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IMPACT OF DUAL PRICING POLICIES ON AGRICULTURAL PRODUCER INCENTIVES IN INDIA

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ABSTRACT

This paper examines the theoretical and practical effects of the government procurement and dual pricing on the producer prices for rice and wheat in India. Contrary to the previous research this paper shows that the impact depends on whether the subsidies are infra-marginal or extra-marginal in nature. Econometric analysis of the pooled cross sectional and time series data for the selected states reveals a negative impact of the grain procurement on the weighted average prices of rice and wheat. Thus, the so called Dantwala-Mellor hypothesis of positive impact is not supported by the data.

Introduction

Dual pricing, also known as two-tier pricing or producer levy schemes, basically refer to the policies under which farmers supply a levied quota to the government procurement agency at a pre-set, generally lower than the open market price, and the rest of the marketable surplus to the open market. Such policies have been implemented in several developing countries namely, India, Bangladesh, Egypt, and Ethiopia. The effectiveness of such policies has been the focus of debate in economics literature since the sixties. The main controversy is about the impact of these policies on producer incentives and on further development of agriculture sector. One school of thought led by Dantwala (1967) and Mellor (1968) proposes that these polices prove to be beneficial to farmers and thereby to agriculture since they result in increased average prices and real farm incomes received by farmers. More recent studies, one by Hayami, Subbarao and Otsuka (1982) and another by Chetty and Srinivasan (1990) used more analytical approach and basically confirmed the "Dantwala-Mellor hypothesis" of positive impact on the producer prices.

On the other hand, Schultz (1964, 1978) has maintained that this

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government intervention causes severe distortions in the incentive system of agriculture and acts as an impediment to the development of agriculture. Similarly, Tweeten (1989) has argued that these and other economic policies in developing countries lead to "economic degradation". He writes.

> "Most developing nations cannot afford to slove the food price dilemma by distorting prices to producers or by universal food subsidies to consumers. Developing nations cannot afford the large public service sector required to administer price controls...." (p. 1103).

His argument that developing countries' web of policies has caused economic degradation, indirectly supports the "Schultz hypothesis".

The purpose of this paper is to examine the effects of the dual pricing of agricultural commodities and to establish conditions under which the above opposing hypotheses are likely to be true. First, a brief section on the dual pricing and public distribution system in India is presented. Then a review and discussion of the existing theories explaining the mechanism of dual pricing policy is presented. This is followed by the development of a more general model that could deal with the infra-and extra-marginal subsidy cases. This model will then be tested by using the pooled cross-sectional and time series data from selected states in India. Finally, the results of the empirical estimation are discussed.

Dual Pricing and Public Distribution in India

Government intervention in the food grain market in India has had a long history. During the early period the intervention was mainly in terms of grain imports. Since 1950, however, procurement of domestic grain is used as an important policy instrument. Procurement of grain, mostly rice in early period, was made at lower than open market prices. Some times procurement was absent especially during the years of high production. Since the establishment of the Food Corporation on India (FCI) in 1965 until recently, the procurement and distribution polices have been implemented much more systematically.

The volume of procurement of food grains has gone up from about one million ton per year during the early 1960s to slightly over 20 million tons in 1984/85. The figures for 1984/85 show a procurement of 9.86, 10.35 and 0.21 million tons of rice, wheat and coarse grains, respectively. The procurement has declined since that year. As shown in Figure 1, over

PERCENT

the years the share of wheat has increased at a faster rate that that of rice. About 2% of the total production of food grains was procured during 1960s, which has gone up to 8.83% in 1971/72 and to 12.54% in 1984/85. From 1984/85 production, 16.83% of rice, 23.40% of wheat and 0.68% of coarse grains were procured. Implications of these high amounts are even more clear when it is realized that a much larger percentage of the marketable surplus is procured by various government agencies. According to George (1988), 35% a' .60% of total marketed surplus for rice and wheat, respectively, was procured by the state in 1980/81. The method of procurement varied from state to state and commodity to commodity, but monc' oly procurement, graded levy (i.e., levy at progressive rates), levy on producers and/or millers and traders, and preemptive open market purchases were the common procurement methods (Saran, 1971; and Sarma, 1988). In general, wheat was procured in the market at a fixed procurement price or by indirect levy through traders and rice by direct levy on producers and/or indirect levy through millers.

