Vol XLI
No. I.

ISSN 0019-5014

JANUARY-
MARCH
1986

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

Ind. Jn. of Agri. Econ.
Vol. 41, No. 1, Jan.-Mar. 1986

RESEARCH NOTES

GOVERNMENT PROCUREMENT OF WHEAT: AN EMPIRICAL ANALYSIS

Procurement policy is a necessary concomitant of the policy of public distribution of foodgrains as well as that of agricultural price policy designed to provide a support price to major foodgrains, especially during the post-harvest months. In a sense, therefore, procurement policy is wedded to both. Procurement operations are undertaken, on the one hand, to feed the supply lines of public distribution system (PDS), and on the other, to prevent any crash in the market prices of foodgrains due to heavy arrivals immediately after harvest. The former objective held its sway prior to 1965, while the latter dominated after 1965 with the simultaneous emergence of Food Corporation of India (FCI) and Agricultural Prices Commission (APC).

Section I of this paper traces the historical behaviour of foodgrains' procurement policy with special emphasis on wheat, its regional dimensions. etc. Section II discusses theoretically the various plausible determinants of wheat procurement, especially since 1965, in an effort to develop different hypotheses. These hypotheses are tested empirically in Section III and compared with the results obtained by other similar studies.

I

PROCUREMENT OPERATIONS: SOME ASPECTS

Procurement operations were in existence even before Independence. In the wake of Bengal famine of 1943 the PDS spread to a number of States and as a follow-up action, procurement operations also had to be enhanced. In 1950 Government of India appointed the Foodgrains Procurement Committee under the Chairmanship of M. Thirumala Rao to (1) enquire into the system of procurement and distribution adopted in the State and (2) to recommend modifications, as may be necessary in the food organisation of the State, to ensure efficient procurement and distribution. Besides, the Committee was asked to look into other aspects of procurement and distribution of foodgrains.[1]

Accordingly, the Committee recommended "that a uniform system of procurement must be established which gives a monopoly of grain to government at the first point of marketing."[2]

This recommendation was somewhat parallel to the recommendations made earlier by the Food-Grains Policy Committee of 1943 under the Chairmanship of Sir Theodore Gregory.[3] But the Government did not respond favourably to the recommendations of the Foodgrains Procurement Committee.

The subsequent years witnessed record production of foodgrains and consequently procurement increased without resorting to any monopoly procurement scheme. But gradually the domestic procurement was replaced by imports. This

1. Government of India: Report of the Foodgrains Procurement Committee, Ministry of Food, New Delhi, 1950, p. 1.
2. *ibid.* p. 16.
3. Government of India: Report of the Food-Grains Policy Committee, Delhi, 1943.

reduced role of procurement was caused primarily by massive imports of foodgrains under P. L. 480 agreement with the U.S.A. Procurement operations remained at a low until 1965. With the institution of FCI in 1965 and the onset of wheat revolution in 1967-68, the procurement of foodgrains sharply accelerated.

Table I demonstrates the temporal behaviour of procurement over the period 1965-83. It also indicates the composition of different foodgrains in total procurement. Upto 1971-73 the relative share of wheat in total foodgrain procurement was consistently increasing. It suffered a setback during 1974-76. This was due to the traders' levy imposed in 1974 and the lagged effect of wholesale wheat trade take-over in 1973. These socialistic measures created an atmosphere of uncertainty and contrived scarcity, induced widespread hoarding and thus adversely affected wheat procurement.

TABLE I. TEMPORAL BEHAVIOUR OF PROCUREMENT, 1965 TO 1983

Average of calendar years		Procurement (million tonnes)			Per cent of total procurement	
		All foodgrains	Rice	Wheat	Rice	Wheat
1965-67	...	4.17	2.95	0.46	70.74	11.03
1968-70	...	6.63	3.33	2.66	50.23	40.12
1971-73	...	8.32	3.16	4.88	37.98	58.65
1974-76	...	9.35	4.84	4.20	51.76	44.92
1977-79	...	11.64	5.31	6.21	45.62	53.35
1980-82	...	13.17	6.27	6.73	47.61	51.10
1983 (P)	...	15.62	7.24	8.29	46.35	53.07

Source: Government of India: Bulletin on Food Statistics, Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi (various issues).
P = Provisional.

