Working Paper

PRICE POLICY AND INCOME OF
THE FARMERS IN INDIA

by

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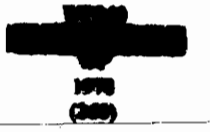
W P No. 260
Dec. 1978



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PRICE POLICY AND INCOME OF THE FARMERS IN INDIA

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Agriculture provides employment to about 70 per cent of population and generates about 50 per cent of national income in India. Further, its relative position in this respect has not changed favourably and significantly in the last two decades. This clearly indicates the importance of agriculture and the relative poverty of farmers in the country.

Ahluwalia's study has revealed that poverty in India is inversely related to the level of agricultural output per head.[1/] Thus, the development of the country cannot be ensured without fostering development of agriculture. One way to develop agriculture is through formulating and implementing an appropriate price policy.

Agriculture in India is characterised by the preponderence of small farmers. Farmers with a land of less than 5 acres account for more than 60 per cent of the cultivating population and operate on less than 25 per cent of the land. The social justice requires

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*The author is grateful to Miss Anjana Vyas for her help in data collection, and to Mr. Deepak Chawla and Mr. R. Padmanabhan for some computer runs.

1/ See Ahluwalia (1978).

that the development in agriculture be such that it brings benefits to the small farmers. Ahluwalia's study of Punjab and Haryana states indicates that, although there has been a rapid growth in agricultural output per head, real income has remained more or less stagnant for lower income groups. This is an undesirable consequence of agricultural development. An appropriate price policy could perhaps be designed to attain growth with social justice.

The paper presents a brief review of the agricultural price policy and examines its impact first on the income of all farmers, and then on that of small farmers. Certain measures are also suggested to enhance the effectiveness of the price policy.

Price Support Policy

The price policy of one or the other kind has been in existence in India ever since the Second World War (1939-1944). In the beginning, it was directed to deal with the problems of inflation and acute food shortages. Such a policy continued till June 1952 when a policy of gradual relaxation of controls and a shift to free trade was decided upon. In 1953-54, there was a record production of cereals, and all the controls on food prices were withdrawan. For about two years between mid-1953 and mid-1955, the food position greatly improved and prices fell sharply. Consequently, the need to prevent prices from falling too low

and thereby to protect the producer interest was felt, and the price support policy for foodgrains was revived. The minimum prices were fixed for wheat, jowar, and maize between 1944 and 1946. For each crops, sugarcane, and cotton they had been in vogue since 1934-35 and 1943-44, respectively. Again, towards the end of 1955, prices of foodgrains started rising and attention was thus focused on the problem of holding down prices to protect the consumer interest. The Second Plan (1956-57 to 1960-61) brought inflation and so the price controls continued. On the whole, during the first two plans (1951-52 to 1960-61), the price policy remained largely consumer-oriented and this involved some restraining of producer prices. The third plan (1961-62 to 1965-66) marked real beginning of the price support policy in India. The Agricultural Prices Commission was set up on January 1, 1965 to advise the government on a continuing basis with regard to the price policy of agricultural commodities.

The principal objectives of the price policy have been:

a) To step up agricultural production by assuring the producer that the prices of his produce will not fall below a certain minimum level.

b) To prevent excessive rise in prices and thereby protect the consumer interest, and

c) To stabilize prices to curb speculative activities.

The main constituents of the price policy have been:

a) Announcement of minimum support prices for major farm products well in advance of the sowing season.

b) Fixation of procurement prices of major foodgrains for purchasing a part of the marketable surplus at below market prices.

c) Running a public distribution system for safe-guarding the interests of low income consumers.

d) Building up buffer stocks to meet emergency situations and to mitigate seasonal and annual price fluctuations.

The Government of India has now been fixing from time to time the minimum procurement (levy) and issue prices for the major foodgrains like rice, wheat, jowar, maize, and bajra; and the minimum prices for the major non-food (cash) crops like cotton, sugarcane, and jute. These prices are sometimes fixed uniformly throughtout the country while at other times they vary from state to state.

Farming is an uncertain occupation and this is more so in a country like India where the nature plays a domimant role. If the nature is favourable, there could be a bumper crop. But if the bumber crop leads to a significant fall in price, it may not bring any advantage to the farmer. Furthermore, if the farmer puts in extra efforts to augment production through adoption of improved technology, prices may again fall and thus nullify the advantage of increased production. Also, there is a gap of four to five months between sowing and

harvesting. Thus, fixing of the minimum support prices well before the sowing season go a long way in reducing the impact of uncertainty facing the farmer.

Procurement and distribution of foodgrains have been a regular phenomenon in India. Procurements have generally been less than the amount distributed, the difference is met through imports and change in stocks. It will be seen from Table 1 that during 1951 to 1976, procurements varied betwen 0.1 and 10.7 per cent of production while distribution fluctuated between 2.3 and 19.5 per cent of production. The number of fair price shops functioning in the country was 160,000 at the end of 1971 and it increased to 243,000 at the end of 1977. The storage capacity owned by the government and the Food Corporation of India was 231,600 tonnes in 1955-56, 696,000 tonnes in 1960-61, 3451,500 tonnes in 1970-71 and 5470,500 tonnes in 1975-76. Although the storage capacity has increased at a faster rate than the production of foodgrains (vide Table 1), the former still accounts for less 5 per cent of the latter. Thus, the government operations in foodgrains have been of a relatively small order.

Farm prices at the time of the harvest are generally the lowest of the prices during the year. It is argued that due to lack of storage facilities and/or need for money, farmers sell the bulk of their produce immediately after the harvest and at a

Table 1 : Production and Government Operations in Food Grains

Year	Production	Internal Procure-ment	Imports	Distri-bution	Procure - ment	Distri-bution
	(Million tonnes)				As proportion of production (%)	
1951	55.01	3.83	4.80	7.99	7.0	14.5
1952	55.60	3.48	3.93	6.80	6.3	12.2
1953	61.78	2.09	2.04	4.60	3.4	7.4
1954	72.33	1.43	0.83	2.15	2.0	3.0
1955	70.74	0.13	0.51	1.64	0.2	2.3
1956	69.34	0.04	1.37	2.08	0.1	3.0
1957	72.46	0.30	3.62	3.05	0.4	4.2
1958	66.63	0.53	3.21	3.98	0.8	6.0
1959	78.80	1.81	3.85	5.16	2.3	6.5
1960	77.12	1.28	5.12	4.94	1.7	6.4
1961	82.33	0.54	3.50	3.98	0.7	4.8
1962	82.40	0.48	3.64	4.37	0.6	5.3
1963	80.33	0.75	4.56	5.18	0.9	6.5
1964	80.70	1.43	6.27	8.67	1.8	10.7
1965	89.37	4.03	7.46	10.08	4.5	11.2
1966	72.35	4.01	10.36	14.09	5.5	19.5
1967	74.23	4.46	8.67	13.17	6.0	17.7
1968	95.05	6.81	5.69	10.22	7.2	10.8
1969	94.01	6.38	3.87	9.39	6.8	10.0
1970	99.50	6.71	3.63	8.84	6.7	8.9
1971	108.42	8.86	2.05	7.83	8.2	7.2
1972	105.17	7.67	0.45	10.48	7.3	10.0
1973	97.03	8.42	3.61	11.41	8.7	11.8
1974	104.66	5.65	4.87	10.79	5.4	10.3
1975	101.06	9.56	7.41	11.25	9.5	11.2
1976	120.83	12.85	6.52	9.17	10.7	7.6
1977	NA	7.39	4.32	6.62	NA	NA

