POLICY BRIEF 39

Buffer Stock Norms for Foodgrains during Twelfth Five Year Plan

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The public sector stocks of foodgrains have been an important pillar of India's agri-food policy. The main aims of these stocks are (i) to maintain price stability and safeguard consumers and producers from the volatility in foodgrain prices arising due to fluctuations in foodgrain production or any other reason, (ii) to enhance availability and accessibility of foodgrains to the poor households through public distribution system and other welfare schemes, and (iii) to provide space for effective implementation of the policy of minimum support prices for foodgrains through procurement operations.

The stocking policy has been successful in achieving its stated objectives to a large extent. The public holding of stocks has also helped the country to pass through serious shortfall in production of staple foodgrains during severe droughts. It is commendable that during 2006 to 2008 when the global food prices spiked and the world faced global food crisis, the price of rice and wheat in India remained stable.

Of late, the policy of buffer stock has come under severe criticism for excessive accumulation of stocks of foodgrains (rice and wheat) and the associated public expenditure towards upkeep, storage, and interest on investments, besides the deterioration in quality and the wastage. Critics find serious fault with government action to keep buffer stocks over and above the official norms at different points of time. For instance, the official norms for minimum buffer stock including strategic reserves are 20 million tonnes for wheat as on 1st of July and 14 million tonnes of rice as on 1st of April. Against this, the actual stock of wheat during the year 2013 was 42.3 million tonnes and that of rice was 35.5 million tonnes. The public stocks have remained more than double the norm most of the time in the last one year – in many months it was more than three times the norm. Such a deviation from official norms for a long time raises an important policy issue that either buffer stock norms are underestimated or these are not followed and thus result in loss to the exchequer. This necessitates a fresh look at the buffer stocking norms that have been in vogue since 2005. Besides, several other changes such as increase in population, expansion of public distribution system and vulnerability of foodgrain production to climate change reinforce a relook at the existing buffer stock norms. In this brief, we revisit the buffer stocking policy as to find out the extent to which the existing norms for public stockholding of foodgrains are appropriate in the wake of recently enacted the National Food Security Act

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(NFSA) and other changes. This will help planning need-based procurement of foodgrains and their stocking norms, besides serving as a guide for investment in storage to accommodate the required stocks of foodgrains and trade decisions.

Requirements for public stock of foodgrains estimated in this paper consist of two components viz. operational stocks and strategic reserves. Operational stocks are the stocks required for month to month distribution to the intended beneficiaries while strategic stocks or reserves, are meant for meeting shortfall in domestic supply arising out of fall in domestic production.

Foodgrain Requirement under NFSA and Other Schemes

India has enacted the National Food Security Act (NFSA) that obligates the state to ensure an adequate access to food at subsidized prices to two-third of the country's population. The NFSA entitles 75 percent of the country's rural and 50 percent of the urban population to avail 5 kg/person/month of foodgrains from the public distribution system at subsidized prices of Rs 3 per kg for rice, Rs 2 per kg for wheat and Rs1 per kg for coarse cereals. The poorest of the poor households, covered under Antyodaya Anna Yojana (AAY) are estimated to be 2.5 crores, and will have an additional entitlement of 2 kg of grains/ person/month. In addition, 6.5 million tonnes of foodgrains are required to run various other welfare schemes such as mid-day meal scheme for school children.

Offtake of food grains by some of the states is higher than what is envisaged in the Act. The NFSA should not result in reduction in allocation for such states. Protecting their existing offtake would require 2.9 million tonnes of additional foodgrains. To fulfill NFSA and other commitments it is estimated to have a public stock of 61.2 million tonnes of foodgrains with 2011 population as base (Table 1).