Table II presents the regional dimensions of wheat procurement. It may be noted that till 1970-71, on an average, Punjab contributed roughly 71 per cent to aggregate wheat procurement. Its share declined in the coming years. Uttar Pradesh and Haryana are the next two important contributors. Together, these three States—Punjab, Uttar Pradesh and Haryana accounted for as much as 83 per cent during 1965-66 to 1967-68, and to 97 per cent during the triennium ending 1982-83. It provides an idea not only of the importance of these States but also of the extreme concentration of wheat procurement operations. Figures within slashes present wheat procurement in different States as a ratio of their local wheat production, indicating the extent of wheat surplus available in the State. Again Punjab tops the list followed by Haryana and Uttar Pradesh.

II

DETERMINANTS OF WHEAT PROCUREMENT

The volume of procurement primarily depends upon the availability, prices and administrative regulations imposed by the government. The availability of wheat essentially has two facets. One is related to the marketable surplus of wheat with the farmers, a close proxy to which can be the output of wheat (QW) itself. This

TABLE II. WHEAT PROCUREMENT: REGIONAL DIMENSIONS

(thousand tonnes)

States	Average of 1965-66 to 1967-68	Average of 1968-69 to 1970-71	Average of 1971-72 to 1973-74	Average of 1974-75 to 1976-77	Average of 1977-78 to 1979-80	Average of 1980-81 to 1982-83	1983-84	1984-85
Punjab	366*	1,867	2,941	2,129	3,547	4,290	5,165	4,863
	(70.66)	(71.34)	(60.28)	(50.67)	(57.08)	(63.80)	(62.33)	(54.09)
	/11.18/	/44.20/	/54.70/	/39.26/	/52.32/	/53.30/	/56.24/	/51.62/
Uttar Pradesh	62	346	935	940	1,300	1,132	1,445	2,021
	(11.97)	(13.22)	(19.16)	(22.37)	(20.92)	(16.84)	(17.43)	(22.48)
	/1.54/	/5.69/	12.33	/13.05/	12.88	/9.50/	/9.45/	/12.43/
Haryana	—	322	704	530	1,077	1,128	1,400	1,772
		(12.30)	(14.43)	(12.61)	(17.33)	(16.80)	(16.89)	(19.71)
		/18.91/	/30.28/	/25.67/	/35.99/	/32.04/	/32.22/	/39.58/
Madhya Pradesh	82	43	102	179	43	77	58	76
	(15.83)	(1.64)	(2.08)	(4.26)	(0.69)	(1.15)	(0.70)	(0.84)
	/5.66/	/2.11/	/3.79/	/7.03/	/1.44/	/2.72/	/1.57/	/1.85/
Rajasthan	8	25	115	262	167	54	178	216
	(1.54)	(0.96)	(2.36)	(6.24)	(2.69)	(0.80)	(2.14)	(2.40)
	/0.86/	/1.99/	/6.17/	/13.32/	/6.44/	/2.01/	/4.71/	/6.25/
Bihar	—	3	22	51	43	12	21	34
		(0.11)	(0.45)	(1.21)	(0.69)	(0.18)	(0.25)	(0.37)
Others	—	11	60	111	37	29	19	8
		(0.42)	(1.23)	(2.64)	(0.60)	(0.43)	(0.22)	(0.08)
All-India	518	2,617	4,879	4,202	6,214	6,724	8,286	8,990
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
	/4.56/	/14.20/	/19.52/	/16.87/	/19.36/	/19.07/	/19.49/	/19.91/
Punjab, Uttar Pradesh and Haryana	428	2,535	4,580	3,599	5,924	6,551	8,010	8,656
	(82.63)	(96.87)	(93.87)	(85.65)	(95.33)	(97.42)	(96.66)	(96.28)

Sources: 1. Government of India: Bulletin on Food Statistics, Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi (various issues).