Sources: 1. Minhas (1976)

2. India, Ministry of Agriculture and Irrigation, Dept. of Food, Annual Reports.

relatively low prices. Table 2 provides data on quarterly farm sales of a few major commodities. It is seen that 55 to 74 per cent of the farm sales of rice, jowar, bajra, and groundnut take place within six months from the beginning of the harvest season (October). However, in the case of wheat and gram, the first six months constitute only about 22 to 37 per cent of the total market arrivals. This could be because the wheat and gram producers are comparatively well-off, and, therefore, their holding capacity is greater. In any case, the data reveal that distress sales, in general, are quite significant.

An examination of quarterly sales data over time reveals no significant reduction in post-harvest sales. Thus, the hypothesis that farmers have become more price conscious and that they are holding out for higher prices to be realised in the lean season is not upheld by the data.2/

The data on monthly farm sales and prices of paddy and jute in two districts in Assam and Andhra Pradesh are presented in Table 3. The Assam data reveal that the highest sale of paddy was during the months of December, January, and February. The price was lowest

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2/ Krishnan (1965) inferred the same conclusion by examining 1960-61 through 1963-64 data.

Table 2 : Quarterly Farm Sales (All India)

(Percentages)

Year	October-December	January-March	April-June	July-September
		RICE		
1960-61	25.3	33.5	23.9	17.3
1964-65	35.8	30.7	21.5	12.0
1970-71	36.4	32.3	20.4	10.9
1973-74	42.9	30.9	15.3	10.9
		WHEAT		
1960-61	48.3	14.7	15.6	21.4
1964-65	52.3	19.6	14.0	14.1
1970-71	56.8	21.4	12.6	9.2
1974-75	55.9	17.8	11.6	14.7
		JOWAR		
1960-61	19.2	41.1	27.6	12.1
1964-65	26.7	41.5	20.9	10.9
1970-71	24.5	35.1	22.6	17.8
1973-74	18.2	35.9	26.8	19.1
		GRAM		
1960-61	55.9	16.1	13.5	14.5
1964-65	58.4	15.1	10.2	16.3
1970-71	57.5	15.3	15.7	11.5
1974-75	45.0	19.0	15.7	20.3
		BAJRA		
1964-65	42.3	28.2	16.5	13.0
1970-71	34.7	29.2	13.7	22.4
1973-74	41.2	31.5	14.7	12.6
		GROUNDNUT		
1964-65	53.5	20.3	15.1	11.1
1970-71	46.7	23.1	17.8	12.4
1973-74	40.4	24.5	20.4	14.7

Source : India, Directorate of Economics and Statistics: Bulletin on Food Statistics, Various Issues.

Table 3 : Farm Sales and Prices Over Months

Month*	PADDY (Nowgong, Assam.)		PADDY (West Godavari, A.P)		JUTE (Nowgong, Assam.)	
	Proportion of arrivals to total (%)	Price (Rs.per quintal)	Proportion of arrivals to total (%)	Price (Rs.per quintal)	Proportion of arrivals to total (%)	Price (Rs.per quintal)
January	13.5	47.3	13.2	53.7	3.7	126.7
February	11.7	54.0	8.5	54.8	6.0	137.3
March	10.3	57.8	6.2	56.9	2.0	128.1
April	8.3	69.5	9.7	59.0	1.4	137.3
May	10.2	74.2	12.0	61.9	0.2	136.8
June	1.8	52.5	7.2	62.8	0.5	147.7
July	7.7	50.8	7.3	64.7	3.8	138.3
August	3.6	51.0	5.3	65.7	11.2	116.7
September	4.0	51.7	4.6	67.5	22.0	101.3
October	4.3	48.0	7.4	67.1	29.5	113.2
November	6.5	42.3	8.0	59.1	9.7	107.5
December	18.1	46.7	10.6	60.4	10.0	114.0
Total Sale (average price)	100.0	53.82	100.0	61.13	100.0	125.4

*Nowgong data are for 1968-69 and West Godavari data are averages of 1969, 1970 and 1971.

Sources: 1. Goswami; and Gogoi (1971)

2. C.H.H. Rao and Subbarao (1976)

immediately after the harvest, i.e., in November and it remained at a relatively low level in the months of the highest sales. In the case of Jute, the maximum sales took place in the months of September and October, when the price was either lowest or a relatively low one. Similar situation prevailed in Andhra Pradesh. Thus, it is true that farmers sell the bulk of their produce at low prices during the post-harvest period.

One of the objectives of the price policy is to check seasonal price differences and this is carried out through building and unloading buffer stocks. The extent to which the price policy has succeeded in this respect could be examined by comparing the differences between the harvest prices and the annual prices over time. However, since the harvest prices have varied from state to state for all commodities, such a comparison is not possible directly. A close look at the data revealed no significant improvement in this respect. This could have been due to the government's inability to maintain a sizeable buffer stock for this purpose.

Price Policy and the Farmers' Income

The Indian farmer is poor in relation to the non-farming community in the country. One of the objectives of the agricultural price policy is to promote farmer's interest. However, it should be noted that since the farming population is rather large, the burden of the subsidy to the farmer will be heavy and borne by a relatively small population. There will be opposition in the non-farming community. The price policy formers will have to bear this fact in mind. The only factor in favour of helping the farmer is that his per-capita income is relatively low.

The farmer derives most of his income from crop production, off-farm labour, and cottage industries. Since the data on income accruing from the latter two occupations are not available, the paper examines only the impact of the price policy on income arising from crop production. The gross crop income equals crop production multiplied by crop price. Since the farmer consumes a part of his production, the inflow of money accruing to him (net income) through this occupation equals his marketed surplus multiplied by crop price. An increase in both gross and net income is desirable but some spokesmen of farmers would argue

that unless the net income increases, there is no material increase in the farmers' income. In any case, it is clear that the increase in agricultural income can be brought about by increasing farm price, farm production, land yield, marketed surplus, or by changing the cropping pattern in favour of more profitable crops. The impact of the price policy on each of these factors is examined.

Impact Through Increased Farm Price

Since there are various factors which influence the farm price, it is difficult to isolate the impact of agricultural prices policy on agricultural price. However, an attempt is made in this section to study this through various approaches. One such approach is to examine the relationship among minimum price, procurement price, issue price, and market price.