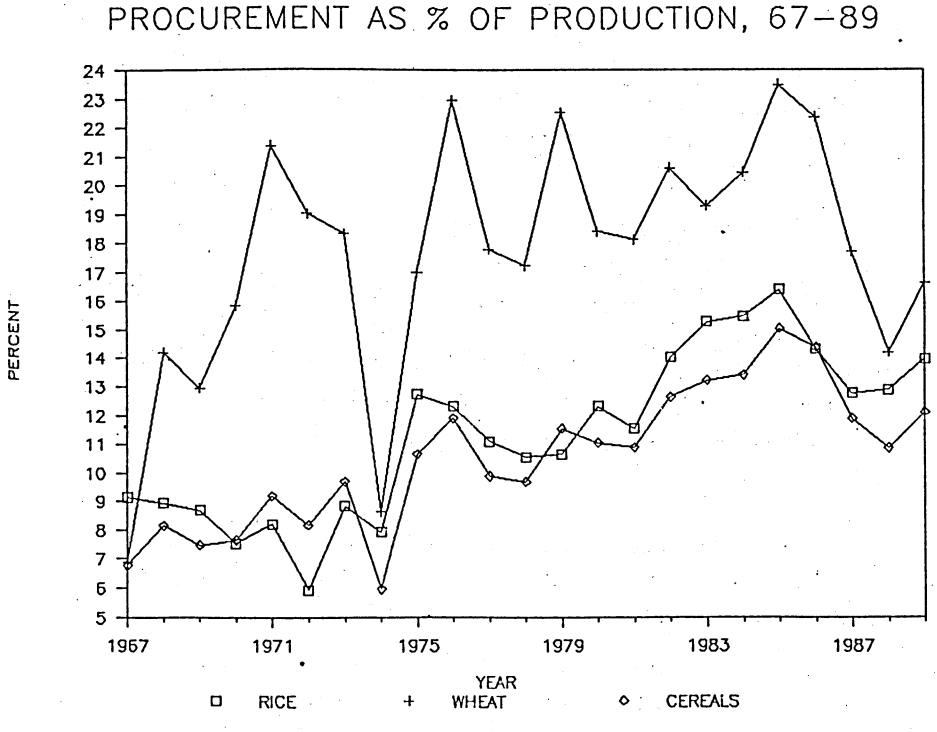

Fig. 1 : Procurement of rice, wheat and cereals as percentage of total production, 1967-89.

Under the dual pricing system, procurement is made at a lower than the prevailing market prices. While the open market prices vary from market to market and period to period, George (1988) states:

> "The farm harvest price in many states was higher than the procurement price. Punjab, where rice is not consumed in large quantities, was the only state where the farm harvest price of paddy was more or less the same as the procurement price." (Based on George, 1983).

Calculations made by Radhakrishna and Indrakant (1988) showed that in Andhra Pradesh, a rice surplus state, the procurement prices varied from 62% to 90% of the wholesale prices for rice. As shown in Table 1, the procurement price as a percentage of the all India wholesale open market price averaged 41% for rice and 79% for wheat over 1966/67 to 1986/87 period.

The quantities procured by the state and the central governments are redistributed to consumers at concessional prices through a network of govenment shops known as the "fair price shops". The intended target group is the low income consumers who otherwise cannot afford to buy food at the regular market prices. Generally, all consumers can buy in these shops, but certain self targeting elements such as lower quality grain, long lineups, irregularity of supply, etc. dissuade consumers, with high incomes and high opportunity cost of their time, from taking advantage of the subsidized prices.

The total quantity distributed through the public distribution system in recent years has been less than the quantity procured. As a result, India has built buffer stocks for emergency purposes. The total stocks (buffer and operational) were 29.2 million tons on July 1, 1985 (Sarma, 1988). According to George (1985) about 85% of the total public supplies are distributed in urban areas. Approximately 85% of the poor live in rural areas who do not necessarily benefit from this subsidization.

The dual pricing model

The mechanism and the implications of the dual pricing system under compulsory government procurement are explained by Hayami *et al.* (1982). A simple graphical expose of their model is presented below.