2. Government of India: Estimates of Area and Production of Principal Crops in India, Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi (various issues).

* Inclusive of Haryana.

Figures in brackets reflect the relative share of that State in all-India wheat procurement.

Figures within slashes indicate wheat procurement as a ratio of wheat production in the respective States.

is basically a supply factor and indicates the capacity of the farmers to sell. The higher the output, the higher is likely to be the volume of procurement and vice versa. The second facet of availability relates to the government, which is indicated by its closing stocks (CSW) in relation to its 'normal commitments' generally approximated by the issues of wheat from PDS, (ISW). This measure of the availability of wheat with the government (CSW/ISW) is mainly a demand factor and reflects the willingness on the part of the government to procure. This would be of great interest if the motive behind procurement is to meet the requirements of PDS. On *a priori* reasoning, an increasing (CSW/ISW) ratio will imply a comfortable situation on the food front and therefore, may result in reluctance on the part of government to procure more and vice versa.

Storage capacity with the government, traders and farmers, can affect the availability variable, and thereby influence the wheat procurement through supply or demand side. It is difficult, however, to capture the interaction of this factor (storage capacity) because of the absence of reliable statistics on storage capacity with the farmers and private traders and ambiguity regarding the channel through which storage capacity variable operates.

The second factor, which is expected to influence wheat procurement is the procurement price relative to the open market wholesale price of wheat. This ratio is likely to capture the 'substitution effect' on volume of procurement, *i.e.*, the farmers' decision to allocate their sales of wheat between the government and private traders.

Administrative measures that exert their influence on wheat procurement refer primarily to zoning restrictions and the method of wheat procurement. Zoning restricts the movement of wheat by private traders across a specified boundary. When the government restricts the movement of wheat from surplus zones to the deficit ones, it 'bottles up' the surplus area and creates there a situation of excess supply. Open market price of wheat in surplus zones is likely to be depressed towards the floor, which is the procurement price offered by the government. The government can, in that situation, mop up the surplus with ease. There are, however, certain difficulties in empirically estimating the exact impact of this variable on the volume of procurement. Zoning area did not remain uniform over time. In fact, sometimes it was a strict single-State zoning while at other times it was multi-State. Operating within this constraint we have tried to capture the effect of zoning through a dummy variable, which takes the value of unity during years of zoning and zero during the free movement period.

The method of wheat procurement has differed from State to State at a given point of time, and also varied over a period of time in a given State. The procurement method has indeed stretched from the nationalisation of wholesale wheat trade, to support operations with 'rights of pre-emption' in between. This wide diversity in the methods of procurement adopted by different States over a period of time makes it difficult to quantify this factor satisfactorily. We have used the dummy variable to represent variations in procurement method. This takes the value of unity during 1973-74 and 1974-75 and zero during the rest of the years. 1973-74 was an year of wholesale wheat trade take-over by the government and 1974-75 an year of traders' levy.

III

ESTIMATION OF DIFFERENT HYPOTHESES

On the basis of the above discussion, various hypotheses have been empirically estimated at all-India level for the post-1965-66 period. The results of regression equations estimated through ordinary least squares method are presented in Table III, The variables used in these equations are defined below:

PRW(t) = Procurement of wheat during the marketing year t (April to March), in thousand tonnes.

QW(t) = Output of wheat that enters the market in the marketing year t, in thousand tonnes. This output will correspond to the (t—l) agricultural year (July to June).

(PPPI/TAPI)(t) = Ratio (per cent) of the indices of procurement price actually paid (inclusive of bonus adjustment) to open market wholesale price of wheat (twice adjusted), in the marketing year t. In the years when procurement price differed from State to State, all-India procurement price was derived as a weighted average of these State prices. Relative shares of each State in the all-India *procurement* acting as the relevant weight. (Procurement prices relate to the common white variety of wheat.)