Relationships Among Minimum, Procurement, Issue and Market Prices

Minimum support price is the price at which the government is ready to buy any amount of produce from the farmer. It is fixed well before the sowing season and is intended to safeguard the farmer in the event of a crash in the market prices. If the minimum price covers the cost of production and allows for normal profits, it serves the purpose of an insurance price also. The procurement price is the price at which official agencies purchase the commodity either for public distribution or for building buffer stock. Issue price, in

contrast, is the price at which official agencies sell the commodity to the selected sections of the economy. The market price is the price which prevails in the private tradings. Normally, the relationship among these four prices is such that the market price is greater than the issue price, which is greater than the procurement price, which is greater than the minimum price.

An examination of the data on the prices of all the pertinent commodities, reveals that the minimum price is almost irrelevant and that procurement and issue prices have little significance. This is because the minimum price is ineffective in the period of bad and normal crops, and in the periods of good crops, the higher procurement price itself is converted into the support price. As seen above, both procurement and distribution have formed a small portion of the total output, and barring Gujarat and Kerala, there has been no public distribution in rural areas. All this has rendered the procurement and issue prices of little significance. Nevertheless, it is possible that announcements of minimum procurement and issue prices might have their impacts on market prices of farm products. However, in the absence of continuous and comparable time series data on these various prices, an enquiry into this is not possible.

Price Policy and Agriculture Price: Another approach to examine the impact of the price policy on farm price is to see if the former has had any significant effect on the latter. To study this, the following model was hypothesized:

$$P_a = f_1 (M, O_a, D)$$

$$f_{11}, f_{13} > 0 > f_{12} \quad \ldots . \qquad (1)$$

where P_a = agricultural price (Index)

M = quantity of money (Rupees billions)

O_a = agricultural output (Rupees hundred millions at constant prices)

D = dummy variable for price policy

f_{1i} = partial derivative of function f_1 with respect to the i^{th} explanatory variable.

Although the price policy has existed ever since the Second World War, it assmed real significance only after the formation of the Agricultural Prices Commission in January 1965. The dummy variable in the model above is, thus, defined to take a value of zero upto 1964-65 and one thereafter. Using the annual time series data for 1955-56 to 1974-75, the linear version of equation 1 was estimated through the Ordinary Least Squares (OLS) method. The results are presented in Table 4.

Table 4 : Agricultural Price Equations.

Equation Number	Dependent Variable	Coefficient (and t-value of) Constant	M	O_a	D	R^2	R^{-2}	DW
4.1	P_a	63.28 (1.26)	2.41 (7.01)	-0.051 (0.62)	13.19 (0.97)	0.95	0.93	1.21
4.2	P_a	56.51 (1.14)	2.58 (8.64)	-0.045 (0.55)		0.94	0.93	1.25

The coefficients of all the three explanatory variables take the correct signs. However, only the coefficient of M is statistically significantly different from zero by the t-test.[3/] The incremental contribution of dummy variable to changes in agricultural price is also very small, for its inclusion increases the value of R^2 by 0.01 only. Thus, it could be concluded that the price policy has had no significant impact on agricultural price.

Trends in Agricultural and Non-Agricultural prices: Yet another method of examining the impact of price policy on farm price is to see if the agricultural price has increased at a rate faster than the non-agricultural price, particularly since the appointment of the Agricultural Prices Commission. This could be pursued by

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3/ The Durbin-Watson test for serial correlation has not been carried out at all and the t-test for the significant of regression coefficient has been conducted selectively only. However, the values of the Durbin-Watson Statistic (DW) and of the t-ratio have been reported for each equation so that the interested readers could easily conduct these tests.

two ways. One, by examining the trends in the prices of commodities bought and sold by farmers. Second, by comparing the trends in agricultural and non-agricultural prices, of which manufacturing price is the major component.

Thamarajakshi has prepared the annual composite price indices of all agricultural products purchased by non-agriculture, and all non-agricultural products purchased by agriculture for the period 1951-52 through 1974-75.4/ The compound annual growth rates in these two series have been computed for the period 1955-56 to 1974-75 and its two sub-periods, viz. 1955-56 to 1964-65, and 1965-66 to 1974-75. The results are reported belw in Table 5:

Table 5: Annual (Compund) Growth Rates of Selected Variables - 1.

(Percentages)

Commodity Group	Price		
	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75
Non-agricultural commodities purchased by Farmers	4.13	7.84	6.14
Agricultural commodities sold by Farmers	5.56	9.54	8.00

Source: Compiled from Thamarajakshi (1977)

4/ See Thamarajakshi (1977).

It is seen that in all the three periods, prices of agricultural commodities sold by farmers have increased at a faster rate than those of non-agricultural commodities purchased by farmers. This indicates that the terms of trade has moved in favour of farmers. Furthermore, the difference in the growth rates is larger for the second sub-period (9.54 - 7.84) than for the first sub-period (5.56 - 4.13). This indicates a favourable effect of price policy on farm prices.

The growth rates in prices and productions of all agricultural commodities and of all manufacturing commodities for the same periods as above are provided in Table 6:

Table 6: Annual (Compound) Growth Rates of Selected variables -2

(Percentages)

Commodity Group	PRICE			PRODUCTION		
	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75
All agricultural commodities	6.01	9.57	8.21	2.57	2.70	1.85
All manufacturing commodities	3.22	7.98	6.00	4.31	3.01	4.12

Sources: Compiled from -

1. Central Statistical Organisation: National Accounts Statistics, Various Issues.
2. Reserve Bank of India, Bulletin, Various Issues.

Again the prices of agricultural commodities have grown at a faster rate than those of non-agricultural commodities during all the three periods. However, the difference in the rates of growth here is more in the first sub-period (6.01 - 3.22) than in the second sub-period (9.57 - 7.98). Since agricultural production has increased at a slower rate than industrial production in all the three periods, it could be argued that the cause of favourable terms of trade for agriculture could be the unfavourable production trend in it. However, Mitra does not accept this logic, for there have been periods, for example 1965-66 to 1970-71, during which even though farm production increased at a faster rate than the industrial production, farm price also increased at a faster rate than the non-farm price. Mitra argues that the favourable terms of trade for agriculture are the result of deliberate policy decisions.5/

Trends in Prices and Productions of Commodities Under and Outside Price Supports: One more method to examine is through a study of trends in prices and productions of commodities under and outside price supports. Table 7 provides the relevant growth rates data

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5/ See Mitra (1977), pp. 108-112.