The system involves disaggregation and separation of consumers into two groups as shown in Figure 2a. One market is government controlled and intended for the "poor" It is characterized by more elastic demand (Dp). The remaining is an open market for the "rich" characterized by

Table 1 : All India procurement and open market prices deflated by the all commodity wholesale price index (1970-71=1)

Year	Rice			Wheat		
	Procure-ment Price (1) Rs/tonne	Market Price (2) Rs/tonne	Price Ratio (1)/(2)	Procure-ment Price (1) Rs/tonne	Market Price (2) Rs/tonne	Price Ratio (1)/(2)
66-67	412.61	1206.28	0.34	544.65	947.65	0.57
67-68	475.13	1230.45	0.39	609.11	907.74	0.67
68-69	476.10	1167.00	0.41	616.77	908.47	0.68
69-70	458.66	1141.24	0.40	677.80	877.84	0.77
70-71	496.86	1102.21	0.45	745.91	812.59	0.92
71-72	477.78	1128.38	0.42	691.65	788.56	0.88
72-73	408.35	1126.47	0.36	580.08	689.86	0.84
73-74	420.71	1181.35	0.36	456.78	821.46	0.56
74-75	420.93	1200.45	0.35	597.27	813.85	0.73
75-76	429.23	1007.53	0.43	609.05	737.80	0.83
76-77	399.14	988.90	0.40	566.34	709.76	0.80
77-78	416.22	963.76	0.43	608.11	706.72	0.86
78-79	457.24	1057.42	0.43	618.61	721.48	0.86
79-80	382.91	911.19	0.42	471.58	578.39	0.82
80-81	377.16	888.55	0.42	466.95	576.42	0.81
81-82	417.10	972.79	0.43	497.72	602.14	0.83
82-83	408.43	1054.48	0.39	489.47	610.80	0.80
83-84	407.19	924.95	0.44	455.09	535.08	0.85
84-85	399.09	894.74	0.45	444.38	523.06	0.85
85-86	392.26	893.59	0.44	435.25	536.67	0.81
86-87	378.79	896.35	0.42	419.19	534.47	0.78
Average=>			0.41			0.79

Source: Ministry of Agriculture. Government of India. Various issues of Agricultural Prices in India and Bulletin on Food Statistics.

more inelastic demand (Dr). Hayami *et al* call this the "effective implementation" case where the two markets can be effectively separated. The aggregate demand (D) and the given short run and long run supply curves (Ss and Sl, respectively) result in an equilibrium price of Pe and the market equilibrium quantity of Qe. With a set of simplifying assumptions listed in their paper, it had been shown that the impact of

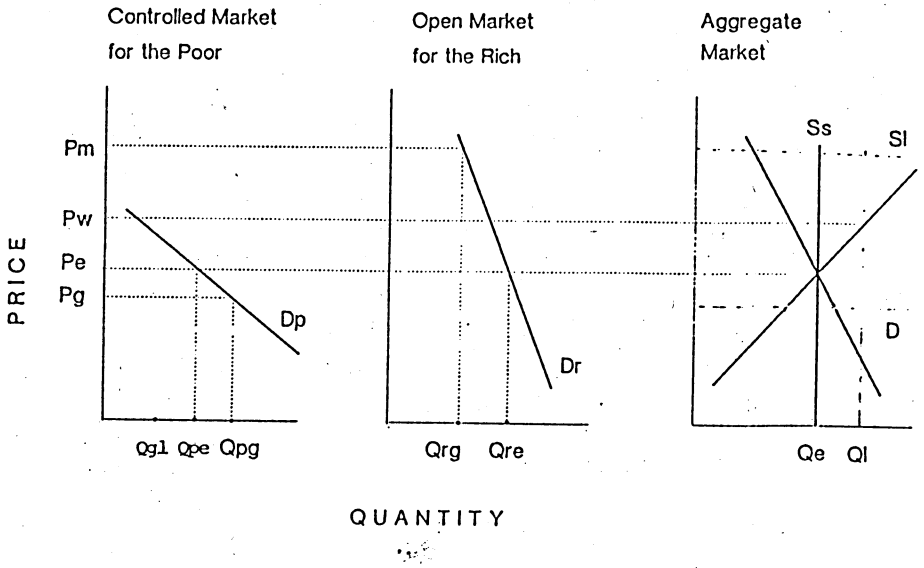

Fig. 2a : Dual pricing model under government procurement scheme (Adapted from Hayami et al).

rationing at a subsidized price, such as Pg, under this situation results in the weighted average price (Pw) greater than Pe.[1] However, it will be argued in this paper that the impact depends on the total quantity available to each consumer in relation to his/her total demand i.e. whether the subsidy is infra-marginal (less than the maximum quantity demanded at the subsidized price) or extra-marginal (equal to the maximum quantity demanded) in nature.

