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NATIONAL SECURITY STOCKS FOR BANGLADESH

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I OVERVIEW

Bangladesh has recently put together a quite positive, if not an overly impressive, performance in terms of production growth rates (Table 1), fluctuations (Fig.1), yield growth (Figs. 2 and 3). Foodgrain availability per capita has had a clearly upward trend (Fig. 4), even as the trend of dependancy on foodgrain imports has been clearly pointing downwards (Fig. 5).[1] Although at least 35 million people in Bangladesh remain underfed, recent evidence points to perceptible improvement in nutritional status of the poor over the past five years (Haggblade, 1994, p. 1, citing other primary sources). The public foodgrain distribution system (PFDS) has been reoriented: as compared with a decade ago, what will be called targeted food distribution channels account for nearly twice as much of total PFDS in the first three years of 1990s. In absolute terms, targeted total distribution (rice plus wheat) averaged 66,000 metric tons (MT) in the three years to 1992/93. It is in this setting that this paper looks at Bangladesh's requirement of security stock.

By security stocks is meant what it takes to stave off starvation, possibly death, due to disaster aftershocks.[2] To use security stocks to also include what stocks it takes to keep up and running the targeted interventions period after period would leave something to be desired. This is because "safety netting" is part of the general rubric of poverty-alleviation programs, and is undoubtedly important. But chronic malnutrition --- the client of safetynetting or targeting --- may, ironically, be less harsh than an utter collapse of survival chances that particularly severe natural calamities, at any rate during their immediate aftermath, may well imply. Hence the differences between the two are real. Stock rrequirements stemming from them should therefore be separated.

This paper is structured as follows: In the section II, we introduce the concept of security stocks in terms of a classification of various types of stocks that may be mandated

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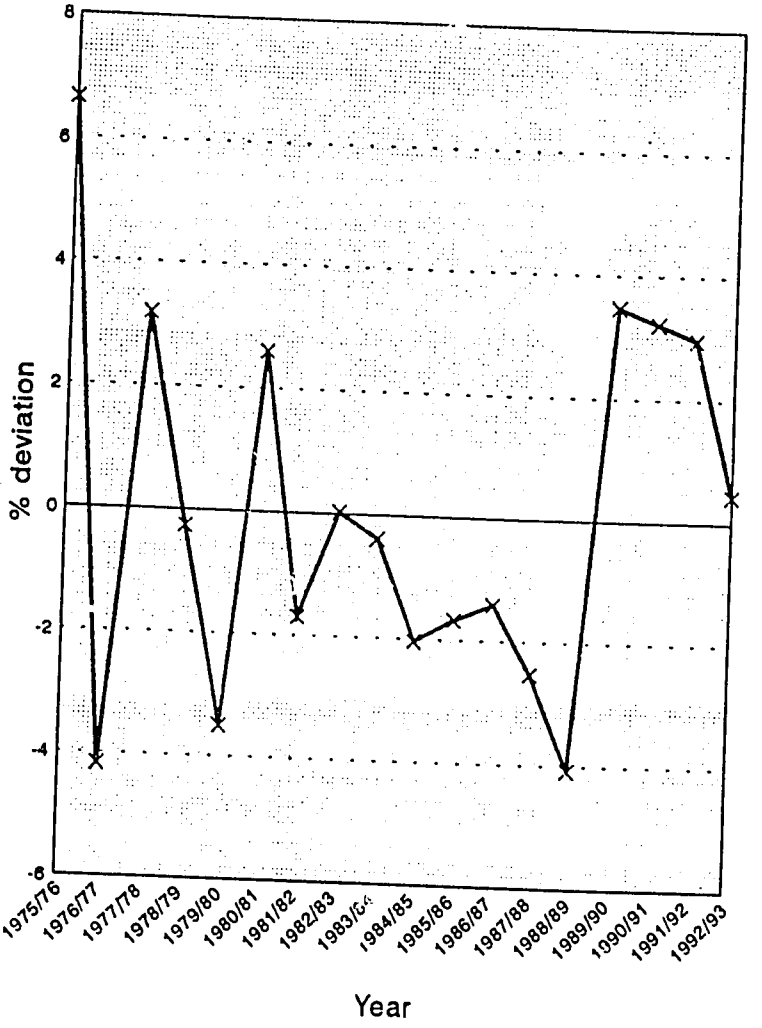
[1]The country does still remain dependent on foodgrain imports, very largely sourced from international food donations, but some indemiable improvement in performance is in evidence.

[2]This is how World Bank looks at this problem in 1979.

Fig.1 - % deviation from trend of Production of All season
(1975/76-1992/93)



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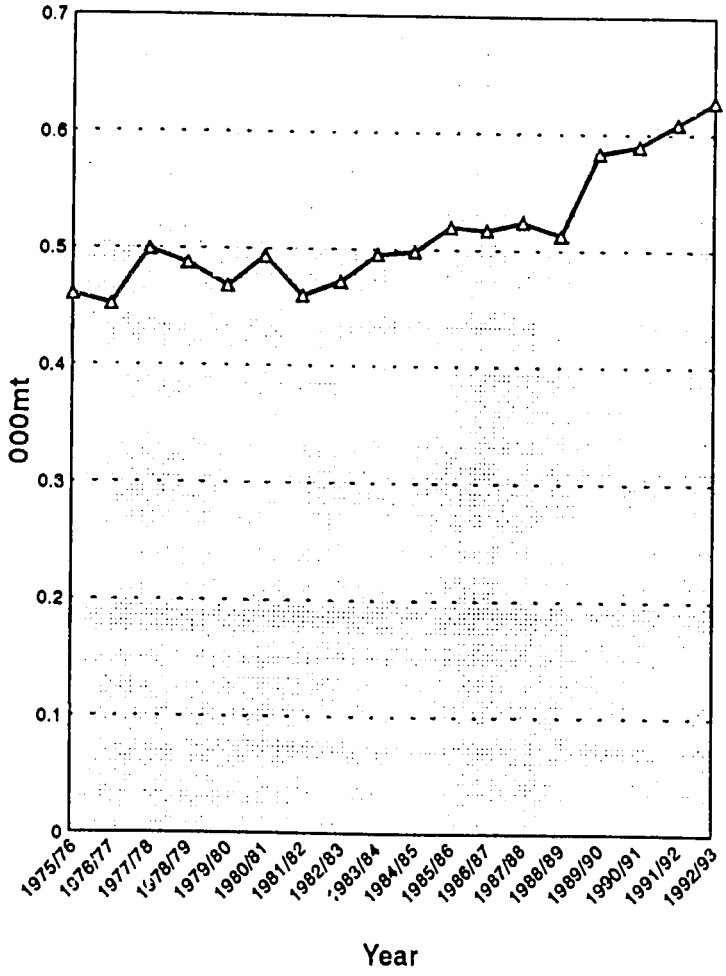
by Food policy. Also in this section are introduced various factors that help determine the security stock requirements. Section III looks at the evolving foodgrain production system, especially in terms of the ingredients of what is termed a resurgence of resilience against random shocks. Against a background of shift of perceptions, we here argue that, given the evolution of the production system, there is a case for rethinking the configuration of security stocks that appears to me implicit in official policy. A position is put forward for debate. Section IV presents a summary of major conclusions of the paper,

Figure 2 - Kharif Season yield rate

(1975/76-1992/93)