Table 7 : Annual (Compound) Growth Rates of Selected Variables - 3

(Percentages)

Commodity	PRICE		PRODUCTION			YIELD			ACREAGE		
	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75	1955-56 to 1964-65	1965-66 to 1974-75	1955-56 to 1974-75
Rice	4.72	10.36	7.89	3.62	2.78	1.91	2.19	1.92	0.90	1.47	0.67	0.93
Wheat	6.43	9.79	8.53	3.42	8.83	5.22	2.51	4.91	3.23	0.82	3.72	1.92
Jowar	3.41	8.94	6.19	3.71	3.03	2.11	3.31	4.06	2.51	0.18	-1.31	-0.46
Bajra	4.48	9.57	7.89	2.80	-1.51	-0.30	2.39	-0.67	-0.17	0.42	-0.60	-0.03
Barley	7.88	8.34	8.48	-1.11	2.79	0.54	1.38	1.93	1.43	-2.46	0.89	-0.85
Cotton	2.74	10.50	6.96	3.11	4.56	2.72	3.09	4.40	2.92	0.34	-0.44	-0.30
Jute	4.73	1.22	4.89	3.66	0.00	0.28	1.87	1.33	0.57	1.84	-1.33	-0.29
Groundnut	8.68	10.82	10.56	4.51	1.83	1.41	0.77	2.73	-0.20	3.69	-0.72	1.68
Sesamum	3.82	6.60	8.25	0.36	-0.79	-0.88	0.00	0.57	-0.53	0.81	-1.17	-0.13
Tobacco	NA	4.20	NA	1.53	2.20	2.01	1.72	1.20	1.57	-0.10	1.00	0.46

Source : Compiled from India, Central Stastical Organisation (1977): Basic Statistics Relating to the Indian Economy, 1950-51 to 1975-76.

for various commodities for the twenty years period as a whole and its two sub-periods of ten years each. During the first sub-period (1955-56 to 1964-65), groundnut achieved the highest growth rate both in its price and production. The second place was occupied by barley in price and jowar in production. During the second sub-period (1965-66 to 1974-75), groundnut came again first in price and wheat came first in production; the second place went to cotton both in price and production. The price of wheat also went up by a little less than the highest growth rate, but the production of barley increased at a rate which turned out to be less than one-third of the highest growth rate. This suggests that the commodities under price supports (wheat and cotton) earned a better price than others (barley). This finding is corroborated by the trends in price and production of seasmum, an another commodity outside the purview of price support policy. In spite of only a fraction of one per cent growth rate in its production, its price went up by less than half of the maximum growth rate in the first sub-period; and even though its production declined, its price increased by a little over half of the maximum growth rate in the second sub-period. Furthermore, the data reveal that in general the rate of increase in prices of commodities under price support relative to their corresponding productions was greater in the second sub-period than in the first sub-period. All this leads one to conclude that price supports have positive effect on farm prices.

To conclude various approaches have found the impact of price supports on farmers' income to be positive, though in one case it was found to be statistically insignificant.

Impact Through Increased Production

The price support policy could lead to an increase in farm income through increase in agricultural production, which could be achieved through increase in either average or land yield. However, this would be possible only if production, yield, and/or acreage are sensitive to changes in relative price. In what follows, the impact of relative price on production and yield is examined with the aid of regression analysis, and then the annual growth rates in production, yield, and acreage of some commodities under and outside price support are compared to infer conclusions on this issue.

Sensitiveness of Production to Relative Price: There are number of studies on price sensitiveness of acreage under, or production of, individual crops. However, there is perhaps no study on the responsiveness of total agricultural output to changes in (relative) prices. Such a study is needed to ensure increase in agricultural production or farm income as a result of price support policy. It is argued that the price elasticity of supply for the whole of

agriculture sector is considerably lower than that for individual commodities, and that it is even lower in a low income traditional agriculture as compared to a high income modern agriculture.[6/] Further, agricultural production as compared to industrial production is, in general, less elastic to price, for the nature plays a greater role than the human factor in agriculture while quite the opposite is true in industry. Besides, agriculture is a best example of perfect competition. As there are too many producers, production cannot be easily adjusted to demand even when prices are high.

For analysing the impact of relative price on agriculture output, production function studies would not be useful.[7/] This is because such studies relate output to inputs only. The following model has been specified for the purpose:

$$O_a = f_2 \left(\left(\frac{P_a}{P_m} \right)_{-1}, Y, I, R \right) \quad \ldots\ldots (2)$$

$$f_{21}, f_{22}, f_{23}, f_{24} > 0$$

where the new notations are

$\left(\frac{P_a}{P_m} \right)_{-1}$ = agricultural price relative to manufacturing price lagged one period (Ratio of indices)

6/ See Mellor (1968)

7/ Krishna (1967)

Y = land yield (Rupees hundred thousands per hectare)

I = irrigation (Percentage of total land irrigated)

R = rainfall (Thousand millimetres)

The linear version of equation 2 is estimated by the OLD method using annual time series data for the period 1955-56 to 1974-75. The selected estimates are presentedin Table 8.[8/] All the explanatory variables assume the correct sign and almost all of the variations in agricultural output is explained by the causal variables. The coefficient of only yield variable alone is significant throughout. However, if theyield variable is not used, both irrigation and rainfall turn out to be significant variables. These results are not surprising because, in fact yield depends on irrigation and rainfall to a large extent and, therefore, its inclusion with the latter two variables render them insignificant. Thus, theoretically as well as statistically, equations 8.2 and 8.4 are the most acceptable ones. In both these quations, relative

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8/ Besides trying several other combinations of the explanatory variables, the quarterly rainfall data and the agricultural price relative to non-agricultural price instead of P_a/P_m were also tried. However, the results with these alternative specifications were not good and hence they are not reported here. The same was true for the land yield equation, reported earlier.

Table 8 : Agricultural Production Equations

Equation Number	Dependent Variable	Coefficient (and t-value) of					R^2	$\bar{R}^2$	DW
		Constant	$\left(\frac{P_a}{P_m}\right)_{-1}$	Y	I	R			
8.1	O_a	-197.4 (4.11)	30.22 (0.51)	141.76 (4.59)	7.89 (1.41)	1.90 (1.39)	.97	.96	2.06
8.2	"	-113.6 (1.71)	46.58 (0.53)		27.33 (4.97)	6.37 (4.42)	.92	.90	1.91
8.3	"	-191.2 (4.22)		142.7 (4.74)	9.31 (1.96)	1.78 (1.36)	.97	.96	2.08
8.4	"	-208.0 (4.41	50.67 (1.06)	188.7 (13.24)			.96	.96	2.01
8.5	"	165.2 (1.34)	514.10 (4.86)				.57	.52	1.06
8.6	"	-203.00 (4.31)		199.8 (20.59)			.96	.95	1.90
8.7	"	24.99 (0.31)			35.95 (9.33)		.83	.81	2.33

price turns out to be an insignficant variable. Thus, it can be concluded that aggregate agricultural production is not quite sensitive to changes in relative price.9/

Although the relative price variable is found to have a coefficient which is not significantly different from zero, it will be useful to compute price elasticity of output, among other elasticities. The mean elasticities corresponding to the selected equations 8.2 and 8.4 are reported in Table 9.

Table 9 : Mean Elasticities of Agricultural Production.