Table 1: Foodgrain requirements under NFSB and other schemes (million tonnes)

Item	Year 2011-12			Year 2016-17		
	Total	Rice	Wheat	Total	Rice	Wheat
67% of the population @ 5kg/person/month	48.8	26.8	22.0	52.1	28.7	23.5
Additional requirement under AAY scheme @ 2kg/person/month	3.0	1.6	1.4	3.2	1.8	1.4
Requirements of other welfare schemes	6.5	3.6	2.9	7.0	3.8	3.1
Additional requirement for protecting the existing average annual off-take of the states	2.9	1.6	1.3	2.9	1.6	1.3
Total annual requirement	61.2	33.7	27.6	65.3	35.9	29.4

Notes

1. 75% of the 833 million rural and 50% of the 377 million urban population in 2011 correspond to 67% of the total population.
2. Quantity of total foodgrains between rice and wheat is distributed on the basis of their ratio of 55:45 in the total procurement in the past three years.
3. Requirement under AAY and other schemes is assumed to increase by same rate as population.

Another estimate was prepared for the terminal year of 12th Five Year Plan, i.e. year 2016-17, when population of the country is projected to reach 1302 million and rural – urban population ratio is projected to reach 67:33. Accordingly, the total foodgrain requirement will rise to 65.3 million tonnes – 6.7 percent more than the requirement for year 2011-12. These stocks are termed as operational stocks and meant for meeting requirements of PDS and other welfare schemes during the year following crop harvest.

Foodgrain requirement for strategic reserves

In addition to the operational stocks, public stocks of foodgrains are also needed to serve as buffer against unforeseen contingencies arising due to extreme climatic events such as drought, flood, cyclone, etc. India is a large country, and often experiences such climatic events in her one or

another part, which affect the local foodgrain production, but disturbs the demand-supply equilibrium at the national level. Imports and stocks are the two options to manage supply shocks and stabilize prices in such a situation. It is learnt from the experience that occasional imports to balance the demand and supply in a bad agricultural year are costly and are often difficult to arrange. It is pertinent to mention here that presently, 5 million tonnes of foodgrains (3 million tonnes of wheat and 2 million tonnes of rice) are held by public agencies as food security reserves. India could escape effects of global food crisis primarily because of its public stocks of foodgrains. Further, due to inelastic demand of foodgrains, their prices also rise dispro-portionately in response to even a small fall in domestic production. In order to stabilize prices, the government intervenes in open market by releasing stocks of foodgrains. While these stocks are considered desirable to meet shortfall in production, the capacity to stock also plays an equally important role in price stabilization in the wake of bumper harvest.

Since, the strategic or buffer stocks are required to meet any serious imbalance between demand and supply caused by shortfall in production, the level of stocking needs to be closely linked to the level of shortfall in domestic production. We have estimated strategic reserves as the negative deviations in the total production of rice and wheat from its normal[1] in the last two decades, i.e. 1991-92 to 2011-12. These are presented in absolute as well as relative terms in table 2.

Table 2: Trend and fluctuation in combined production of rice and wheat

Year	Production (million tonnes)		Deviation from the normal	
	Actual	Normal	Absolute (million tonnes)	Relative (%)
1991-92	130	131	-0.64	-0.49
1992-93	130	135	-4.45	-3.31
1993-94	140	138	1.69	1.22
1994-95	148	142	5.32	3.74
1995-96	139	146	-6.61	-4.54
1996-97	151	149	1.80	1.20
1997-98	149	153	-3.73	-2.44
1998-99	157	155	1.92	1.24
1999-00	166	157	9.00	5.73
2000-01	155	157	-2.28	-1.45
2001-02	166	156	10.07	6.45
2002-03	138	155	-17.35	-11.20
2003-04	161	156	4.97	3.19
2004-05	152	158	-6.08	-3.85
2005-06	161	162	-0.40	-0.25
2006-07	169	166	3.09	1.86
2007-08	175	171	4.59	2.69
2008-09	180	175	4.86	2.78
2009-10	170	179	-9.65	-5.38
2010-11	181	185	-4.02	-2.17
2011-12	198	192	6.22	3.24

As the trend in production has been rising, relative shortfalls are considered more appropriate for deciding level of reserve. The maximum deviation in the total production of rice and wheat from the normal was 11.2% in the year 2002-03. If the food policy aims to provide a complete protection against such shortfall, then it is desirable to stock 11.2% of the normal level of foodgrains production. In absolute terms, the stocks for 2011-12 turned out to be 21.5 million tonnes. The probability of such a decline in foodgrain production, however, is less than 5%, that is once in 20 years. Holding such a large stock will also be very costly.