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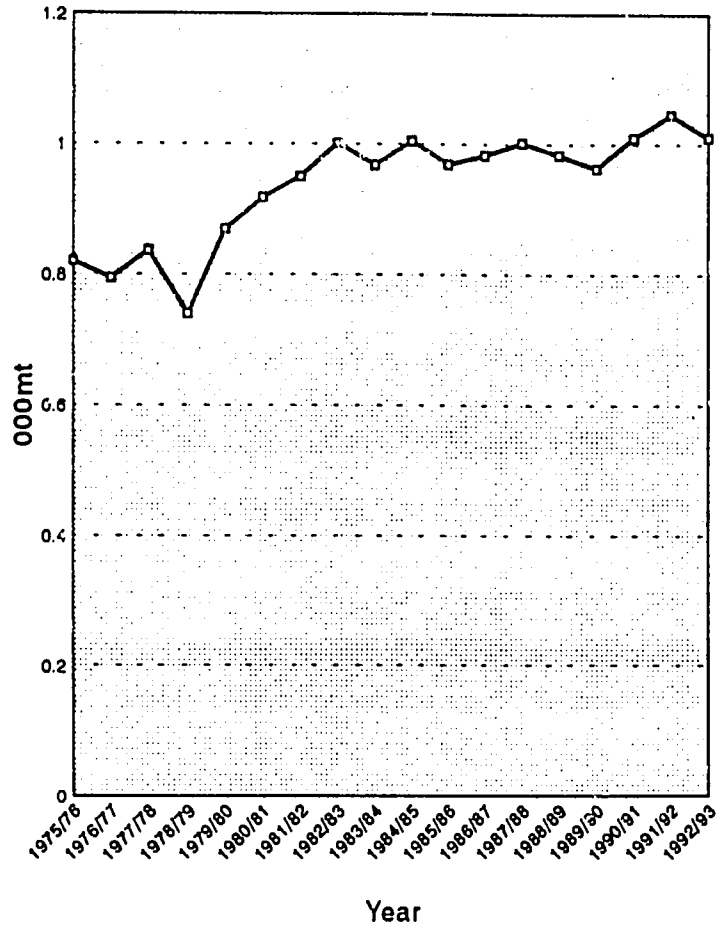
II THE CONCEPT OF SECURITY STOCKS

The need for any storage arises because, while production of any agricultural commodity is almost always seasonal, its consumption is a more continuous activity. Also, producers and consumers are separated by distances too, and this necessitates a measure of storage. The need for public as distinct from private, storage arises because private discount rates, storage and information costs, to name the two of the more important factors, may be different from their social values, thus preventing private sector from the socially optimum quantity of storage. This need applies to both developed as well as the developing economies. Additionally, governments of developing countries, in search of both greater equity and efficiency than would be allowed by leaving markets to their own devices, may decide to intervene in foodgrain markets. To the extent that these interventions deliver on their equity rationale, they entail the need to carry some stocks for being effective. Security stocks are one of four types of stocks usually thus rationalized. The others are (i) stocks that owe themselves to the compulsion of keeping in place routine public foodgrain distribution; (ii) stocks that are meant to allow price stabilizing operations at the time and on the scale and grain composition warranted; and (iii) working stocks, i.e. stocks that have to be retained to tide consumers over the brief period between the end of statistical crop year and the time when the new crop is actually available for consumption, as well as stocks held for protection against transport and marketing risks per se.

Changing Foodgrain Production System

It is common knowledge that since about 1986/87, cereal production growth rate accelerated (Table 1): from 2.1% per year in the decade to 1985/86, growth rate rose to 3.5% per year in the period since. Matched numbers for foodgrain sector overall are 2.4% and 3.5%. According to Chow test, growth rate in the second period is significantly higher. Annual variability in both rice and foodgrain production, too, has fallen in the second period (Table 1). And finally, the source of additional output in the second period is different: while growth rate of rabi season rice production has remained about the same in both periods, the growth rate for *kharif* season is twice as high in the second period. To secure a pick-up in the output growth rate in the typically sluggish kharif season had always seemed like a landmark achievement in prospect. Rice economy has edged closer

Figure 3 - Boro Season yield rate
(1975/76-1992/93)



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to that goal. Private stocks at the end of October have thus increase during this period. And this implies that private sector security stocks can provide cover against a major crop loss during aman season.

Foodgrain-sector commercialization

Bangladesh's foodgrain economy has spawned a noteably rapid degree of commercialization. From about 15% of rice output in the late 1960s, marketed surplus has reached over a half of output in the early 1990s (Chowdhury, 1994a, Table 3; Table 7 below). The size of the rice market is estimated to grow at a trend rate of about 6% or so during 1978/79 to 1992/93 (Chowdhury 1994b, Table 1). The underlying estimate of the responsiveness of marketed supply with respect to production of 1.9 jells reasonably well with other, cross-sectional estimates (Chowdhury et al. 1992). Such rapid commercialization underwrites foodgrain security for households relying on the market in ways that did not exist in the 1970s. All this is marketed all over the densely-populated chains all over the country, with lean inventories in the trade being the norm. Rice's national markets embrace virtually all regions in the country, including those with high exposure to natural disasters, in their chains.

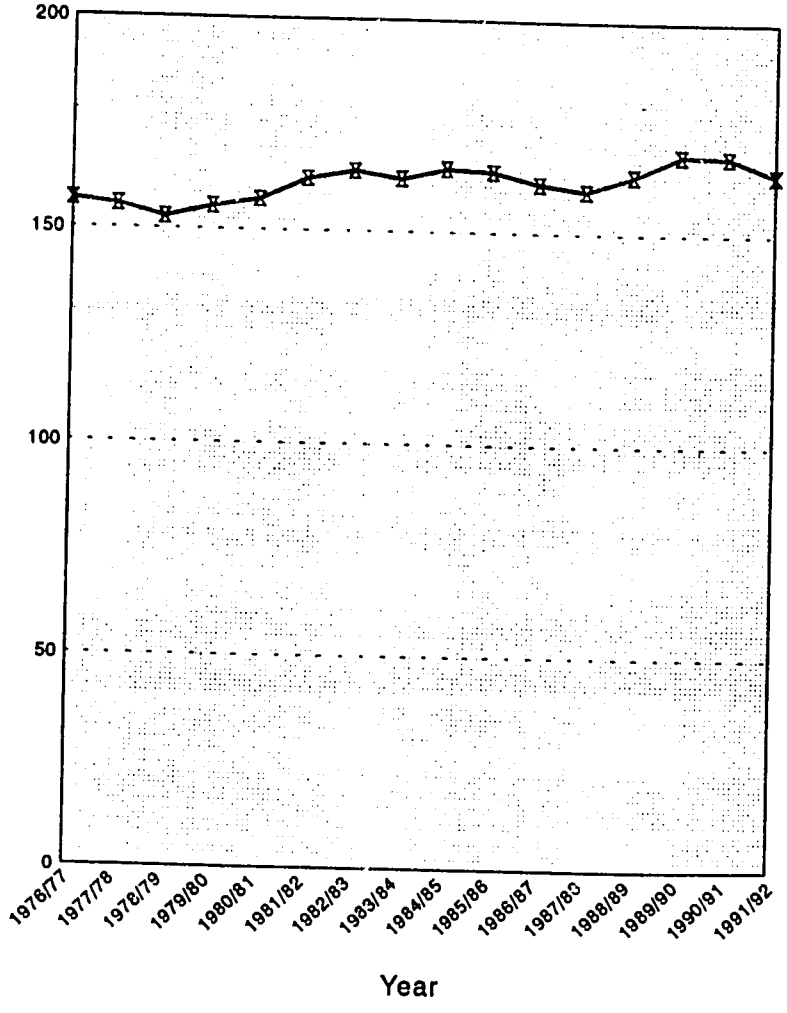
Of the admittedly much smaller wheat crop, fifty two per cent in 1992/93 was marketed by the farmers (Chowdhury, 1993, Table 12). Considering that a full 83% of all wheat farmers in Bangladesh are those with upto 1 hectare of own land (i.e. they are small farmers), this would be symptomatic of strong commercialization.

The evidence on foodgrain market commercialization raises irrepressible questions about the rationale of carrying large security stocks at public expense. This is because of the ownership and the dispersion of foodgrain stocks in the economy, to which we may now turn.

Rice Stocks in Bangladesh

The ownership of stock usually carries with it the economic privilege of sway over price. The broader is the basis, spatial and by agrarian size classes, of the ownership of market stocks, the likelier would such a market configuration be to stave off adverse aftershocks from a natural disaster. The more atomistic is the competitive basis in which

Figure 4 - Foodgrain availibility per capita using 3 years moving average
(1976/77-1991/92)



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these rice stocks are held by private storers living off arbitrage over time, the greater would be the squeeze on them due to governmental storage (Sarris, 1983). To understand the inherent security characteristics of a grain system, it is therefore imperative to come to grip with the magnitude, seasonality and the laws of notion of private stocks.

