Stored and Selling Latter
Assumption	If Credit is	1. Income (Tk)	15,764												
	Disbursed at	2. Income for Selling	-	20,355	19,207	18,060	16,912	20,355	19,207	18,060	16,912	20,355	19,207	18,060	16,912
A. Production 4.3	Procurement	after 6-months (Tk)													
ton for 1 hectare	Price	3. Income difference (2-1) Tk	-	4,591	3,443	2,296	1,148	4,414	3,311	2,207	1,103	4,414	3,311	2,207	1,103
B. 2.58 (60%) ton															
available for sell		4. Cost of Loan (Tk)	-	1,012	759	506	253	1,115	836	557	279	1,286	965	643	322
		5. Gain (3-4) Tk	-	3,579	2,684	1,790	895	3,299	2,475	1,650	24	3,128	2,346	1,564	781
C. Harvest Price															
Tk 6	110/ton														
D. Paddy Price															
Tk 10	720/ton after														
6 months															
E. Prcourement															
Price Tk 8	576/ton														
F. 3% storage loss															
G. Storage Cost															
Tk 100/ton/month															
H. Loan Disbursed@															
80% of the															
Procurement Price															
A. Production 4.3	If Credit is	1. Income (Tk)	15,764												
ton for 1 hectare	Disbursed at	2. Income for Selling	-	20,355	19,207	18,060	16,912	20,355	19,207	18,060	16,912	20,355	19,207	18,060	16,912
B. 2.58 (60%)	Market Price	after 6-months (Tk)													
available for sell		3. Income difference (2-1) Tk	-	4,591	3,443	2,296	1,148	4,414	3,311	2,207	1,103	4,414	3,311	2,207	1,103
C. Harvest Price		4. Cost of Loan (Tk)	-	893	670	447	223	967	725	483	242	1,089	817	544	272
Tk 6110/ton		5. Gain (3-4) Tk	-	3,698	2,773	1,849	925	3,447	2,586	1,724	861	3,325	2,494	1,663	831
D. Paddy Price															
Tk 10	720/ton after														
6 months															
E. 3% storage loss															
F. Storage Cost															
Tk 100/ton/month															
G. Loan Disbursed@															
80% of the Market															
Price															

Note: i) *IAH=Immediately after the harvest.

Source: Estimated by authors on the basis of the average market price of paddy immediately after the harvest, and 6 months after the harvest.

return of growers might jeopardize the self-sufficiency in rice. Growers have little scope of netting a reasonable profit because they handle too small a volume of paddy. They have little option to compensate a loss of the negative return from produce. They would earn more and would compensate the negative return from *boro* if they could store paddy for certain periods. Unfortunately, they could not. They are forced to sell paddy at even less than the cost of production because they need immediate cash in hand for purchasing agricultural inputs, repayment of loans, etc. Therefore, giving a good return to growers on their production is an important area that should be reviewed carefully.

Though the effect of credit (both formal and informal) was not analyzed in this study, it is understood that the cost of informal credit should have influenced on the return of the growers. Because the growers have shortage of capital, which is not enough for crop cultivation, so they need more capital for land operation. It was observed in this study that because of various problems, growers' face difficulties to get credit from an institutional source in the research areas. Informal sources are the main sources of capital for the poor growers. Understanding the difficulties of getting an institutional credit growers accept the informal credit even though the conditions of informal credit is very hard. An informal source knows how difficult it is for a poor grower to get credit from an institutional source. So a majajan takes the advantage of this situation, and exploits the growers by imposing different conditions and high interest rate of loan. As a result, instead of getting the advantage of borrowed capital growers suffer seriously for accepting credit from the informal sources. They found themselves within a vicious circle of informal credit. Therefore, proper care must be taken on the availability of credit to the growers. Institutional credit must be made easily available to growers.

Paddy assemblers, rice millers and wholesalers are important members of the marketing channel. Not only do they bridge the gap from growers to consumers, they also provide a lot of employment to rural population. Rice millers and wholesaler-cum-*aratdar* were observed benefiting from rice trading. In terms of earning profit, these two parties are in better position than the growers. Even though the per unit profit margins decline, they are able to profit reasonably from the rice trading by trading in bulk. However, considering the importance of rice millers, wholesalers and other paddy assemblers in the marketing channel, it wouldn't be worthwhile to go for bulk change of the channel or to eliminate some of the groups from the channel in this context. We should look for alternative options of giving benefits to growers.

Therefore considering the importance of the growers in the paddy/rice marketing channel, it is suggested that credit for paddy will allow the growers to buy other necessities, or to repay loans. The cash flow could curtail the need to sell paddy immediately after the harvest. However, the credit should be made available only to those who are forced to sell produce because of cash need and

storage problems. It is important to note that the informal credit facilities in this regard will not bring benefits to growers because of the very high interest rates of the credit and the harsh repayment conditions. Furthermore, the analysis showed that the growers potential for profit of storing paddy increases when the rate of interest of credit is at less. Potentiality for profit declines when the rate of interest of credit increases. This was the case we found for wholesalers. Though the interest of informal credit was not considered in sensitivity analysis, it is obvious that the growers potential for profit by holding paddy must decline if they received credit from the informal sources. The reality is that a significant number of growers are compelled to accept the informal credit because of the inefficient management and distribution of institutional credit to those who need it. So, to give benefits to the growers, and to encourage them to reject and break the vicious circle of the informal credit, it is suggested that the specialized or commercial government bank, cooperatives, and NGOs must come forward and work efficiently in order to give benefit to the growers and thus helping them to improve their socio-economic conditions. Of course, proper care must be given in selection procedure. Actual growers, who needs storage credit for crop, must be given preference in this case. The purpose of the credit program might go astray, if proper selection procedures (of growers) are not followed.