[1] The normal level production of rice and wheat was estimated by de-trending their time-series production using HP filter with an adjustment factor of 6.25. One may apply one or another functional form to de-trend the series, but the results are sensitive to the choice of functional form. For example, linear function assumes a time series to grow at the same rate throughout, while the actual data may behave differently. The HP filter takes care of the variable growth in the series, unlike the constant growth as in the case of linear function.

The next best option is to hold stock of grains equivalent to 5.83% of their normal production, which is the second highest fall in production. This suggests that in 95% of the cases foodgrain production is unlikely to fall by more than 5.83%. At this level of shortfall, the strategic reserves are estimated to be 10.3 million tonnes. The absolute level of stocks will vary depending upon the production trends. It may be indicated that these stocks can be used for alternative purposes, and once built upon, need only to be replenished to the extent of their utilization.

The strategic reserve of 10.3 million tonnes is distributed between rice and wheat in the ratio of 40:60. A higher share of wheat in these stocks is justified on the ground that in the case of a severe shortfall in production, it is easier to import wheat than rice without putting much pressure on the world market. The global market for wheat is larger than for rice - during 2009-11 on average, about 145 million tonnes of wheat was traded as compared to 32 million tonnes of rice (http://faostat.fao.org). Also, wheat imports are cheaper; the average world price of wheat being US$255/tonnes during 2009-11 as against US$534/tonnes for rice (http://www.imf.org).

Earlier estimates of the total stocks also included 2 million tonnes of foodgrains, termed as base level stocks, which are not available at a short notice because of their being in transit or in far flung areas. However, with advances in storage technology and transportation the base stocks have now become negligible. We do not consider these in our estimates.

Including operational stocks and strategic reserves, India will need about 71.6 million tonnes of foodgrains annually, comprising 37.8 million tonnes of rice and 33.8 million tonnes of wheat. However, it is not required to keep the entire quantity in stock throughout the year. From supply side, the level of stocks to be maintained at different points of time in a year would depend upon the monthly or quarterly pattern of procurement, and from demand side it will depend on pattern of offtake. Often, these patterns are considered on quarterly basis.

Buffer stocking norms

In order to arrive at quarterly stocking norms of rice and wheat, one needs to have information on inflow (procurement) and outflow (offtake) during each quarter of the year. Table 3 shows pattern of procurement and offtake of rice and wheat for the past three years. Note that we have considered inflow of rice, not of paddy because it is the rice which is made available for distribution. It comes out that while offtake of both rice and wheat is almost evenly distributed over the four quarters, their procurement is not. Most of the wheat is procured during April-June, just after harvest. On the other hand, procurement of rice has a wider spread. More than 42% of rice is procured during January-March, and 26% during April-June, and the rest is almost evenly distributed over the other two quarters.

As the pattern of procurement is different from pattern of offtake; the procured quantities have to be stored as to match the offtake. Thus, it is the pattern of offtake that decides the level of stock for each quarter. In other words, the offtake in any quarter should be equal to or more than the opening stock in that quarter. Hence, in deciding

Table 3: Pattern of procurement and offtake of rice and wheat during 2009-10 to 2011-12 (%)

Quarter	Rice		Wheat	
	Procurement	Offtake	Procurement	Offtake
April-June	25.9	24.7	98.8	23.7
July-September	16.5	26.1	1.2	25.2
October-December	15.3	24.9	0.0	25.7
January-March	42.3	24.3	0.0	25.4
Total	100.0	100.0	100.0	100.0

stocking norms, we begin with the quarter with highest level of offtake and then estimate closing stock for this taking into consideration the inflow and the outflow during this quarter. The closing stock for this quarter serves as the opening stock for the next quarter; and so on.

The levels of stock of rice and wheat required on 1st day of each quarter are presented in Table 4. The quantity of foodgrains to be in stock on 1st of July for reference year 2011-12 is estimated to be 53.4 million tonnes including food security reserves. The stocking norm falls to 43.5 million tonnes on 1st of October, to 33.2 million tonnes on 1st of January and then marginally to 32.3 million tonnes on 1st of April.