Magnitude and secular growth of private rice stocks

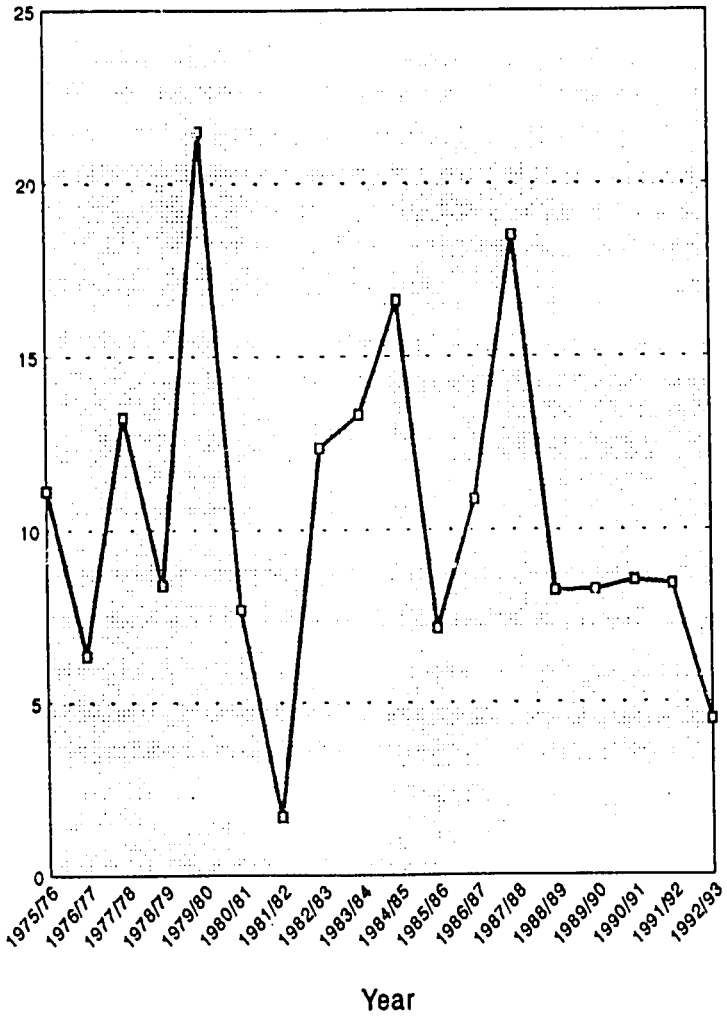
In 1967/68, private rice stocks amounted to no more than one month's consumption cover.[3] In 1989/90, the matched figure was three months' cover (Chowdhury, 1992, Table 68). Farm stocks account for three fourths of all private stocks. Because of the large proportion of such stocks owned by small and medium farms who by common consent are not predisposed to speculative arbitrage, much of these stocks are by way of working stocks, ie they would be held regardless of movements in relative prices and storage costs in the economy. They are located in manifest geographical dispersion, and are owned with an increasingly egalitarian streak (Chowdhury, 1992). On the middle of November 1990, carryout was equal to four weeks' consumption cover, as against two weeks' a year ago. During that particular interval, small and marginal farmers increased their percentage of the total, at the expense of their larger brethren (Fig. 6). This is partly because they register higher yields (Table A3.1). It is also arguable that, being more risk-average in the presence of uncertain future supplies than better-off farmers, these farmers are likely to have a more steeply-sloped on-farm consumption schedule of own-account production.

Role of Government Stocks

In theory, public storage usually has a case. Simply put, it says that the markets, left to their own devices, may carry less stocks than would secure the largest social benefit. The reasons for such underachievement may be about (i) risk aversion; (ii) different rates of discount; and the like. Also, if severe costs, economic and/or human, can be suddenly imposed on the economy by natural disasters, a plausible case can be made for public

[3]This estimate is adapted from Farouq (1971). Farouq arrived at economy-level stocks by pitting a putative consumption "norm" per month against a plausible monthly appearance of output. The residual was equated with stocks. As Farouk's survey did not probe into agents' stocks, either farmers or traders, he could not directly estimate stocks in the economy, even on a rough basis. Because Farouq abstracts from consumption sourced from public distribution system, he ends up with negative estimated stocks in lean months. It would not be implausible to equate negative inventories with drawdown of public rice stocks.

Figure 5 - Import as % of Availability
(1975/76-1992/93)



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storage of grain which, when released, can ameliorate the harsher aspects of equally sudden collapse in the survival chances, especially by the poor.

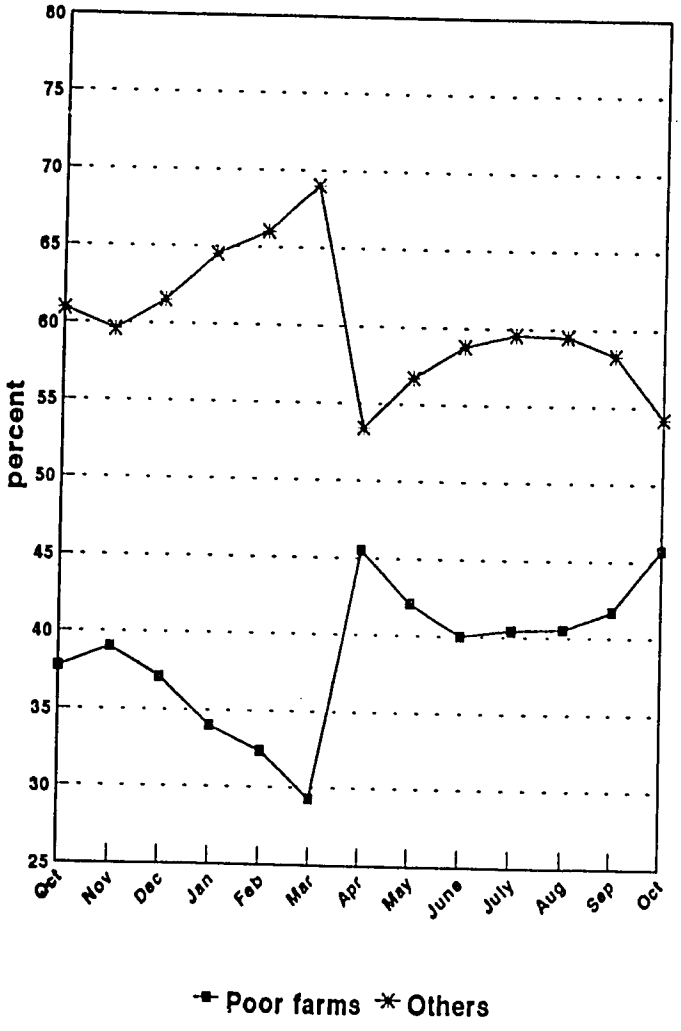
One may want to formalize the distinction between three types of stocks, viz. (i) the year-to-year storage, meant to engender a capacity to deal with shortfalls on a year-to-year basis; (ii) the intra-year storage, allowing authorities a capacity to mount price stabilizing operations; (iii) working stocks (including some dead stocks), of a magnitude that is sufficient to ward off the probability of a "stockout" in any point of a multi-facility storage system.[4] In this classification, security stocks may plausibly be lumped into (ii), because natural disasters, once past their killer fury and peak physical destruction, manifest themselves mainly, albeit not solely, through vicious, or at any rate, sharp price increases for foodgrains.

Arrayed against these foregoing imperative are the negatives of public storage. First to be considered is the direct costs due to such storage. In Bangladesh, public storage is a very costly business. This is for several reasons. Excluding the silos, virtually all other public storage facilities are flatbed godowns. None of the CSDs has the required facility for air circulation within the bulk by a system of steel ducting on the floor. Such a method can be used for blowing ambient temperature an through the bulk of the grain during the wet season. It is expertly believed that, given the quality of these facilities, especially grain produced in the wet season deteriorates quite rapidly after three or four months in storage. This creates the compulsion to turn stocks over rapidly (World Bank, 1992). However, seasonal market fundamentals often make such rapid turnover difficult, rendering imperative prolonged storage, costly or not. Public storage ends up being very costly (John-Evans, 1986).

Second, public storage displaces profit-seeking private storage. This is in theory intuitive: it has been argued that, where private trade is perfectly competitive, there exists a one-to-one displacement and public storage is completely ineffective as a stabilization

[4]For a definition of working stocks in this sense, see Siamwalla (1988) and Morrow (1980). For a definition of dead stock, see World Bank, 1979. It should be stressed that the distinction made, while no doubt useful in broad logistical and planning terms, does not totally preclude any fungibility in stocks. In fact stocks are fungible. Therefore, total stocks requirements are likely to be less than the sum of the parts.