The Short-Run Impact: Assume that the price in the controlled market is set at Pg i.e. below the equilibrium price. First consider a case where a small quantity (less than Qpe), such as Qg1 is rationed in the poor market. It is obvious that this subsidy program would have no effect on the open market prices. The poor consumers buy Qg1 at Pg and the difference between Qpe and Qg1 at the open market price of Pe. In fact

[1]Price Pw is a weighted average of the government price (Pg) and the open market price (Pm). The weights are the relative shares of the quanties sold to government and to the open market, respectively. To keep the model as simple as possible it is assumed that the procurement price is equal to the distribution price and the open market price is equal to the producer price. However, even under the assumption of a constant percentage marketing margin the qualitative results of this analysis are likely to hold.

the rationing up to quantity such as Qpe has no impact on the open market price. The weighted average price, however, will keep falling up to Qpe since the quantity procured and rationed increases (i.e. the weight given to Pg, the lower of the two prices, increases). Rationing beyond Qpe in the poor market will result in shrinking that much supply from the open market and hence the open market price will start rising. This transfer of quantity from the open to controlled market is maximum when the rationed quantity is equal to the quantity demanded at Pg (at quantity such as Qpg). At this point of extra-marginal subsidy, the open market price and the weighted average price are maximum. These price movements corresponding to different levels of procurement quantity are shown in Figure 2b.

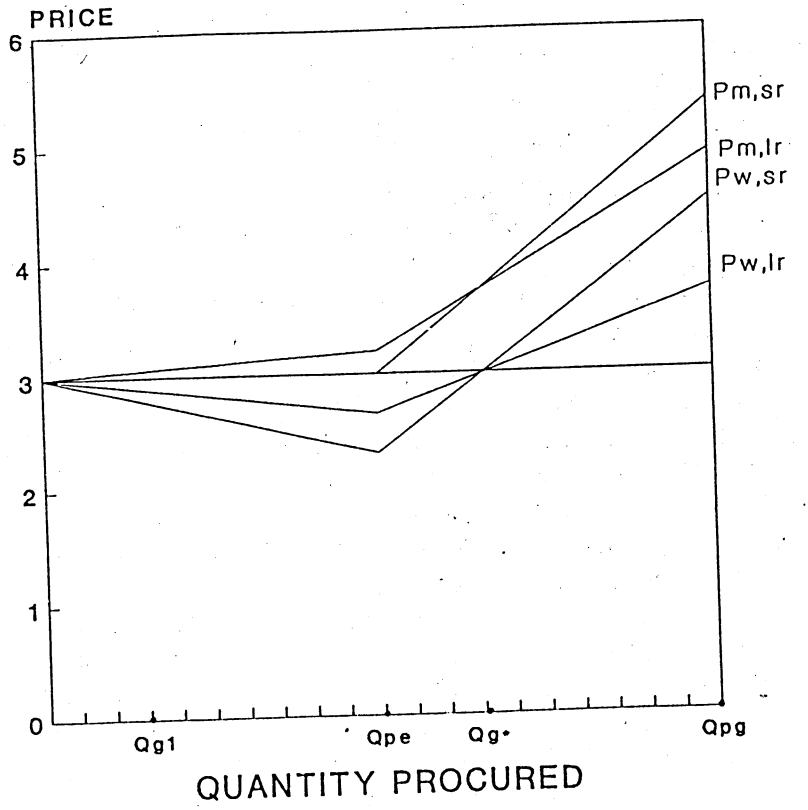

Fig. 2b : Impact of procurement on market price (Pm) and weighted average price (Pw) in the short-run (sr) and the long-run (lr).

At a point such as Qg* the increase in Pm is just enough to compensate the tax implied in procurement price. Thus at this point, the Pw is equal to Pe. At point such as Qpg, it is a case of extra-marginal subsidy. At the subsidized price of Pg an additional quantity of Qpe to Qpg will be demanded in the controlled market. If that same amount is taken out of the free market (i.e. Qre to Qrg), the open market price will rise more than proportionately. This is explained by the relatively high inelastic demand (or conversely high price flexibility coefficient) in that market. Consequently the weighted average price (Pw) received by farmers in the short run will be higher than Pe i.e. the price without this government intervention. This is basically the Dantwala-Mellor hypothesis. Hayami *et al* have basically analyzed this last case where subsidy is seen as extra-marginal. Rationing at quantities above Qpg is not possible unless the subsidized price is further lowered.