Equation No.	With respect to			
	Irrigation	Rainfall	Yield	Relative Price
8.2	0.735	0.343	-	0.071
8.4	-	-	1.197	0.077

The relative price elasticity of output ranges between 0.071 and 0.077. Thus, the price sensitivity is not only statistically insignificant, but it is also small in magnitude. Under such a

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9/ The relative price variable is highly significant in equation 8.5. But this equation is mis-specified, for it ignores the other pertinent causal variables. This equation and some others are reported here simply for comparison purposes.

situation, price support policy could be of little help in augmenting production. In contrast, the yield, irrigation, and rainfall elasticities of output are significant as well as large. Thus, the ways to improve farmers' income through increased agricultural production lies not so much in ensuring favourable terms of trade to agriculture but in creating more irrigation facilities.

Sensitiveness of Yield to Relative Price: It is aruged that if the terms of trade are favourable, farmers make greater efforts to improve land yield.[10/] To examine this the following model has been postulated:

$$Y = f_3\left(\left(\frac{P_a}{P_m}\right)_{-1}, \quad I, \quad R, \quad EMI \text{ or } EMI/_{EAI}\right) \qquad \ldots\ldots (3)$$

$$f_{31}, \; f_{32}, \; f_{33}, \; f_{34} > 0$$

where the new notations are

EMI = expenditure on modern inputs (Rupees hundred millions at 1960-61 prices.)

EMI/EAI = expenditure on modern inputs as proportion to total expenses on all inputs (percentage)

The OLS estimates of the linear version of equation 3 for various combinations of causal variables obtained by using annual data for 1955-56 through 1974-75 are provided in Table 10. All the variables

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10/ Price sensitiveness of land yield.(productivity) rather than of labour productivity is studied here, for land is scarce while labour is abundant in India.

Table 10 : Land Yield Equations

Dependent Variable	Coefficient (and t-value) of						R^2	$\bar{R}^2$	DW
	Constant	I	R	EMI	$EMI/_{EAI}$	$\left(P_a/P_m\right)_{-1}$			
Y	1.90 (2.81)	0.0002 (1.91)	0.035 (3.72)	0.010 (2.59)		1.035 (1.99)	.87	.83	1.56
Y	1.93 (2.97)	0.0002 (1.93)	0.035 (3.86)		0.029 (2.74)	0.968 (1.89)	.88	.84	1.55
Y	3.04 (7.78)	0.0002 (1.52)	0.033 (3.21)	0.016 (5.95)			.84	.80	1.24
Y	2.96 (7.94)	0.0002 (1.55)	0.033 (3.42)		0.044 (6.25)		.85	.81	1.24
Y	0.57 (1.12)	0.0002 (1.66)	0.044 (4.42)			2.074 (5.38)	.81	.77	1.46
Y	2.30 (3.57)	0.0001 (0.34)	0.061 (3.93)				.48	.39	0.61
Y	2.03 (2.79)		0.036 (3.59)	0.010 (2.41)		0.898 (1.61)	.84	.80	1.58
Y	2.06 (2.95)		0.036 (3.72)		0.030 (2.61)	0.825 (1.51)	.85	.81	1.59
Y	3.02 (7.45)		0.034 (3.25)	0.015 (5.58)			.81	.78	1.31
Y	2.95 (7.58)		0.035 (3.44)		0.043 (5.85)		.83	.80	1.34
Y	4.31 (42.10)			0.019 (6.47)			.70	.67	1.35
Y	4.25 (39.11)				0.054 (6.55)		.70	.67	1.39

enter with a priori expected sign and the causal variables explain an overwhelming part of the variations in land yield. On statistical ground, equation 10.2 is the best of all the 12 alternative yield equations. Equation 10.1 comes very close to equation 10.2. However, since at least a part of the expenditure on irrigation is a component of expenditure on modern inputs, the said equations may not be very sound on the theoretical ground. Equations 10.5, 10.7, and 10.8 are free from this limitation and are nearly equally acceptable in other respects. The remaining alternative specifications of the yield equation are inferior to all these. The choice from these five equations is not obvious and all of them are considered here for further analysis.

All the variables in the selected equations are either significant or are very close to significance. In par icular, the relative price is a highly significant causal variable in equation 10.5, it is significant in equations 10.1 and 10.2 at the 5 per cent significance level, and in equations 10.7 and 10.8 at the 10 per cent significance level by the one-tail t-test. Thus, it is concluded that relative price enjoys a significant impact on land yield.

The mean elasticities of yield with respect to its determinants for the selected equations are presented in Table 11.

Table 11 : Mean Elasticities of Land Yield

Equation Number	With respect to				
	Irrigation	Rainfall	EMI	$EMI/_{EAI}$	$(Relative\ Price)_{-1}$
10.1	*	.297	.054	-	.249
10.2	*	.297	-	.064	.232
10.5	*	.374	--	-	.498
10.7	-	.306	.054	-	.216
10.8	-	.306	-	.066	.198

*Very small

The elasticity of yield with respect to irrigation is nearly zero, and with respect to EMI and EMI/EAI is also very small to merit attention. The elasticity with respect to rainfall varies between 0.297 and 0.374, and with respect to the relative price, between 0.198 and 0.498. Thus, the land yield, though usually varies signficantly with its determinants, has elasticities which have low magnitudes.

Since the land yield was found to depend on the expenditure on modern inputs or that in proportion to the expenditure on all inputs, the

following model was formulated to see if the relative or absolute price exercise any influence on either version of this expenditure:

$$\text{EMI or EMI}/_{\text{EAI}} = f_4\left(\left(\frac{P_a}{P_m}\right)_{-1} \text{ or } P_{a_{-1}},\ T\right) \qquad \ldots\ldots\ (4)$$

$$f_{41},\ f_{42} > 0$$

Where the only new notation T stands for trend variable and is normalised to take a value of 1 in 1955-56, 2 in 1956-57, ..., and 20 in 1974-75. The OLS estimates of the linear form of equation (4) are provided in Table 12.

It will be seen from the table that the absolute price turns out to be a better argument in the function than the relative price. Further, the either form of dependent variable is well explained by the regressions. Obviously equation 12.2 is the best for EMI and equation 12.6 for EMI/EAI. The price variable is highly significant and the trend variable is also significantly different from zero at the 5 per cent level in both the equations. The mean price elasticity of EMI in equation 12.2 comes to 1.59 and that of EMI/EAI in equation 12.6 stands at 1.79. Thus, the expenditure in both its forms is highly price sensitive.

The above analysis clearly indicates that the land yield significantly depends on price, both directly and via its impact on farm expenditure on inputs. Thus, if the price support policy can push-up farm prices, it could lead to improvement in land yield.