Figure 6 - Composition of Farm Rice Stocks between Poor & Other Farmers, 1990



device: the displacement of private storage is complete (Sarris, 1982). Because private stocks at any given point in time comprise farm stocks and trade stocks and because the two components may not be equally responsive to price-responsive (Chowdhury, 1993), the displacement is often likely to be less than complete. Nonetheless, it is part of the indirect costs of public storage that it squeezes a part of potential private storage out of existence. We present an estimate of the displacement effect later on. The final consideration is that more costeffective alternatives to reliance on in-country foodgrain stocks do exist, in the form of reliance on trade. This is certainly the case with year-to-year storage and, upto a point, with intra-year storage, too.

Currently, actual content of security stock policy is dictated, or at any rate, heavily influenced by the perception that minimum security stocks consistent with adequate cover against disasterds are as high as 600,000 MT, following the World Bank (1979, annex 7). Most knowledgeable observers would now concur that the country could do well with a much lower reserve stocks, on account of any one among a large number of reasons, viz. (i) considerable gains in continuous cropping of rice throughout the year; (ii) gains in farm stocks; (iii) dramatic improvements in the speed with which disparate markets can be connected; (iv) the odds against a joint "infrastructural dislocation" involving a broad swathe of the country have sharply fallen; (v) the early warning system is better honed; (iv) the degree of integration into the world markets has been greatly improved; and finally (vii) the production system has brought into being spatial "restabilizers"(Table 2). These arguments in favor of a lower security stocks are amplified in Appendix-1.

The displacement effect is estimated at 44% by Chowdhury (1993). Using data for the early 1970s, when rice markets were much fewer agents than in 1989/90, Ravallion estimated a version of the same displacement at 17% (Ravallion, 1987). The displacement effect is significant in the present context of society's capacity to carry security stocks: the government is appropriating a larger share of that function at a time when the markets are large and growing. It will be admitted readily that to ensure market performance commensurate with avoidance of widespread failure of exchange entitlements puts the accent on a reorientation of the government's foodgrain operation. Some of the ingredients of such a intervention regime are outlined in this paper.

Table 1 — Semilogarithmic growth rates and variability of rice output

	Kharif season rice			Rabi season rice			All			Foodgrain			Rice Availability			Foodgrain Availability		
	1976-1986	1987-1993	1976-1993	1976-1986	1987-1993	1976-1993	1976-1986	1987-1993	1976-1993	1976-1986	1987-1993	1976-1993	1976-1986	1987-1993	1976-1993	1976-1986	1987-1993	1976-1993
Growth rate	0.7	1.2	0.6	7.6	8.3	8.4	2.1	3.5	2.5	2.97	3.23	2.78	2.12	3.51	2.44	2.82	2.73	2.52
SEE as % mean of ln(Q)	0.34	0.6	0.45	1.6	0.97	1.31	0.32	0.25	.33	.33	.29	.31	.29	.33	.33	.40	.41	.40

Source: Computed by the author

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Table 2 — Production restabilizers within the rice economy, 1970-1986, 1986-1992

	1970-1986		1986-1992	
	Covariance	r	Covariance	r
Surplus districts alone				
Kharif vs rabi season rice production disturbance	-.0003	-0.03	-.003	-0.66
Surplus vs deficit districts				
Kharif vs rabi season	-.0004	-0.06	-.001	-0.22
Rabi vs kharif season	-.0022	-0.122	-.0024	-0.64
Within deficit districts				
Kharif vs rabi season rice production disturbance	-.0022	-.196	-.0012	-.275
All districts	-.0012	-.13	-.0018	-0.40

Source: Computed by the author

Note: r denotes zero-order correlation coefficient. Each number in the table has been computed using residuals from estimated time trends, the underlying data being three-yearly moving averages.

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Table 3 — The ascendancy of HYVs in rice economy

(% of the total)

	1975/76		1985-86		1991/92	
	Area	production	Area	production	Area	production
Wet season	9	16	12	19	32	43
Dry season	22	45	37	60	59	78
Both season	14	28	23	38	44	60

Source: Bangladesh Bureau of Statistics, Statistical Yearbook, various issues

Notes: Wet season is aman. Dry season includes boro and aus.

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Table 4 — Decomposition of production growth to area and yield growth, rice, 1976-1992

(% of the total growth)

% of growth in production due to		1975/76-1985/86		1986/87-1991/92		1975/76-1991/92	
		Wet season	Dry season	Wet season	Dry season	Wet season	Dry season
Rice	- area growth	35.1	22.0	-1.1	-10.6	-12.6	21.1
	- yield growth	64.9	77.7	101.1	110.6	111.9	78.9

Source: Computed by the authors from data in BBS Statistical Yearbook, various issues.

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Table 5 — Aggregate end-of-month private rice stocks, 1989/90, 1992/93

(MMT, rice)

Month	1989-1990			1992-1993		
	Farm stocks	Trade stocks	Total	Farm stocks	Trade stocks	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
November	5.73	1.44	7.17	6.52	1.03	7.55
December	5.79	2.02	7.81	6.21	1.99	8.20
January	4.73	2.04	6.77	4.73	2.38	7.11
February	3.68	1.64	5.32	3.33	2.26	5.58
March	2.71	.66	3.37	1.90	1.64	3.54
April	3.32	1.06	4.38	1.62	2.98	4.60
May	4.66	1.66	6.32	5.25	1.39	6.64
June	3.67	1.68	5.35	4.14	1.47	5.62
July	2.99	1.34	4.33	3.72	1.04	4.76
August	3.36	.94	4.3	2.81	1.70	4.51
September	2.43	.72	3.15	2.25	.55	2.80
October	1.44	.40	1.84	1.70	.42	2.12

Source: For cols (2)-(4), adapted from Chowdhury, 1992. For cols (5)-(7), FPMU/IFPRI Private Stock RRA, 1993

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Table 6 — Consumption Significance of Private rice stocks in Bangladesh, 1989/90, 1992/93

Month	1989/90				1992/93			
	Private rice stocks	Public rice stock	Total rice stocks	Private rice stocks as multiple of rice need	Private rice stocks	Public rice stock	Total rice stocks	Private rice stocks as multiple of rice need
November	7.17	0.60	7.77	5.10	7.55	0.64	8.19	5.14
December	7.81	0.72	8.53	5.54	8.20	0.61	8.81	5.58
January	6.77	0.82	7.59	4.80	7.11	0.55	7.66	4.84
February	5.32	0.84	6.16	3.77	5.58	0.52	6.1	3.73
March	3.37	0.75	4.12	2.39	3.54	0.50	4.04	2.37
April	4.38	0.64	5.02	3.11	4.60	0.44	5.04	3.07
May	6.32	0.65	6.97	4.48	6.64	0.42	7.06	4.44
June	5.35	0.82	6.17	3.79	5.62	0.40	6.02	3.76
July	4.33	0.85	5.18	3.07	4.76	0.42	5.18	3.18
August	4.3	0.83	5.13	3.05	4.51	0.40	4.91	3.01
September	3.15	0.78	3.93	2.23	2.80	0.39	3.19	1.87
October	1.84	0.65	2.49	1.76	2.12	0.34	2.46	1.42
All months	4.72	0.73	5.46	3.39	5.08	0.48	5.57	3.42

Source: Chowdhury, 1992; FPMU/IFPRI Private Stock RRA, 1993

Notes: Monthly putative rice requirement during 1989/90 is assumed at 1.41 MMT and during 1992/93 at 1.496 MMT. The latter is obtained assuming a population growth of 2% a year between 1989/90 and 1992/93

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Table 7 — Proportion of Output Marketed by Farmers in Bangladesh

(Percent)

Type of district	Farm size classes	1989/90		1992/93	
		Aman	Boro/aus	Aman	Boro/aus
Progressive					
	Small	39.6	48.2	49.6	61.5
	Medium	41.7	77.5	58.9	73.5
	Large	51.9	84.0	68.9	86.5
	All	41.7	57.2	53.5	66.6
Nonprogressive					
	Small	24.6	36.7	47.5	50.9
	Medium	35.4	65.6	53.5	62.4
	Large	43.8	76.1	64.7	82.5
	All	28.4	45.7	50.4	56.2

Source: Chowdhury, 1989/90; IFPRI/FPMU Rapid Appraisal, 1993/94.