The Long-Run Impact: The long-run implications are slightly different since farmers are expected to adjust their production in response to the changing weighted average prices. At point such as Qg1, since the short-run Pw is lower that Pe, the production next year will be lower in response to this price. Assuming a cobweb type of supply response and that the elasticity of supply is lower than the elasticity of open market demand, a long-run convergence will occur but at a quantity lower than Qe, open market price higher than Pe and weighted average price lower than Pe. The long-run convergence price Pw cannot be equal to (or greater than) Pe in this case. If it did the total supply will be equal to old Qe and the open market price (Pm) will be equal to Pe. If Pm is equal to Pe and Pg is lower than Pe, the Pw will have to be lower than Pe, irrespective of the weights attached to them. Consequently, it is a *market clearing disequilibrium* solution. It is disequilibrium because the solution is not at quanity Qe and price Pe. Nevertheless, the market is cleared as the sum of the quantities demanded in the two markets is equal to the total production. Thus in the long-run, Pm will continue to rise and Pw will continue to fall gradually up to a point such as Qpe (see figure 2b). At Qpe, the long-run weighted price and therefore the production will be the lowest. Here on, however, more rationing will result in quantity withdrawal from the open market and consequently an upward pressure on Pm. Thus, the Pw and hence the long-run output start rising at Qpe. At Qg*, the short-run and the long-run market prices are the same and thus the short-run and the long-run weighted average prices are equal to Pe. At Qpg (a point on the demand curve in the poor market), due to a positive supply response to the high

short-run Pm and Pw the long-run Pm and Pw will be lower than their short-run levels but above the equilibrium price level (Pe).

The scheme described above involves an implicit income subsidy to the poor segment of the population and as such is likely to have some positive income effect on the consumption of the grains being considered. This will push up the Pw line in Figure 2b as quantity procured and distributed increases. However, this income effect, in aggregate terms, is likely to be small and not alter the shape of the Pw line substantially.

As seen from the above theoretical discussion, it is clear that the impact of procurement policy depends on the level of quantity rationed in relation to the quantity demanded by the poor i.e. whether the subsidy is infra-marginal or extra-marginal. In other words, it is possible to observe negative, positive or no effect of procurement on the weighted average price depending on the level of procurement (and distribution) in relation to the demand curve in the subsidized market. Dantwala-Mellor effect (i.e. Pw>Pe) is true only in Qg* to Qpg procurement range. The Hayami *et al* results are a special case when the procurement is assumed to be at Qpg. The crucial point therefore would be to establish this level of rationing to avoid adverse effect on the producer prices.

To test the model empirically, one would require data on consumption of the rationed commodity by source. Unfortunately, the National Sample Survey (NSS) data do not provide a breakdown of purchases from the ration shops and purchases from the open market at the household level. For lack of such appropriate *historical* data one may be forced to look at the indirect evidence of the infra-marginality or extra-marginality of subsidy by way of the impact of the subsidy schemes over a relatively long period. One such model is discussed below.

Reduced Form Model of Weighted Average Price: The above analysis leads us to a derivation of an econometric model where the calculated weighted average price (procurement price and the open market price weighted by the relative shares of quantities sold to government procurement scheme and to the open market, respectively) can be expressed as a function of the quantity procured and rationed (as shown in figure 2b). This model assumes that whatever is procured is rationed. However, in reality the situation is much more complicated. Prior to 1975 in India the procurement of rice was lower that the quantity rationed; the gap was met by imports. In more recent years the quantity procured has been higher than the quantity distributed through the public distribution system. Generally, the surplus has been used to build buffer stocks. When the rationed quantity exceeds procured quantity, the open

market price and thereby the weighted average price can be seen as a result of two separate policies-a procurement policy and an import policy. Similarly, during the years of surplus procurement, it can be seen as a result of the procurement policy and the buffer stock policy. Thus in addition to the "procurement variable" another variable named "procurement-distribution gap" was introduced. The negative values of this variable are similar to the import quantities and the positive values similar to the stocks. Of course, a final *reduced form* of the price model will have to include the demand shifting and supply shifting factors. Thus the following average price model for rice and wheat was specified:

$$WP_{ijt}=f\ (QP_{ijt},\ QG_{ijt},\ PO_{jt},\ PI_{jt},\ CS_{ijt},\ PS_{ijt-1},\ TC_{ijt},\ RN_{ijt})$$

Where, WP=real weighted average price

QP=procurement by state and central governments with six months lag behind the open market prices.

QG=quantity procured minus quantity distributed through the public distribution system (PDS). This is also with a six months lag behind the open mrket prices.

PO=total population.

PI=real per capita income.

CS=real price of a consumption substitute commodity.

PS=real price of production substitute commodity with one year lag.

TC=technological change.

RN=annual rainfall.

These variables take values for ith commodity (i=two commodities, Rice and Wheat), for jth state (j=7 for rice and 5 for wheat), and for tth year (t=1968 to 1987); t-1 refers to one year lag period.