Table 12 : Expenditure on Modern Inputs Equations

Equation Number	Dependent Variable	Coefficient (and t-value) of				R^2	$\bar{R}^2$	DW
		Constant	$\left(\frac{P_a}{P_m}\right)_{-1}$	$(P_a)_{-1}$	T			
12.1	EMI	-16.75 (0.98)	5.77 (0.32)		3.46 (7.36)	.91	.90	0.27
12.2	EMI	-23.42 (6.93)		0.274 (4.62)	1.03 (1.78)	.96	.95	0.91
12.3	EMI	-106.5 (4.43)	114.36 (5.57)			.63	.59	0.47
12.4	EMI	-26.79 (9.05)		0.374 (19.28)		.95	.95	1.22
12.5	$EMI/_{EAI}$	-4.78 (0.84)	1.81 (0.30)		1.26 (8.10)	.93	.91	0.39
12.6	$EMI/_{EAI}$	-6.69 (5.34)		0.082 (3.73)	0.54 (2.51)	.96	.95	0.92
12.7	$EMI/_{EAI}$	-37.41 (4.37)	41.44 (5.65)			.64	.60	0.50
12.8	$EMI/_{EAI}$	-8.46 (7.17)		0.134 (17.37)		.94	.94	1.20

Trends in Production, Yield and Acreage of Commodities Under and Outside Price Supports: The annual compound growth rates in production and yield of and acreage under various commodities during different time periods are presented in Table 7. It is seen that during the first sub-period of 10 years, the highest growth rate in production as well as in acreage was achieved by groundnut, and in yield, jowar enjoyed the highest growth rate. In the second sub-period of 10 years, the growth rate was maximum in wheat in all the three respects. Between the two sub-periods, while the growth rates in all the three variables increased for wheat and barley, it decreased for rice, bajra, and jute; for other farm products there was increase in some variables and decrease in others. Thus, from this analysis it is not possible to conclude as to whether the price support policy has pushed-up the growth rates. However, if the annual growth rates during the whole of 20 years period are analysed, it will be noticed that while wheat enjoyed the highest growth rates in all the three respects, the lowest growth rates were recorded in sesamum so far as production and yield are concerned and in barley with respect to acreage under cultivation. Since wheat has been enjoying price supports almost all through the period, and both sesamum and barley have been outside its purview, it seems price support policy has positive impact on the growth rates.

Thus, the various approaches through which the impact of price support on production has been analysed indicate that the effect has been positive but not quite substantial.

Impact Through Increased Marketed Surplus

Increased marketed surplus does not always mean increased prosperity of the farmer, for consumption of his own products also forms a part of his welfare. Nevertheless, it is interesting to study the price sensitivity of marketed surplus. A change in farm price influences marketed surplus through income and substitution effects. On the one hand, as the price increase, the farmer becomes richer and so his consumption of his produce (assuming it is a normal commodity) must increase and, therefore, the marketed surplus decrease.[11/] On the other hand, as the price increases, his own consumption becomes expensive relative to sales than before and so the marketed surplus must increase. Thus, the two effects of price change work in the opposite direction and so the total effect is ambiguous. Therefore, theoretically, even if price support leads to increased price, it may not bring an increased marketed surplus. On the contrary, the subsistence farmers, which constitute a sizeable portion of the farming community in India, may have a target demand for cash and if so they will sell a small quantity

11/ Marketed surplus could be different from marketable surplus, but the difference between the two is disregarded here.

at higher prices and a large quantity at lower prices. It is for these reasons that different studies using different data have arrived at different conclusions on price responsiveness of marketed surplus. The following model has been hypothesized to study this here:

$$MS = f_5\left(Q_a,\ P_a \text{ or } P_{a/P_m}\right) \qquad \text{.....(5)}$$

$$f_{51} \gtrless 0\ ,\ f_{52} \gtrless 0$$

where the only new notation MS stands for marke ed surplus of production in agriculture.

The official data on marketed surplus are not available. Fortunately, Thamarajakshi has compiled index numbers for marketed surplus of agriculture as well as of agricultural output with a base of 1960-61 = 100.[12/] Her data have been used along with the price data to estimate function (5) above. The OLS estimates of the linear form of equation (5) obtained using annual data for 1954-55 through 1973-74 are reported in Table 13.

12/ Thamarajakshi (1977)

Table 13 : Marketed Surplus of Agriculture Equations

Equation Number	Dependent variable	Coefficient(and t-value of)				R^2	$\bar{R}^2$	DW
		Constant	D	P	P_a/P_m			
13.1	MS	-14.59 (1.18)	1.23 (8.37)		1.25 (0.08)	.90	.88	1.29
13.2	MS	13.59 (1.12)	0.78 (4.67)	0.14 (3.18)		.94	.92	1.25
13.3	MS	-14.06 (1.36)	1.24 (12.51)			.90	.89	1.29
13.4	MS	9.21 (0.35)			90.47 (0.04)	.47	.41	0.42
13.5	MS	68.02 (14.00)		0.32 (10.19)		.85	.84	0.90

Although the relative price is not a significant causal variable, the absolute price is highly significant. Besides, both the price variables always enter with a positive coefficient. Thus, the results indicate a positive and significant effect of price on marketed surplus. Of the five equations in the table, equation 13.2 is the best both on the grounds of theory and statistical inference. It explains 94 per cent of the variation in MS. The elasticity of MS with respect to O_a and P_a, computed at mean, comes to 0.71 and 0.19, respectively. As expected, the price elasticity of marketed surplus is quite low.

Impact Through Change in Cropping Pattern

The price support policy can affect the farmers' income through its effect on relative crop profitability and cropping pattern also. If the cropping pattern changes in favour of more profitable crops, the farmers' income would increase and vice versa. The data on acreage under the major food crops over time are provided in Table 14. No data on crop profitability over time are available for any crop. However, profitability data are available for some crops in some states for some years from the Economics of Farm Management studies and individual research studies.

Analysing the trends in cropping pattern, one notices that the acreages under rice, wheat, and maize have increased while under jowar and bajra have decreased both in absolute and relative terms during the last ten years. The substantial increase has been found for wheat and a substantial decrease for jowar. Both wheat and jowar have been under price support policy. No comparable data on profitability of wheat and jowar were available. However, the necessary data for wheat and bajra (kharif) for a taluka in Gujarat were accessible.[13/] They are included in Table 20. The profit net of all costs, including the charges even for family labour, is negative from the cultivation of both the crops. Further, the losses are more

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13/ Patel (1978), Chapter 4.

Table 14 : Area Under Different Crops (All-India)

(Million Hectares)

Year	Rice	Wheat	Jowar	Bajra	Maize	Total
1965-66	32.47	12.65	17.68	11.56	4.80	79.16
	(41.0)	(16.0)	(22.3)	(14.6)	(6.1)	(100)
1970-71	37.43	18.24	17.44	12.91	5.84	91.86
	(40.7)	(19.9)	(19.0)	(14.1)	(6.3)	(100)
1971-72	34.33	19.16	16.80	11.77	5.64	90.70
	(41.2)	(21.1)	(18.5)	(13.0)	(6.2)	(100)
1972-73	36.69	19.46	15.51	11.82	5.84	89.32
	(41.1)	(21.8)	(17.4)	(13.2)	(6.5)	(100)
1973-74	38.01	19.06	16.96	13.65	6.02	93.70
	(40.6)	(20.3)	(18.1)	(14.6)	(6.4)	(100)
1974-75	37.92	18.11	15.86	11.26	5.59	88.74
	(42.7)	(20.4)	(17.9)	(12.7)	(6.3)	(100)

Note : Numbers in parentheses indicate the area under different crops as percentages to the total area under all the five crops.