Notes: Progressive districts are those that generated foodgrain surplus from production over and above putative consumption requirements in 1988/89 and 1989/90.

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Table 8 — Rice production and commercialization, Bangladesh economy, 1980-93

Year	Rice Production (000 MT)	Rice Marketed Surplus (000 MT)	Marketing ratio (%)
1979/80	12740	4459	35.000
1980/81	13881	4997	36.000
1981/82	13630	5043	37.000
1982/83	14216	5402	38.000
1983/84	14508	5615	38.700
1984/85	14622	5776	39.500
1985/86	15041	6152	40.900
1986/87	15456	6492	42.000
1987/88	15662	6891	44.000
1988/89	15794	7344	46.500
1989/90	17856	8749	49.000
1990/91	17852	9051	50.700
1991/92	18252	9582	52.500
1992/93	18375	10106	55.000

Source: Computed by the author, data from Chowdhury, 1992 and Chowdhury 1994b.

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Government rice stocks and public procurement together complete a circle: the former by lowering market prices enhances the quantities publicly procured which in turn raise public stocks, and depresses prices further.

Requirement of Security Stocks

A reasonable definition of security stock equates it with what it takes to keep a part. of the country's population supplied with foodgrain so that it can survive, albeit on a lower-than-customary intake level, upto such time as relief supplies become available. The focus must be on the relatively quite short period in the wake of a natural disaster, when supplies. especially in at short, perhaps very short, notice, before more can be launched. This implies that security stocks are likely working stocks needed to minimize the probability of "stockout" over a fairly short time interval.[5] On this reasoning security stocks, to the extent that they are needed at all, have to be quite small, rather than big.

Experienced aid agencies make the point that, especially during heavy flooding, the affiliated people may find foodgrain of little help when their survival changes are at a very low ebb. Precooked food is the most needed succour.[6] To some observers, it is not clear that security stocks and the capacity to deliver precooked food in areas hardhit are equivalent. The position of this paper is that security stocks embodies a public potential capacity to ensure availability of precooked food when and where needed. If the government's security reserves are nonexistent, it can only argument its capacity to distribute precooked food first through buying in the market --- in the process of driving prices there even higher. That may not be sensible.

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[5]Stockout means stock depletion. Working stocks are those held to protect the economy against risks associated with the breakdown of the transport and marketing system due to a devastating flood, as well as against the environmental loss of private-sector working stocks.

[6]During 1988 floods, private voluntary agencies and charity-clubs in Dhaka made countless trip to low - lying slums around the city to deliver precooked rice. Also note that the government of Bangladesh opened hundred of public eateries (*langar khanas*) during 1974 famine.

NATURAL DISASTER

The object of the following sections is to lead off towards an estimate of security stocks for Bangladesh

Under current conditions, it takes a maximum of two to three months from the date of purchase and delivery contract for standard commercial foodgrain imports to arrive in Bangladesh ports. This time may be cut somewhat in the event of a major calamity. For example, emergency procedures and priority shipments may be put in place and grain-carrying ships already loaded may be diverted to Bangladesh. Depending on the distance of the affected areas from the point of import -- usually the ports of Chittagong and Chalna, the delivery of imported foodgrains to the final distribution points may take up to 15 additional days. The physical infrastructure of the country has improved materially.

Suppose that upto 10 million people are affected by a single large disaster and that their grain stocks as well as their standing crops are destroyed or lost.[7] By any stretch of imagination, such a calamity will be of a fairly rare occurrance. Of course, it is true that the transportation and communications within the country is in sufficiently good repair that stocks retained outside the stricken areas could be moved into the stricken area within relatively short period. Moreover, if a devastating flood is what we are taking about, then the availability of a large fleet of mechanized trawlers and boats are of big help in moving relief stocks from outside stricken areas. If the government is to provide sufficient foodgrain supplies to these people to ensure minimum nutritional levels for a period of above 60 days (until further relief supplies from external sources can be delivered to the affected regions), this would require almost 257 thousand tons of grains just to provide a daily quota of 15 ounces to each individual in the disaster areas. Adding a 5% contingency for losses in transit and distribution, the total security stock requirement would come to at least 286 thousand tons.

Taking into account that most other food supplies (except possibly fish and that 15 ounces of foodgrains represent only 1571 calories, to supply more than this bare

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[7]The Disaster Management Bureau of the Government of Bangladesh estimates that 37 upazilas in flood prone districts have about 4 million persons, while 48 cyclone prone thanas have a little over 10 million people. The covariance between occurance of calamity in these two quite small.

minimum to the stricken population may be imperative. For each additional ounce provided per day and person, the security stock requirement would increase by about 18 thousand tons (including losses) for a 60-day period. At a daily per caput quota of 16 ounces, some 286 thousand tons of security stocks would be needed. If authorities perceive that providing for only 60 days of relief operations err on the low side, provisions made for 75 days, would raise the stocks required would be 357 MT. Most knowledgeable observers would feel that a provision of 60 days cover is quite adequate.

It is true that the country transportation system may itself suffer a temporary capacity contraction due to the disaster, as bridges may be destroyed, and roads and rail beds washed out. If the inland water transport system in easily vulnerable to disaster-induced damage --- both to vessels and to loading/unloading facilities --- then security stock cover needed tends to increase. In short, the lower is the state of readiness of the physical infrastructure in the face of disaster, the longer is the consumption cover that is desired *per se*. However, one can assert that, on recent record, the transport sector infrastructure appears to be well-adapted to the threat to be posed by a disaster, especially if it is a major flood. The response to the cataclysmic floods in 1988 is a case in point.[8] Even when a large part of the country's road infrastructure was impassable due to submersion, water transport system had quite effectively stepped into the void. As weekly price data for several districts, that are regarded to be food-deficit, show clearly, rice prices rose sharply for only two to three weeks, after which they promptly returned to normal level (results available with author).

Therefore, we posit that security stock can be put between 300,000 MT to 350,000 MT.

Five disaster years in prespective

We compare five disaster years, viz. 1979, 1984, 1987, 1988 and 1991. The first was a year with major crop loss due to drought. The last was struck by a tidal bore that claimed about 130,000 in about 12 hours. The other three were years of excessive flood;

[8]For those who are unfamiliar with Bangladesh's recent flood history, the country was hit by a devastating flood in 1988. About a half of the country, including the city of Dhaka was innundated.

1988 was ravaged by the worst flood in memory. Table 10 has to be examined in tandem with Table 9.

The following results stand out

First, even through 1988 was a year of extraordinary flooding, rice price increase (in % terms from trend) due to the flood in September was surprisingly small: only 3%. This is despite the largest aman-season loss in the pastliberation period, of 1.5 million metric ton (MMT) (Table 9). And yet, a decade ago in 1979, prices spiked upward by between 14 and 20% when boro crop failed. The root cause is that rice markets are larger and more integrated in 1988 than in 1979.

Second, note how peak monthly offtakes during high-demand months, viz September and October, are lower in the two flood years of 1987 and 1988 than for either 1979 or 1984 (compare the % monthly offtake deviations across these years). The implications seems to be that, after a calamity, prices are returning to more normal levels due to both release of public but also private stocks. The demand for security stocks *per se* has thus fallen over time.

Table 9 — Trend Deviations from Rice Production by season, in five disaster years, 1979 - 1991

(MMT)

Rice crop	1979	1984	1987	1988	1991
Boro	-368	-137	-434	-11	218
Aus	-321	-66	372	290	-269
Aman	-33	-103	-590	-1563	346
Total	-722	-306	-652	-1284	295

Source: Computed using BBS production data

Note: Boro of 1979 refers to the boro crop harvested during May or June of 1979. Aman of 1979 refers to the aman crop harvested during November-December of 1979, and so on.