For lack of precise and appropriate data, rice yield (RYD) and wheat yield (WYD) were taken as proxies for TC and RN combined in the final model.[2] To avoid the problem of too few degrees of freedom, the cross sectional and time series date were pooled for each of the two commodities separately. Thus following three alternate models were selected for analysis:

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[2]It is well known that procurement is influenced by total crop output. Thus inclusion of yield and the procurement in the reduced form model may create the problem of multicollinerity. However, yield variable as a proxy for the level of technology and rainfall is expected to shift supply appropriately and influence the market price and therby weighted average price. Moreover, *ex-post,* the correlation between these two variables is found to be relatively low (equal to 0.172 in the case of wheat and 0.627 in the case of rice).

Model 1: With common coeffcients for all states for all variables:

$$WP_{jt}=a_0+a_1 *QP_{jt}+a_2 *QG_{it}+a_3 *PO_{jt}+a_4 *PI_{jt}+a_5 *CS_{jt}+a_6 *PS_{j,t-1}+ a_7*YD_{jt}+U_{jt}$$

Where, U_{jt} is a stochastic disturbance term.

Model 2: With separate intercepts for different states:

$$WP_{jt}=a_{01} D_1+a_{02} D_2+...+a_{on}D_n +a_1 *QP_{jt}+a_2 *QG_{it}+a_3 *PO_{jt}+a_4 *PI_{jt}+a_5 *CS_{jt}+a_6 *PS_{j,t-1}+a_7 *YD_{jt}+U_{jt}$$

Where $D_j=1$ for the jth state; =0 otherwise.

Model 3: With separate procurement quantity (QP) variable for different states:

$$WP_{jt}=a_0+a_{11} *QP_{it} D_1+a_{12} *QP_{it} D_2+...+a_{1n} *QP_{it} D_n +a_2 *QG_{it}+a_3 *PO_{jt}+a_4 *PI_{jt}+a_5 *CS_{jt}+a_6 *PS_{j,t-1}+a_7 *YD_{jt}+U_{jt}$$

Each of these three models was specified for rice and for wheat. The procedure used to derive the necessary data for some of the important variables is discussed below.

The data

The annual data were collected for the period of 1968 to 1987 for rice and wheat sectors at the national level from various published sources. Most of the time series on prices (procurement and wholesale open market prices), production, and grain procurement are published by the Ministry of Agriculture (see references under Government of India). The nominal prices are deflated by the all commodity wholesale price index (with 1970-71 equals 1) to convert them into real prices. The series on weighted prices has been derived. The general procedure used is as follows. The estimated market arrivals from villages to assembling markets for selected years has been published. Based on these an average marketable surplus percentage figure for the whole sample period was arrived at for each state. Thus marketable surplus was estimated by multiplying the average marketable surplus percentage by the annual production. Then the open market quantity is derived by subtracting the procurement quantity from this estimated marketed surplus. Negative quantities were replaced with the lowest past value as an approximation

of the open market sales. The relative shares of the open market quantity and the procurement quantity form the two necessary weights. The data were gathered for seven rice growing states, namely, Andhra Pradesh, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh, Bihar and West Bengal, and five wheat growing states, namely, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh and Bihar.

Results

The above mentioned three models are estimated using the pooled data. After initial estimation it was discovered that the correlation coefficient between variables QP and QG was 0.94 for rice and 0.989 for wheat. In order to avoid the problem of multicollinearity QG was dropped from the model. In many states the consumption substitute crop and the production substitute crop is the same. Hence based on the *ex-poste* analysis the less significant of the two (i.e. PS) was removed and instead TIME was added as a catch-all variable. The method of estimation is the generalized least squares (GLS) that accounts for the cross-sectionally correlated and time-wise autocorrelated error structure. The results of estimation are presented in Table 2.

Overall very high R-Squared values are obtained for all six models. The R-squared range of 0.95 to 0.99 implies that, depending on the model chosen, all explanatory variables together explain 95 to 99 percent of the variation in the weighted average prices for the 1968-87 period. Most of the variables are significant at 1 to 10 percent levels.