Source : Gupta (1977), p.96

in wheat than bajra. The particular taluka in Gujarat is not the representative region of India. Otherwise it would have meant that the cropping pattern has changed in favour of crops running into losses.

Small Versus Large Farmers

The objective of all the economic policies in India is not only to bring an overall prosperity in the country but also to achieve a more and more equitable distribution of income over time in the country. In this context it is pertinent to examine the price support policy in relation to the income of the small farmer. Questions have been raised as to whether an increase in farm price is good for the small farmer.[14/] To understand this, an attempt is made in this section to analyze the pertinent differences in the small and the large farmers in India.

There is no unanimity about the definition of the small farmer. However, normally the farmer operating on less than 5 acres (approximately 2 hectares) of land, is termed as the small farmer. As far as possible, the farm sizes have been classified into four categories, the first and the last, representing the small and big farmers, respectively and the middle ones standing for the medium sized farmers.

14/ See, for example, Rao (1978), Lipton (1977).

Proportion of Small Farmers

The data on operational holdings by size for 1953-54, 1960-61, and 1971-72 are provided in Table 15. It will be seen that nearly 70 per cent of the households operate on land below 5 acres, that they comprise of more than 60 per cent of the cultivating population, and that the total land on which they operate forms about 20 per cent of the total land under cultivation. In contrast, the houseohls operating on a land of 25 acres and above comprise of about 3 per cent of all the households, 4 per cent of all the cultivating population and operates on 23 per cent of the cultivated area. These data clearly indicate the preponderance of small farmers and small farms in India. Although there is no substantial change in their share over time, fortunately the change is in the direction of reduction in inequalities.

Land Uses by Size

The data on some indices of land use by size are presented in Table 16. They indicate that the cropping intensity declines as the land size increases, implying that the cropping intensity is high on small lands and low on large lands. The same is true with respect to both cultivated area in relation to total area and irrigated area in relation to total area. Since the high values of all these three indices are better than their low values, the small farmer is better-off than the big farmer in all these respects.

Table 15: Operational Holdings By Size

Size Group* (Acres)	Number of Households ('000)			Cultivating Population ('000)			Area Operated ('000 acres)		
	1953-54	1960-61	1971-72	1953-54	1960-61	1971-72	1953-54	1960-61	1971-72
Below 5	45498 (71.6)	51358 (73.9)	38889 (68.1)	203815 (64.0)	230668 (65.8)	203727 (62.3)	55577 (16.6)	63202 (19.3)	74593 (24.0)
5.0 - 9.99	9074 (14.3)	9369 (13.5)	10077 (17.7)	53654 (16.8)	57969 (16.5)	63552 (19.4)	54281 (19.1)	65954 (20.3)	69963 (22.5)
10.0 - 24.99	6406 (10.1)	6542 (9.4)	6345 (11.1)	41938 (13.2)	44874 (12.8)	45688 (14.0)	97895 (29.2)	98630 (30.3)	94681 (30.5)
25.0 and above	2554 (4.0)	2236 (3.2)	1759 (3.1)	19100 (6.0)	17129 (4.9)	14208 (4.3)	117958 (35.1)	120423 (37.1)	71340 (23.0)
All	63532	69505	57070	318507	350640	327175	335711	324969	310573

* For 1971-72, the size groups are slightly different. They are below hectares 2.03, 2.03 - 4.04, 4.05 - 10.12, and 10.13 and above.

Note : Numbers in parentheses are percentages of the corresponding total.

Source: India, Directorate of National Sample Survey: The National Sample Survey, Various Rounds.

Table 16 : Some Indices of Land use by size

Class (Acres)	Total Holdings		Net cultivated Area	Gross Cropped Area			Cropping Intensity	Cultivated area as prop. to total area	Irrigated area as prop. to total area
	Number ('000)	Area		Irrigated	Unirrigated	Total			
		('000 HECTARES)							(%)
2.0	49,116 (69.7)	33,827 (20.9)	31,531 (21.8)	11,223 (31.4)	26,512 (21.7)	37,735 (23.9)	1.12	93.2	29.7
3.9	10,631 (15.2)	29,999 (18.5)	27,776 (19.1)	8,147 (22.8)	23,191 (18.9)	31,338 (19.8)	1.04	92.6	26.0
9.9	7,332 (11.2)	48,234 (29.8)	43,594 (30.0)	10,231 (28.6)	36,490 (29.8)	46,721 (29.6)	0.97	90.4	21.9
and above	2,766 (3.9)	50,064 (30.8)	42,178 (29.1)	6,116 (17.2)	36,146 (29.6)	42,262 (26.7)	0.94	84.2	14.5
	70,493 (100.0)	1,62,124 (100.0)	1,45,079 (100.0)	35,717 (100.0)	1,22,339 (100.0)	1,58,056 (100.0)	0.97	89.5	22.6

e : India, Ministry of Agriculture and Irrigation (1975) : All India Report on Agricultural Census, 1970-71, New Delhi.

Cropping Pattern by Size

The data on cropping pattern by size are given in Table 17. The commodities are arranged in the descending order of their importance in terms of acreage in the country as a whole. Rice occupies the largest area, wheat the second, joward the third largest area, and so on. The size-wise cropping pattern is such that small farmers devote a greater proportion of their land in the cultivation of rice, wheat, ragi, sugarcane, barley, and jute than do the large farmers; while quite the opposite is true with respect to jowar, bajra, cotton, gram, sesamum, and lineseed. No such trend is seen in the case of groundnut and maize. This finding differs a bit from Mitra's observation that while wheat and cotton are grown more by the large farmer, rice and jute are grown more by the small farmer.[15/] However, these findings may not be inconsistent, for while Mitra is comparing in terms of production, the comparison here is in terms of acreage under cultivation and even in the acreage the differences are marginal. The pertinent hypothesis to be examined later in this respect is that has the price support policy led to a greater increase in the prices of small farmers' crop than of large farmers' crop?

15/ See Mitra (1977), Pp.130-1.