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Table 10 — The five disaster years in perspective

Month	1979			1984			1987			1988			1991			1987-1988	
	Offtake			Offtake			Offtake			Offtake			Offtake			Offtake	
	Price (% devn)	Actual (000 mt)	devn. form trend	Price (% devn)	Actual (000 mt)	devn. form trend	Price (% devn)	Actual (000 mt)	devn. form trend	Price (% devn)	Actual (000 mt)	devn. form trend	Price (% devn)	Actual (000 mt)	devn. form trend	Price (% devn)	devn. form trend
FEB	-14.22	158.66	10.40	-3.07	206.80	48.17	-0.49	215.77	50.58	7.13	212.40	44.96	1.27	241.00	66.63	3.32	47.77
MAR	-9.26	177.68	29.25	1.09	226.37	67.56	7.95	238.67	73.29	8.51	229.68	62.05	5.71	240.00	65.43	8.23	67.67
APR	-2.59	161.05	12.45	2.23	193.15	34.16	12.23	203.83	38.26	3.73	44.72	-123.10	2.14	178.00	3.24	7.98	-42.42
MAY	-1.28	163.03	14.27	-0.64	186.98	27.81	0.80	148.18	-17.57	-7.48	118.90	-49.11	-2.24	212.00	37.04	-3.34	-33.34
JUN	14.23	187.19	38.26	-1.04	131.76	-27.59	2.43	122.70	-43.24	-6.66	73.17	-95.03	-1.16	164.00	-11.16	-2.12	-69.13
JUL	19.72	196.27	47.17	3.45	187.51	27.99	-5.77	140.25	-25.88	-4.31	102.00	-66.39	0.42	169.00	-6.35	-5.04	-46.13
AUG	13.15	203.37	54.10	0.42	228.37	68.67	1.35	164.54	-1.67	-3.98	133.00	-35.58	-0.14	184.00	8.45	-1.31	-18.62
SEP	9.18	226.75	77.31	5.51	255.64	95.76	1.36	224.61	58.11	3.56	206.00	37.23	3.50	229.00	53.25	2.46	47.67
OCT	-0.08	253.90	104.30	2.32	248.81	88.75	0.27	230.70	64.01	-0.68	259.00	90.04	4.18	295.00	119.05	-0.20	77.03
NOV	-5.38	208.86	59.09	-2.38	270.70	110.46	-1.82	212.40	45.52	-1.90	243.00	73.85	-7.46	216.00	39.85	-1.86	59.69
MAR-APR	-5.93	169.37	20.85	1.66	209.76	50.86	10.09	221.25	55.78	6.12	137.20	-30.52	3.92	209.00	34.34	8.11	12.63
SEP-OCT	4.55	240.33	90.80	3.91	252.23	92.25	0.81	227.66	61.06	1.44	232.50	63.64	3.84	262.00	86.15	1.13	62.35
FEB-NOV	2.35	193.68	44.66	0.79	213.61	54.17	1.83	190.18	24.14	-0.21	162.19	-6.11	0.62	212.80	37.54	0.81	9.02

Source: Computed by the author using offtake data from DGF and price data on national wholesale prices

Notes: What is shown under price is percentage deviation from trend component in monthly prices, determined by twelve-month moving averages. Offtake deviations in monthly foodgrain offtakes.

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There is simply no evidence in the foregoing to suggest that rice markets arnd public distribution were not getting through reasonably well as the road and rail network was temporarily incapacitated. This is directly to be attributed to the water transport sector. It bears a repetition that the significant increase in the seasonal availability of mechanized small boats during the monsoons taking advantage of the diesel engines primarily meant to power irrigation pumpsets is the cutting edge of the increasing "flood-proof" physical infrastructure.

Strategic location of security stock

Usually, the adequacy of transportation system implies a desirable degree of strategic location of security reserves. Such a strategic decentralization of security stocks would usually increase overall quantity required for emergency prepardness above what is needed were all security stocks to be centralized. Because the country's transport infrastructure has demonstrated its capacity to accommodate the worst flood in recent memory, we shall conclude that there is no imperative for add-on security stocks associated with a strategic decentralization. Under current circumstances, the add-on needed in a decentralized security stock system could really be quite small, if only a part of the total were held in the likely disaster area (say a supply of 15 days at most), while the rest is kept in a few strategically located central facilities, from where it could be moved to strickenn regions before they confronted the prospect of stockout.

Storing grains to supply 16 oz per days over 15 days for say 20 million people in various disaster-prone parts of the country would require about 133 thousand MT (including a 5% allowance for losses). It is reasonable to expect that, once this immediate aftermath is past, private trade will redirect its supplies to the stricken region lured by higher prices. Therefore, the calculation oof security stock should reflect smaller interventions. Storing enough foodgrains to supply 15 oz daily to say 10 million for another 45 days --- once the strategically - decentralized supplies were exhausted --- sould mean a furhter 201 thousand MT to be held in more contralized locations. That adds up to 334 thousand MT.

Besides, even devastating floods do not come totally unannounced. Usually, they are preceded by climatological premonitions, and the government has at any rate a basic

capacity by way of early warning information. For instance, there is the more than casual empiricism that floods in Bangladesh succeed those in one or two upper riperian countries with a lag of between one to two weeks. It whould not only be possible but highly disirable to predicate a higher degree of foreward planning and anticipatory logistics. Informed forward planning is nearly always a substitute for public security storage (Siamwalla, 1988). And the lack of adequate forward planning in the pursuit of public stock deployment has been influentially vented on several occasions (World Bank, 1992; Lynton-Evans, 1986). Security stock requirements commensurate with effective forward planning (by diminishing the proportion of the strategically decentralized stocks) would be lower.

In sum, Bangladesh's security foodgrain reserves should perhaps be about 350 thousand MT. this would provide more than a 10% contingency reserve above the base case of 357 thousand MT. This will be about the size twice the peak monthly offtake during the month of October in the immediate aftermath of the 1988 flood (Table 10), and several times the deviation of offtake in October 1988 from twelve-monthly moving average (which can stand in for monthly trend).[9]

Policy implications

Because security stocks are argued to be about 0.35 MMT, which are lower than current practice would suggest, we would suggest he ingredients of a refocussing of policy in this context. We shall only mention these without elaboration

(i) Security stocks can be lower

(ii) Because the response of private agents are very important determinants of coping with disasters, the authorities need to issue unambiguous and credible policy signals to the markets, so that private plans for action are not destabilized. An underachieving private trade can reduce the social payoff to public actions.

[9]Note that natural disasters by causing sudden increases in the public distribution are to be evaluated in terms of deviations from trends on a monthly interval.

(iii) Investment by the government in generation and dissemination of market information germane to private marketing has high payoff.

(iv) Improve infrastructure, especially rural infrastructure even further.

(v) Because the lead time in forging informed trade in world markets is on the decline, there will remain the case for improvement of market intelligence capability, especially relative to world markets, within the government.

REFERENCE

Brammer, 1979, "The 1979 Drought: Lessons for Planners and Administrator", Ministry of Agriculture and Forests, 1979.

Chowdhury, N., "Foodgrain Marketing in Bangladesh: A Review of Issues and Evidence", Dhaka, IFPRI, (mimeo.)

Chowdhury, N., "Rice Markets in Bangladesh: A Study in Structure, Conduct and Performance," International Food Policy Research Institute, Bangladesh Food Policy Project, Dhaka, Oct. 1992a.

_____, "A Reassessment of Bangladesh's Poverty Record, 1974-1984", *The Bangladesh Developmental Studies*, December 1992b.

_____, "Reassessment of Poverty Record: A Further Comment on Osmani", *The Bangladesh Developmental Studies*, March 1993a.

_____, "Interactions between Private Rice Stocks and Public Stocks Policy: evidence for a crowding out", Dhaka, IFPRI, 1993, June (mimeo.)

_____, "The Structure and Conduct of Bangladesh Wheat Markets: Some Emerging Insights", Dhaka, IFPRI, August, 1993c (mimeo.)

_____, 1994a. "Credit and Bangladesh's Foodgrain Market: new evidence ir Commercialition, Credit relations and effects of Credit access", Dhaka, IFPRI (mimeo.).

_____, 1994b. "Causalities and Costeffectiveness of Public Rice Procurement in Bangladesh", presented to this Seminar.

Chowdhury, N., Meisner, C., Morris, M., "Comparative Advantage of wheat in Bangladesh: Technological, Economic and Policy Issues", Dhaka, IFPRI/CIMMYT, April 1994 (draft report).

Farruk, M.O., 1972, *Structure and Performance of the Rice marketing System in East Pakistan*, New York: Cornell University Special Publications.