To test the theory proposed in Figure 2b, it is important to look at the impact of the procurement quantity (QP) variable.[3] The sign of the QP variable is negative in all six models. The variable is also highly significant in most cases, particularly at the national level (aggregate of the selected states). At the state level, procurement (and its public distribution) is shown to have significant impact in Andhra Pradesh, Haryana, Uttar Pradesh, and West Bengal for rice and in Haryana, Madhya Pradesh and Uttar Pradesh for wheat (see Model 3 results in Table 2). The coefficients are not significant in Punjab, Madhya Pradesh and Bihar for rice and Punjab and Bihar for wheat. In Bihar and Madhya

[3]To test the theory proposed in Figure 2b, a quadratic form involving a square term of variable QP was tested for all six equations. Both QP and QP^2 variables were found insignificant at ten percent level. Also, the coefficient of QP^2 was negative. Hence, the quadratic form was rejected.

Table 2: Parameter estimates of Rice and Wheat weighted average producer price equations

Table 2: Parameter estimates of Rice and Wheat weighted average producer price equations

INDEPENDENT VARIABLE	RICE			WHEAT		
	MODEL 1	MODEL 2	MODEL 3	MODEL 1	MODEL 2	MODEL 3
Common Intercept	56.199 (0.45)		277.15 (1.43)	1201.1 (14.27)***		1257.8 (13.98)***
Intercept-Andhra Pradesh (AP)		493.77 (3.06)***				
Intercept-Haryana (HY)		39.098 (0.22)			1174.7 (15.29)***	
Intercept-Punjab (PB)		380.06 (1.66)*			(1248.4 (17.44)***	
Intercept-Madhya Pradesh (MP)		428.5 (2.81)***			1304.3 (14.73)***	
Intercept-Uttar Pradesh (UP)		602.01 (3.05)***			1507.4 (12.26)***	
Intercept-Bihar (BH)		389.45 (2.33)***			1399.9 (13.92)***	
Intercept-West Bengal (WB)		597.55 (3.38)***				
Quantity Procured (QP)	-0.051 (4.00)***	-0.058 (4.76)***		-0.029 (3.13)***	-0.021 (2.06)**	
QP-AP			-0.052 (4.43)***			
QP-HY			-0.467 (4.52)***			-0.034 (1.93)*

QP-PB			-0.07 (1.65)			-0.012 (0.93)
QP-MP			-0.145 (1.59)			-0.719 (6.22)***
QP-UP			-0.168 (2.63)***			-0.032 (2.36)***
QP-BH			-0.202 (0.48)			-0.236 (0.60)
QP-WB			0.66 (3.58)***			
Population (PO)	0.244 (0.45)	-6.155 (4.93)***	-2.376 (2.84)***	-2.137 (8.30)***	-5.352 (4.84)***	-2.303 (7.87)***
Per Capita Income (PI)	0.112 (1.45)	0.182 (1.53)	0.191 (1.64)	-0.354 (7.64)***	-0.332 (6.00)***	-0.407 (7.79)***
Consump. Substitute Price (CS)	0.788 (15.28)***	0.652 (11.73)***	0.624 (9.17)***	0.147 (8.60)***	0.084 (3.76)***	0.114 (4.30)***
Crop Yield (YD)	0.358 (1.97)**	0.459 (2.05)**	0.746 (2.38)***	-0.437 (1.33)	-0.198 (0.42)	-0.755 (2.50)***
TIME	0.08 (1.54)	0.077 (1.42)	0.065 (1.04)	-0.127 (3.18)***	-0.108 (3.04)***	-0.1 (2.27)**
Buse Raw-Moment R-squared	0.9498	0.9869	0.9821	0.9883	0.9932	0.9883

Note: t statistics are shown in parantheses. Also*, **and*** indicate the level of significane at 10,5 and 1 percent, respectively. The method of estimation is GLS with cross-sectionally correlated and time-wise autocorrelated error structure.
Estimation is based on the pooled cross- sectional and time series data: 1968 to 1987 period; for seven rice growing states (140 observations) and five wheat growing states (100 observations).

Pradesh where procurement, especially of wheat, is low the marginal impact of procurement on weighted average price is found to be much higher compared to other states. Punjab, on the other hand, is a surplus state and accounts for major portion of the procurement of wheat, historically, and of rice more recently. There the procurement price acts as a support price and not as a low levy price. Hence either a positive or non-significant impact may be expected. It should be noted that the impact measured in the models specified here is basically of short term nature.

The other variables such as population (PO), and price of a consumption substitute (CS) were significant in both rice and wheat equations. In addition, variable-crop yield (YD) was significant in rice equations and per capita income (PI) and TIME were significant in wheat equations. With the exception of PI in wheat equation and PO in both equations, all variables have expected signs.