ZON(t) = Dummy variable that takes the value of unity during the years of zoning (single-State or multi-State) and zero during the years of free movement of wheat.

LVY(t) = Dummy variable taking the value of unity during 1973-74 and 1974-75 which were characterised by wholesale wheat trade take-over and traders' levy respectively, and zero during the rest of the years.

(CSW/ISW)(t—l) = Ratio (per cent) of the closing stocks of wheat with the government (Central and States) to the issues of wheat made through PDS by the government (Central and States) during the previous calendar year. (Stocks are inclusive of the quantity of wheat in transit, docks and holds of steamers; and issues are exclusive of any exports to foreign countries.)

Equation (1) sheds light on the relative roles of output and price factors in determining wheat procurement. The coefficients of both the output and price variables are statistically significant at 1 and 5 per cent levels respectively. The output elasticity turns out to be approximately 70 per cent higher than the price elasticity of wheat procurement. It may be emphasised here that TAPI used in

TABLE III. WHEAT PROCUREMENT EQUATIONS (DEPENDENT VARIABLE IS WHEAT PROCUREMENT)

Equation/Period		Constant	Regression coefficients of					$\bar{R}_2$	D-W
			QW(t)	$\frac{PPPI}{TAPI}(t)$	ZON(t)	LVY(t)	$\frac{CSW}{ISW}(t-1)$		
(1) 1965-66 to 1981-82	...	—5824.50	0.2599	34.485				.927	2.23
		(—3.831)	(12.864)	(2.300)					
			/1.549/	/0.913/					
(2) 1965-66 to 1981-82	...	—6620.82	0.2706	38.203	283.79			.924	2.14
		(—3.304)	(10.118)	(2.325)	(0.629)				
			/1.612/	/1.011/	/0.038/				
(3) 1965-66 to 1981-82	...	—5938.41	0.2595	35.593		52.369		.922	2.28
		(—2.796)	(12.057)	(1.708)		(0.080)			
			/1.546/	/0.942/		/0.001/			
(4) 1967-68 to 1981-82	...	—6639.08	0.2739	40.497			—2.308	.885	2.13
		(—3.151)	(8.324)	(2.22)			(—0.671)		
			/1.555/	/0.970/			/—0.041/		

Figures in brackets are the t-values and within slashes the relevant elasticities at mean values.

equation (1) is not the Economic Adviser's Wholesale Price Index (EAWPI) of wheat but a modified version of wholesale market price of wheat.[4]

Equations (2) and (3) admit the influence of administrative measures like zoning and levy respectively, along with output and price factors, The results are not very encouraging. The explanatory power of the equations ($\bar{R}^2$) remains almost unchanged with the induction of these variables. Moreover, the coefficients of ZON(t) and LVY(t), though containing the expected signs, are not statistically significant. Equation (4) tests the hypothesis whether the government's willingness to procure, as reflected by (CSW/ISW)(t—l) ratio, plays any major role in wheat procurement. The result is negative because the coefficient of the government stock variable is statistically insignificant at 15 per cent level, not withstanding its expected sign. The output and price variables, in any case, remain the dominant factors affecting the volume of wheat procurement.

It may be noted that variables ZON(t), LVY(t) and (CSW/ISW)(t–1) are primarily demand factors, reflecting the willingness on the part of the government to procure more of wheat. But all these variables turn out to be statistically insignificant, which imply that wheat procurement is basically determined by supply forces rather than by demand factors. And within supply forces, the output dominates. The policy implication of such a result seems to be that output augmentation should receive more attention than frequent hiking up of procurement price or resorting to regulatory mechanisms.