Haggblade, S., "Price Stabilization Matter any more to Low-Income Consumers in Bangladesh," Dhaka, IFPRI, 1993.

_____., "Evolving Foodgrain Markets and Food Policy", Dhaka, IFPRI.

IFPRI/FPMU, "Report of the Very Rapid Appraisal of Private Foodgrain Stock, 1992/93," a report for the Ministry of Food, January 1994.

Lynton-Evans, L., "Logistics Study (on Bangladesh)", Dhaka: Ministry of Food, May 1986.

Osmani, S.R., "Structural Change and Poverty in Bangladesh: The Case of False Turning Point," *The Bangladesh Development Studies*. Vol. 18 September 1990.

Ravallion, Martin, *Markets and famine*, Oxford: Clarendon Press, 1987.

Sarris, A.H., "Commodity-Price Theory and Public Stabilization Stocks", in Chisholm, A.H., and Tyers, R. (eds), *Food Security: Theory, Policy, and Perspectives from Asia and the Pacific Rim*, Lexington, Mass: Lexington Books, 1982.

Siamwalla, A., "Public Stock Management", in Mellor, J.W. and Ahmed Raisuddin (eds), *Agricultural Price Policy for Developing Countries*, Baltimore: The Johns Hopkins University Press, 1988.

Kampsax, "Feasibility Study for Jamuna Bridge, Dhaka, 1988.

World Bank, *Bangladesh: Selected Issues in Rural Employment*, Washington D.c., 1983.

_____, *Bangladesh Selected Issues in External Competitiveness and Economic Efficiency*, Washington, D.C., 1992

World Bank, 1992. Bangladesh Food Policy Review: Adjusting to the Green Revolution, Washington, D.C.

Security stocks needed to deal with Disasters or Crop Losses

Because cyclones, floods or tidal bores or a massive crop failure may drastically reduce people's survival chances through famine or starvation, the government may seed to maintain a foodgrain reserve large enough to carryout massive emergency relief operations in the affected areas. It is the purpose of this appendix to argue that the magnitude of security stocks required has fallen as compared with the late 1970s when the experts had last systematically examined the problem (World Bank, 1979, annex 7).

Considerations bearing upon security reserves

The following matter:

(a) The probability that an imponderable would materialize which will destroy crops, stocks and/or physical infrastructure;

(b) The existence of geographical production "restabilizers", as measured by production-deviation covariances across different production regions in the economy;

(c) The density, geographical outreach of foodgrain marketing system;

(d) The readiness and repair of the transportation system, including vehicular choice range and speed;

(e) The magnitude and the dispersion in the ownership of private foodgrain stocks.

In 1979, the World Bank postulated the position that security stock requirements that would provide cover against both a massive natural disaster as also against a major countrywide aman crop failure was roughly equal to its procedures and assumptions with respect to each of the objectives conditions enunciated above. We take the position that Bangladesh has achieved a clear measure of improvements with regard to the fundamentals.

The Probability of adverse aman production risk

The estimate of 0.6 MMT was predicated on a possible crop loss to aman on the order of 1.5 MMT. A loss of such a large magnitude overwhelmed the economy in five years during the 15 years to 1974/75 (World Bank, 1979, p. 93, ff. 2). The probability was an order of aman crop loss this poor (in absolute terms) in one nineteen or 6% (Table A1).

The existence of regional compensating variation

It has been succinctly shown that deviations from production trends have negative covariances across different geographical regions within the same time intervals (Hossain, 1988). Occupancy of the top positions on district-level league tables for rice-output growth rates from one period to another has been clearly fluid, thus suggesting a broad geographical basis of relative advantage in rice (Mahmud et al 1993). Input markets, and growing integration in markets create a more responsive and resilient production system (Brammer, 1979).

The density of marketing chain

The marketing chain is more densely and competitively populated today, than in the late 1970s.

The readiness of the physical infrastructure per year. Mileage of all-water road (high type) rose at 6%.

The number of trucks has grown from 10,000 in 1979/80 (World Bank, 1979) to 47,000 in 1986/87 (Chowdhury, 1992, p. 208). Feeder road mileage rose from 2340 km to 5680 km. Commercial trucking is highly competitive (Kampsax for ADB, 1986). Mechanized boats rose from 12800 in 1976/77 to about 30,000 in 1989/90 (Chowdhury, 1992, p. 208). In short, there has been a quantum change in the infrastructural capacity to betake relief imports to the afflicted parts of the country, once they arrive. In particular, the inland water system has given itself a strong fillip by riding piggy-back on the veritable explosion in the availability of diesel engines, which are not needed in the monsoons (Palmer et al. 1993).

Private Rice Stocks

Private rice stocks have grown overtime. (This is amplified in the text, and will not be belabored here.)

Lead time for Relied Import

By common consent, import lead time have fallen sharply, under the relentless improvement in communications and transport technology (World Bank, 1994). Thailand has completed a US $ 5 billion new port in 1990 (Newsweek, 1988). Shipments time from Pakistan have fallen to three weeks. Chalna, which has sustained an increase in unloading by about 300% over the last six years, has reduced ship turnaround times overall.

By the criteria of virtually all of the above objective determinants, security stocks requirements for Bangladesh is likely to be much lower in 1994 than was mooted in 1979/80.

Major Developments in Rice Production System in Bangladesh

Production and yield trends: foodgrains

Trends in area, production and yields of rice by season and by variety are evaluated in Table A2.1 in terms of quadratic time trends. These growth rates are separately presented for two time periods that set themselves off in terms of the relative scope of agricultural policy changes, viz. 1975/76 - 1985/86 and 1986/87 - 1991/92. Data are smoothed using three-yearly moving averages. Some findings deserve highlighting. First, in both periods and for both seasons, rice area is relocated toward HYVs and apparently at the expense of local varieties: compare the varietal area growth rates. More to the point, the pace of relocation has accelerated in the second period, when both fertilizer and water markets were substantially more liberalized. Second, overall yield rates register faster growth rates during the second subperiod. Chow tests suggest on the basis of the yield equation that, whatever the season, yields rates have accelerated faster during the years following 1986/87 than during the previous period examined and yield rate grew at the rates of 2.6% and 2.28% annually.

Bangladesh's rice yield growth has been trendy during the 1980s by international standards, too. During the eight years to 1988, Bangladesh's rice yield trend growth rates have been close to China's and higher than in several important rice-producing Asian countries, like Indonesia, South Korea and the Philippines (Table A2.2).

One significant aspect of the transition in the rice economy has been about relocation of area and production into HYVs, as already stated. This structural change can be seen more vividly than before in Table 3 in the text. In fifteen years, the proportion of rice area overall under HYV has risen from 14% to 44%, while the proportion of HYV paddy in total output rose from 28% to 60%. However, the wet-season paddy, i.e. the aman paddy, has surpassed the dry-season in terms of the diffusion of HYVs since about 1986/87. Against a background of sclerotic performance by wet-season rice production for decades, its sudden spurt since 1986/97 has been one of the

finds by way of what liberalizing markets and favorable incentives can do to economie's with dense marketing networks.

Table 4 in the text basically shows that throughout the fifteen years to 1991/92, for rice yield growth has overshadowed area growth in the generation of output growth.

In the second subperiod, the favorable yield performance of dry season is *not* due to HYV-boro. Indeed, yields of HYV boro during this period has decelerated, perhaps due to the diffusion momentum rolling on to marginal land. That bright spot is due to HYV aus --- a *kharif*-1 crop.

Table A2.1 — Growth rates of area, production and yields, rice and wheat, Bangladesh, 1976-1991

(% per year)

			1975/76-1985/86	1986/87-1991/92	1975/76-1991/92
Wet season rice	Local	Area	-0.07	-4.95	-1.84
		Production	0.76	-3.35	-0.89
		Yield	0.82	1.59	0.95
	HYV	Area	6.53	17.80	9.52
		Production	5.82	18.96	9.31
		Yield	-0.71	1.16	-0.22
	ALL	Area	0.53	-0.04	-0.18
		Production	1.51	3.55	1.43
		Yield	0.98	3.59	1.60
Dry season rice	Local	Area	-1.51	-8.48	-3.12
		Production	-0.49	-8.11	-1.76
		Yield	1.01	0.37	1.36
	HYV	Area	6.41	7.93	7.39
		Production	6.74	8.82	7.51
		Yield	0.33	0.89	0.13
	ALL	Area	0.71	-0.39	0.79
		Production	3.23	3.69	3.75
		Yield	2.51	4.08	2.96
Wheat		Area	15.20	0.83	7.77
		Production	18.20	-0.33	8.00
		Yield	3.10	-1.16	0.28

Source: Bangladesh Bureau of Statistics, Statistical Yearbook, various issues.