A comparison of estimated stocking requirements for 2011-12 with the existing norms shows that the level of stocking norms should be raised by 8 to 22 million tonnes at different points of time, over the current norms.

The requirement of foodgrain stocks for 2016-17 is also presented in table 1. The operational stocks will increase by 4.1 million tonnes, comprising 2.5 million tonnes of rice and 1.6 million tonnes of wheat. The strategic reserves taken as 5.83% of the normal production of rice and wheat in 2016-17 (projected to reach 206.8 million tonnes) will increase to 12.0 million tonnes (4.8 million tonnes of rice, and 7.2 million tonnes of wheat). These changes will raise the maximum stocking norm to 59.2 million tonnes as on 1st of July, and so on.

The stocking norms may vary depending on the government policy with respect to operational stocks as well as strategic reserves. For instance, if the policy aims to cover 80% rather than 95% of the risk by building strategic reserves, and the rest through imports, then one may think of maintaining a strategic reserve of 7.4 million tonnes (3.85% of the normal production). In this situation, stocking norms for each quarter can be lowered by 2.9 million tonnes.

The stocking norms are also useful in trade policy decisions. These can be used as a trigger to decide on imports and exports. When the actual stock crosses the established norm at any point of time, the country can decide to export; and when it falls below the norm, it signals the need to think of importing the grains.

Table 4: Desired buffer norms for reference year 2011-12 and 2016-17, million tonnes

Quarter starting	Operational stock			Operational stock plus strategic reserve			Norms in use		
	Reference year 2011-12								
	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total
April 1st	14.8	7.1	21.9	19.0	13.3	32.3	14.2	7.0	21.2
July 1st	15.3	27.8	43.1	19.4	34.0	53.4	11.8	20.1	31.9
October 1st	12.0	21.2	33.2	16.2	27.3	43.5	7.2	14.0	21.2
January 1st	8.8	14.1	22.9	12.9	20.3	33.2	13.8	11.2	25.0
	Reference year 2016-17								
	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total
April 1st	17.1	8.9	26.0	21.9	16.2	38.1	14.2	7.0	21.2
July 1st	17.5	29.6	47.2	22.4	36.8	59.2	11.8	20.1	31.9
October 1st	14.3	23.0	37.3	19.1	30.2	49.3	7.2	14.0	21.2
January 1st	11.1	15.9	27.0	15.9	23.2	39.0	13.8	11.2	25.0

Conclusions

India's policy of public stockholding of foodgrains has served several goals such as promoting national food security, safeguarding livelihood of the vulnerable and poor communities, maintaining price stability, managing supply shocks and checking transmission of price volatility from international markets. A noteworthy achievement in the recent years has been the stability in prices even in the wake of global food crisis and price spikes during 2006-08. Nonetheless, buffer stocks involve huge cost to public exchequer. It is, therefore prudent to maintain the level of buffer stock at a reasonable level.

The existing stocking norms were prepared in 2005, and given the increase in population, expansion of public distribution system, and changes in production behavior of foodgrains, these have now lost their relevance. Therefore, fresh norms have been prepared for 12th Five Year Plan taking 2011-12 and 2016-17 as the reference years. The stocking norms are designed to meet requirement of 61.2 million tonnes of foodgrains for public distribution system and to absorb 95% of the food security risk due to decline in domestic production. Our estimates suggest that India needs to raise stocking norm to a maximum of 53.4 million tonnes of foodgrains as on 1st of July and should be prepared to raise it further to 59.2 million tonnes toward the terminal year 12th Five Year Plan. These buffer stock norms can be safely used as trigger for export and import decisions of grains. Due to open ended procurement of rice and wheat the actual level of stocks after procurement season can exceed the norm. Any excess of actual stock over the norm should be treated as surplus and should be liquidated through open market sales or exports. Similarly, any deficiency of actual stock compared to the norm will indicate need to arrange supply through imports.

April 2014

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Published by Prof. Ramesh Chand, Director, National Centre for Agricultural Economics and Policy Research
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