The findings of this paper are in sharp contrast with the results obtained by Raj Krishna and Raychaudhuri (1980). In their study, they found: "The elasticity of procurement with respect to output turns out to be as high as 2.32 and the elasticity of procurement with respect to the procurement price/wholesale price ratio is even higher (3.72)"[5] * The result of Raj Krishna-Raychaudhuri is also at variance with most of the other studies, which have used State level data. For example, Kahlon and Tyagi (1983) estimated wheat procurement functions for Punjab, Haryana and Uttar Pradesh for the period 1967-68 to 1978-79. In connection with their results they emphasised that "it was the volume of production that largely determined the size of procurement and the procurement prices had little significance."[6] Similarly, Sidhu (1979) found that for the Punjab for the period 1967-68 to 1976-77, price factor was not statistically significant even at 10 per cent

4. The rationale and methodology of constructing this TAPI need description. It may be briefly mentioned that the Economic Adviser's Wholesale Price Index of wheat at the all-India level is constructed on the basis of price quotations from 23 market centres. Seven of these markets quote wholesale issue price. First adjustment, therefore, is to take this component of issue price out. Second adjustment is to make the representation of each State in the all-India wheat price index proportional to its relative share in the all-India wheat production. The resulting series is termed as twice adjusted wholesale price index of wheat (TAPI). For greater details regarding the construction of TAPI, see Ashok Gulati: Some Aspects of Agricultural Price Policy—A Case Study of Wheat in India, Ph.D. Thesis, Department of Economics, University of Delhi, Delhi, August 1984, pp. 97-99, pp. 125-126.

5. Raj Krishna and G. S. Raychaudhuri: Some Aspects of Wheat and Rice Price Policy in India, World Bank Staff Working Paper No. 381, International Bank for Reconstruction and Development, Washington, D. C., April 1980, p. 23.

* This 3.72 is printer's devil. Actually it is 2.72. This was confirmed with Raychaudhuri (co-author of the paper) and also from *Indian Economic Review*, Vol. XIV (New Series), No. 2, October 1979, where a part of this paper was published under the title "Some Aspects of Wheat Price Policy in India", p. 112.

6. A. S. Kahlon and D. S. Tyagi: Agricultural Price Policy in India, Allied Publishers Private Limited, New Delhi, 1983, p. 467.

level.[7] George (1985) also found output to be the main determinant of wheat ,procurement at the all-India level for the period 1963-64 to 1983-84.[8]

These contradictory results led us to explore deeper into the Raj Krishna-Raychaudhuri equation. In our numerous experiments it was discovered that the result of Raj Krishna-Raychaudhuri holds good for the period 1965-66 to 1975-76 only. If this period is extended upto 1981-82, even with their specification of the price variable, the elasticity of procurement with respect to price becomes lower than that with respect to wheat output. And if specification of the price variable is improved upon by substituting TAPI in place of EAWPI (which suffers from errors of observation) in the denominator, even for 1965-66 to 1975-76 period, the price elasticity would be lower than the output elasticity of wheat procurement.

To sum up, procurement operations in the foodgrain sector serve the twin objectives of feeding PDS as also to provide an effective support price to the farmers, thereby rendering an important contribution to the consumers' and the farmers' economic welfare. The quantum of wheat procurement has been fluctuating over time, depending upon the government's policy of imports and administrative measures. Empirical testing of the various factors, that seem relevant on *a priori* reasoning, determining the level of wheat procurement reveals that procurement quantum is mainly influenced by supply forces and not by demand factors. Output plays the major role, followed by price. Administrative measures like zoning, somewhat unexpectedly, do not turn out to be statistically significant. The obvious policy implication of the empirical results presented here is that to augment wheat procurement, the authorities need to pay greater emphasis on output than on price.

Ashok Gulati*

7. D. S. Sidhu: Price Policy for Wheat in India, S. Chand and Company Ltd., New Delhi 1979, p. 89.

8. P. S. George: Aspects of Procurement and Distribution of Foodgrains in India, Working Papers on Food Subsidies, Number 1, International Food Policy Research Institute, Washington, D. C., 1985.

* Lecturer, Department of Economics, Deshbandhu College, University of Delhi, New Delhi-19.

The author is thankful to Prof. Dalip S. Swamy with whom he had the benefit of fruitful discussions.