The average impact of the procurement variable, measured by the price flexibility coefficient (percentage change in the producer weighted average price (WP) for a percent change in quantity procured (QP) is presented in Table 3. In general, the impact in small. At the aggregate level, a 10 percent increase in QP is estimated to have a less than 0.5

Table 3: Price flexibility coefficients (i.e. percentage change in weighted average producer price (WP) for a percentage change in quantity procured (QP) for Rice and Wheat at the sample mean levels

STATE	RICE	WHEAT
Andhra Pradesh (AP)	-0.010***	—
Haryana (HY)	-0.045***	-0.0111*
Punjab (PB)	n.s.	n.s
Madhya Pradesh (MP)	n.s.	-0.0166***
Uttar Pradesh	-0.016***	-0.0109***
Bihar (BH)	n.s.	n.s.
West Bengal (WB)	-0.020***	—
All Selected States-Model 1	-0.042***	-0.052****
All Selected States-Model 2	-0.049***	-0.011**

Note: ***.**and * indicate the level of significance of the variable QP in the regression models at the levels of 1, 5 and 10 percent respectively.
n.s.=not significant at the 10 percent level of significance. Hence statistically the impact is assumed to be equal to zero.

wheat growing states (100 observations).

percent decrease in WP (Model 1 and Model 2 results). For rice producing states, this coefficient ranges from 0.01 in Andhra Pradesh to 0.045 in Haryana and in wheat producing states from 0.0109 in Uttar Pradesh to 0.0166 in Madhya Pradesh. The procurement did not seem to have been large enough to exert a significant positive impact on the weighted average prices received by farmers. Thus according to the results, the Dantwala-Mellor hypothesis (that the procurement policies have had positive impact on prices received by farmers) is not supported in either the case of wheat or rice.

The average impact of procurement is generally lower on wheat producer prices than on rice producer prices. This is perhaps due to the fact that the procurement prices as percentage of the open market prices, in general, have been much lower for rice compared to wheat. The average procurement price for 1966/67 to 1986/87 was about 41 percent for rice and 79 percent for wheat (see Table 1). Another explanation of this result could be that the rice procurement as a percentage of total production has been much lower than the wheat procurement. The 1967-1989 average procurement of rice was 11.4 percent as opposed to wheat procurement which was 17.7 percent (Bulletin on Food Statistics, Govt. of India). This may have pushed the wheat procurement in positive impact region, as per Figure 2b, during certain years of the sample period. Also, a large part of wheat is distributed to institutions (military, hospitals, etc.) and for rural work programs. This would have the effect of putting upward pressure on the open market prices and ultimately the weighted average prices of wheat.

Conclusions

It is shown in this study that on theoretical ground it is possible to have negative or positive impact of government procurement through direct or indirect levy on producers, at less than open market prices, on the producer incentives. However, the empirical results of the study indicate that the past policies of government procurement have had a significant negative effect on the weighted average price of rice as well as of wheat. This result holds particularly at the aggregate level and for four out of seven rice producing states and for three out of five wheat producing states. Thus the empirical evidence does not seem to support the Dantwala-Mellor hypothesis of positive impact. However, the negative impact of the procurement (and susbsequent public distribution of it) on the weighted average prices is fairly small; the overall price flexibility

coefficient (percent change in weighted price for one percent change in procurement quantity) was found to vary from -0.01 to -0.05. The results show that, in general, the impact is larger for rice producers compared to wheat producers.

Most farmers sell their marketable surplus at harvest time when the market prices are the lowest. Thus they may not necessarily be able to take advantage of the higher open market prices predicted in the model. It is likely that due to the imperfect market mechanism (lack of price quantity market information to the farmers, lack of transportation, competition, etc.) farmers may not necessarily benefit from the higher open market prices. Large farmers with storage facilities and financial backing may benefit from higher market prices, thus creating income inequality to some extent.

One of the main reasons for the dual pricing policies is the food security argument i.e. the governments would like to provide basic food items at subsidized prices to the low income consumers, who cannot afford to buy them at the open market prices resulting in increased food availability and consumption by these groups. This is a worth while objective for any society. However, the dual pricing policy involving compulsory government procurement or other indirect means may prove to be counter productive for the long term development of agriculture sector. The system as such involves a massive government bureaucracy for production assessment, grain procurement, storage and distribution activities which are prone to breed inefficiencies and market distortions. Based on the experience generated from the operation of such systems, alternatives that are less distorting such as food stamps or other food distribution mechanisms require a serious consideration. Of course, implementation of such a system is likely to be difficult but it may provide a more efficient and less distorting alternative.

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