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Table A2.2 — Comparative growth rates for rice yield, Bangladesh and other Asian economies, 1972 - 1988

(% per year)

Period	Bang-ladesh	China	India	Indo-nesia	Korea Rep.	Myan-mar	Pakis-tan	Phili ppin	Sri Lanka	Thai-land	Viet-nam
1972-1988	2.12	3.58	2.41	3.69	1.42	4.47	0.48	3.61	3.43	0.87	2.36
1972-1980	2.04	3.04	1.81	3.40	3.21	5.65	0.86	4.68	3.06	-0.15	-0.91
1981-1988	2.47	2.55	3.29	2.38	1.39	0.18	-0.68	2.01	1.53	1.05	3.60

Source: Bangladesh Bureau of Statistics, Statistical Yearbook, various issues; IRRI, 1990

Notes: Wet season is aman. Dry season includes boro aus.

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The most conspicuous structural change in Bangladesh's rice economy is the rise of the boro output: from a tenth two decades ago, boro averages about a third of rice output. The other change, as already touched upon, is that since the latest quantum change in reforms, the growing edge has been about HYV aman production, especially in the Rajshahi division, and two districts of Khulna division.[10]These mostly high-land districts have been able to take advantage of the improved access to minor irrigation even during the monsoons.

An overwhelming part of the increase in output of rice came from yield increases in both periods, but especially in the second. Also, note how yield growth curves for kharif-season rice has had a vigorus upward trend, while the same cannot be said for rabi-season output.

[10]These districts are Dinajpur, Rangpur, Bogra, Rajshahi, Pabna, Kushtia and Jessore.

Table A3.1 — Rice Yield Rates by farm size classes, Northwest and elsewhere, 1989/90, 1993/94

(Mds/acre)

Farm size classes	1989/90 (aman)			1989/90 (boro/aus)			1993/94			Percentage change from a year ago		
	Rajshahi Division	Other districts	All	Rajshahi Division	Other districts	All	Rajshahi Division	Other districts	All	Rajshahi Division	Other districts	All
Small	38.8	32.1	34.8	50.8	43.3	46.4	34.8	41.3	36.7	-9.6	+2.8	-0.8
Medium	[illegible]	29.0	32.3	46.4	39.7	43.3	31.6	36.1	34.8	-17.5	-1.7	-7.1
Large	33.0	30.5	31.9	44.9	42.4	43.8	31.2	30.8	30.9	-11.1	-4.8	-6.6
All	34.9	30.4	32.8	46.6	41.8	44.3	33.69	39.4	35.7	-11.2	1.3	-2.4

Source: 1989/90 data are from IFPRI Farm Survey, 1989/90; 1993/94 data are from IFPRI/FPMU Rapid Appraisal, 1994.

Note: Figures in row headed by "all" are population-weighted, the weights being a proportion of farmers in each class in the rice economy as a whole, according to Agricultural Census, 1983/84.

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Table A3.2 - Average Opening Stock

Month	1978-1982	1988-92
February	950.44	1116.00
March	841.70	992.80
April	755.72	876.40
May	705.51	807.60
June	651.86	981.40
July	685.62	1163.60
August	804.44	1196.00
September	902.12	1204.00
October	992.43	1171.20

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Deviations from trend, in 1991, for rice price and combined offtake, by cyclone prone districts

District	Month	% change of OFFTAKE	% change of RPRICE
Bagerhat	Mar.	48.258	5.146
	Apr.	-0.035	0.821
	May	-0.732	-3.562
	June	-47.491	-2.405
Barguna	Mar.	6.448	1.992
	Apr.	-27.559	0.512
	May	52.894	0.216
	June	-31.784	-2.721
Barisal	Mar.	34.431	2.677
	Apr.	-15.193	2.759
	May	6.115	0.658
	June	-25.353	-6.094
Bhola	Mar.	11.400	3.746
	Apr.	15.984	1.539
	May	4.719	-2.019
	June	-32.103	-3.265
Chittagong	Mar.	7.661	0.723
	Apr.	-32.062	-0.556
	May	34.343	2.791
	June	-9.942	-2.958
Cox's Bazar	Mar.	-53.923	-0.828
	Apr.	-56.522	0.187
	May	9.050	4.417
	June	101.395	-3.776
Feni	Mar.	-2.465	3.396
	Apr.	-10.939	0.664
	May	22.874	0.930

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District	Month	% change of OFFTAKE	% change of RPRICE
Khulna	Mar.	25.537	2.150
	Apr.	-5.047	0.418
	May	-4.248	-2.841
	June	-16.242	0.272
Laksmipur	Mar.	-14.763	5.144
	Apr.	-29.248	-0.391
	May	47.547	-0.239
	June	-3.535	-4.515
Noakhali	Mar.	-9.635	2.843
	Apr.	-43.532	-1.266
	May	50.047	0.841
	June	3.120	-2.417
Patuakhali	Mar.	-26.366	0.768
	Apr.	-48.894	1.771
	May	43.954	0.611
	June	31.306	-3.150
Perojpur	Mar.	57.415	3.653
	Apr.	-13.125	2.707
	May	-16.177	-2.896
	June	-28.113	-3.464
Satkhira	Mar.	28.467	1.596
	Apr.	-9.648	-2.314
	May	5.316	-2.288
	June	-24.134	3.006
All District	Mar.	8.651	2.539
	Apr.	-21.217	0.527
	May	19.669	-0.260
	June	-7.104	-2.806
Over all		-0.00025	0.00000

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Deviations from trend, in 1988, for rice price and combined offtake, by flood prone districts

District	Month	% Change of OFFTAKE	% Change of RPRICE
Bogra	Jul	-65.586	-8.485
	Aug	-50.100	-2.778
	Sep	7.517	-5.452
	Oct	47.460	-5.508
Chandpur	Jul	-66.178	-10.706
	Aug	-32.144	-8.303
	Sep	36.823	7.444
	Oct	-12.162	0.229
Faridpur	Jul	-36.728	-6.130
	Aug	-36.107	-3.854
	Sep	-12.430	2.532
	Oct	18.094	-2.015
Gaibndha	Jul	-75.302	-8.306
	Aug	-32.741	-1.974
	Sep	11.228	-1.702
	Oct	44.610	-5.055
Hobiganj	Jul	-40.522	-0.425
	Aug	-46.381	-2.041
	Sep	-4.430	2.097
	Oct	29.447	1.992
Jamalpur	Jul	-74.016	-6.330
	Aug	-46.643	-6.891
	Sep	19.641	0.944
	Oct	27.504	-3.126
Kurigram	Jul	-72.889	-1.965
	Aug	-32.863	-0.684
	Sep	16.679	2.806
	Oct	30.405	-4.302
Manikganj	Jul	-74.301	-3.905

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District	Month	% Change of OFFTAKE	% Change of RPRICE
	Aug	-69.881	-2.132
	Sep	-3.835	6.333
	Oct	55.361	-0.524
Munshiganj	Jul	-48.025	-2.459
	Aug	-43.507	-3.408
	Sep	34.364	4.625
	Oct	52.910	-4.898
Pabna	Jul	-57.061	-2.418
	Aug	-57.266	-6.228
	Sep	25.093	4.804
	Oct	8.159	-4.977
Rajbari	Jul	-61.259	-7.778
	Aug	-45.006	-6.892
	Sep	13.888	3.822
	Oct	27.208	1.717
Serajganj	Jul	-72.522	-9.445
	Aug	-55.374	-5.700
	Sep	21.857	5.066
	Oct	3.584	-1.168
Tangail	Jul	-67.830	-8.973
	Aug	-55.938	-6.845
	Sep	6.307	0.714
	Oct	19.394	-2.467
All Disrtricts	Jul	-62.478	-5.948
	Aug	-46.458	-4.441
	Sep	13.285	2.618
	Oct	27.075	-2.316
Over all		-17.144	-2.522

BEST AVAILABLE DOCUMENT