Note

1. *Aman* paddy is from where to where from July to September and harvested between November and January. A traditional variety of *aman* paddy that is called Broadcast *aman* is sown between March and April and is harvested between November and December. *Boro* paddy (local *boro*) is transplanted from the middle of November to the middle of January, and harvested from April to May while the HYV *boro* (*boro*) paddy is transplanted from January to the middle of February, and harvested from the middle of May to June. *Aus* paddy is transplanted between the middle of March and the middle of May, and harvested between July and August.
2. Political administrative unit. division is the highest political administrative unit followed by district, upazaila/thana, union and village
3. Mears (1981) used the following formula:

$$Ch = [\{Pfo(r_s + r_i)\}/12] + S$$

Where:

Ch = monthly cost of holding paddy

Pfo = farm gate prices of paddy per kg (price received by growers) during base month, where base month is the low price month during harvest season.

r_s = rate of loss in storage per year.

r_i = interest rate per year

s = storage cost of paddy Rp/kg/month

4. These are the traditional storage devices growers use to store paddy or rice in the village areas of Bangladesh. For details see Zaman et al (2000) Islam et al (1987).
5. Taka (Tk.) is the currency of Bangladesh.

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Summary

Both macro and micro data was used in this research to fulfill the objectives. Macro data was considered for Chapter 2 and Chapter 3 while field data were used for Chapter 4 and Chapter 5.

The macro data analysis in chapter 2 showed that the growers could not earn profits of the procurement and price support policy in Bangladesh since the inception of these policies. Growers' rate of return was very poor in the procurement program because of non-payment of cash, long waiting hour, below payment, malpractice of the depots officers, etc. As a result, growers did not participate in the procurement program, so they were deprived of the benefit from the price support policy. Growers have been deprived of getting direct support from the support price because of several conditions imposed by the local procurement depots on growers during the procurement period for which government could not buy paddy directly from the growers. But, the paddy assemblers who have a good understanding with depot officers taking the benefit of the support price. In the third chapter, we have discussed the stabilization of paddy and rice prices at the growers and consumers level. Also, the potentiality for profit from holding paddy and rice were discussed to know the scope of giving benefit to the growers and traders as well.

In chapter 3, the long-term movement of domestic rice prices has showed that the rice prices have increased from 1989/90 to 1999/00. However, the increase has been irregular. Seasonality of high and low periods has been changed in the 90s compared to the 70s and 80s. The popularity of high yielding varieties (HYVs) in the 90s might have influenced the timing of high and low seasonality of prices. The seasonality of paddy and rice prices was not the same. The difference reflects the processing and transport time from rural to urban areas. The intra-year price range of paddy is considerably higher than the retail rice price. This is explained by the fact that growers cannot regulate supply and demand, and must sell most of the paddy at the harvest time because of storage and financial difficulties. The comparatively small range in retail rice price fluctuations reflects the degree of concern the government has to satisfy politically important urban areas. The potential for profit of growers and wholesalers analysis showed that the growers potential for profit from storing paddy is higher than the potential for profit of wholesalers. However, in chapter 4 we analyzed the characteristics of the growers and other intermediaries of the paddy/rice marketing channel in Bangladesh. The discussion would help us to know the behavior of the members of the marketing channel. It is an important area that needs to be discussed prior to setting further guidelines to support the growers of Bangladesh.

Field data was used in chapter 4 to identify the characteristics of the growers, rice millers, rice wholesalers and paddy assemblers of the surveyed areas. It was identified in the analysis that the growers' ability to store paddy is very poor. They sell a major portion of the paddy within a short period of the harvesting time because of cash need for repayment of loans, input purchases, and storage problems. So they could not take the opportunity of high prices. Also, they need to re-purchase paddy when they have no more of their own paddy. The re-purchase price of paddy was higher than the selling price. Growers also face problems of getting institutional credit, so they accept the non-institutional credit even though the repayment condition is very hard and the interest rate was very high. They were found stuck within the vicious circle of informal credit.

Paddy assemblers and rice millers have been playing important role in the paddy/rice trading. Paddy assemblers bridge the gap between the growers and the millers while the millers bridge the gap between the growers and the rice wholesalers and consumers, and also between the paddy assemblers and wholesalers. Also, the paddy assemblers and rice millers create employment opportunities to the rural residents. Rice wholesalers are also the important members of the marketing channel. They act between the rice millers and the retailers. They also play the role of commission agents. In return to the service as commission agent they levy commission to millers and retailers. They also provide permanent and temporary employment opportunities to the unemployed persons.

The field data analysis identified that both growers and intermediaries are the important members of the paddy/rice marketing channels. The contribution of paddy assemblers, rice millers and wholesalers cannot be ignored even though the growers are the most important members of the channel. Considering the importance of growers and other traders of the channel we further have extended our analysis to chapter 5, where the marketing margins, profit margins of growers, rice millers and wholesalers were discussed.

The marketing margins, share and profit margins analysis in Chapter 5 showed that growers get a reasonable share of the consumers' price for producing *aman* and *boro* paddy. They also get a positive return for producing *aman* paddy, however, their return from *boro* paddy was negative. Rice millers and wholesalers on the other hand, were in a better off condition in terms of maintaining reasonable profit margins from rice trading than to the growers. Even though the per unit margins decline for millers and wholesalers, they are able to net reasonable return from rice trading as they transact large volumes of paddy and rice. However, growers cannot earn reasonable profits because they have little in hand to sell. Moreover, generally, they sell bulk of the volume after the harvest due to cash need and storage problems, when the market price of paddy is very low. It was observed that growers could increase benefit from *boro* paddy trading, if they could store for certain periods.