Table : 17 : Cropping Pattern by Holding Size

e ares)	Total cropped Area ('000 hectares)	AREA UNDER ('000 HECTARES)													
		Rice	wheat	Jowar	Bajra	Cotton	Gram	Ground nut	Maize	Ragi	Sugar-cane	Barley	Sesamum	Linseed	Jute
2.0	37735 (23.9)	13722 (36.4)	4741 (12.6)	2072 (5.5)	1684 (4.5)	626 (1.7)	1352 (3.6)	1236 (3.3)	1150 (3.0)	807 (2.1)	699 (1.9)	767 (2.0)	236 (0.6)	143 (0.4)	402 (1.1)
3.9	31338 (19.8)	8709 (27.8)	3811 (12.2)	2908 (9.3)	2049 (6.5)	1141 (3.6)	1364 (4.4)	1375 (4.4)	1505 (4.8)	570 (1.8)	571 (1.8)	497 (1.6)	282 (0.9)	179 (0.6)	216 (0.7)
9.9	46721 (29.6)	8887 (19.0)	5459 (11.7)	5973 (12.8)	4090 (8.8)	2084 (6.2)	2341 (5.0)	2578 (5.5)	1651 (3.5)	644 (1.4)	685 (1.5)	569 (1.2)	496 (1.1)	357 (0.8)	159 (0.3)
above	42262 (26.7)	4807 (11.0)	4257 (10.1)	5835 (13.8)	5721 (13.5)	3112 (7.4)	2379 (5.6)	2109 (5.0)	851 (2.0)	322 (0.8)	364 (0.9)	357 (0.8)	595 (1.4)	390 (0.9)	73 (0.2)
	158056 (100.0)	36125 (22.9)	16268 (11.6)	18788 (10.6)	13544 (8.6)	7763 (4.9)	7436 (4.7)	7298 (4.6)	6157 (3.9)	2363 (1.5)	2319 (1.5)	2190 (1.4)	1609 (1.0)	1069 (0.7)	850 (0.5)

: Numbers in parentheses are percentages of the corresponding total

e : India, Ministry of Agriculture and Irrigation (1975) : All India Report on Agricultural Census, 1970-71, New Delhi

Economies of Scale, Land Productivity, and Crop Profitability by Size

There have been official studies on the Economies of Farm Management for various states. Besides, research workers have also carried on such studies on individual basis. These researches provide data on cost, output, farm business income, and profit for various crops by size of holdings. The data for the selected crops for the three states, Tamil Nadu, Uttar Pradesh, and Gujarat are provided in Tables 18, 19 and 20 respectively.

No definite conclusion can be inferred about economies of scale from these data except that there is evidence of slight economies of scale in the cultivation of paddy (late) in Uttar Pradesh, and paddy (dry) and tobacco (dry) in Gujarat, and of slight diseconomies of scale in the cultivation of bajra (kharif, irrigated) tobacco (irrigated), cotton (irrigated), and bajra (kharif, dry) in Gujarat.

The hypothesis that the productivity of land is higher on small farms than on large farms is neither sustained nor falsified by the data. It fluctuates on both the directions as the farm size increases so far as in Tamil Nadu and Uttar Pradesh are concerned, and it shows a positive relationship in 6 out of 10 cases in Gujarat; whereas it fluctuates in the remaining four cases. Some of the studies conducted on earlier data had found an inverse relationship between land productivity and farm size. The change in this relationship might have been

Table 18 : Cost - Profit Data by Size (Tamil Nadu: 1970-71)

(Rupees per hectare)

Size Group (hectares)	Total Cost	Paid-out Cost	Gross Output	Net Farm business income	Net Profit
			RICE		
Upto 2.02	2399	1793	2437	644	38
2.03 - 3.34	2297	1241	2412	1171	115
3.35 - 5.67	2502	1431	2405	974	-97
5.68 - 10.52	2192	1350	2675	1325	483
Above 10.52	1856	1252	2478	1226	622
All Farms	2215	1358	2517	1159	302
			GROUND NUT		
Upto 2.02	1399	1096	1505	409	106
2.03 - 3.34	1347	837	1513	676	166
3.35 - 5.67	1372	874	1568	694	196
5.68 - 10.52	1348	879	1875	996	527
Above 10.52	1268	907	1748	841	480
All Farms	1322	890	1690	800	368
			COTTON		
Upto 2.02	2018	1173	3667	2494	1649
2.03 - 3.34	2182	1424	3180	1756	996
3.35 - 5.67	1856	1137	2496	1359	640
5.68 - 10.52	1812	1158	2625	1467	813
Above 10.52	2257	1552	3415	1863	1468
All Farms	2057	1352	3051	1699	994

Source: India, Ministry of Agriculture and Irrigation, Directorate of Economics and Statistics (1977): Studies in the Economics of Farm Management in Coimbatore District (Tamil Nadu), 1970-71.

Table 19 : Cost-Profit Data by Size (Uttar Pradesh : 1968-1969)

(Rs. per hectare)

Size Group (Hectares)	Total Cost	Paid-out Cost	Gross Output	Net farm business income	Net Profit
		WHEAT			
Upto 1.04	1500	842	2319	1477	819
1.05 - 1.79	1343	800	1977	1169	634
1.80 - 3.07	1276	817	2159	1342	883
Above 3.07	1207	829	1069	1040	582
All farms	1297	825	1951	1126	654
		BARLEY (IRRIGATED)			
Upto 1.04	1194	573	1829	1256	635
1.05 - 1.79	944	438	1457	1019	513
1.80 - 3.07	1151	727	982	255	-168
Above 3.07	1155	410	1302	892	147
All Farms	1129	673	1269	596	140
		SUGARCANE (PLANTED)			
Upto 1.04	3008	1017	5050	3233	2042
1.05 - 1.79	2369	1442	3648	2206	1279
1.80 - 3.07	3493	2527	4562	2035	1070
Above 3.07	839	1470	3371	1093	2532
All farms	2401	1515	3692	2177	1291
		PADDY (LATE)			
Upto 1.04	932	567	1362	795	380
1.05 - 1.79	957	594	1327	733	370
1.80 - 3.07	910	582	1167	585	257
Above 3.07	873	591	1860	1269	987
All farms	915	585	1558	973	643

Source : India, Ministry of Agriculture: Directorate of Economics and Statistics (1973): Studies in the Economics of Farm Management in Deoria District (U.P.), 1968-69.

Table 20: Cost-Profit Data by Size (Padra, Baroda District, Gujarat: 1976-77)

(Rs. Per acre)

Size Group (acres)	Total Cost	Gross Output	Net Profit	Total Cost	Gross Output	Net Profit
	PADDY (IRRIGATED)			PADDY (DRY)		
Upto 4.9	554	560	6	418	437	19
5.0-9.9	433	483	50	353	401	48
10.0 and above	469	548	79	336	459	123
All	463	523	60	354	434	80
	WHEAT (IRRIGATED)			WHEAT (DRY)		
Upto 4.9	1035	649	-386	429	252	-177
5.0-9.9	947	695	-252	379	213	-166
10.0 and above	973	934	-39	460	273	-187
All	976	793	-183	440	259	-181
	BAJRA, KHARIF (IRRIGATED)			BAJRA, KHARIF (DRY)		
Upto 4.9	424	314	-110	277	212	-65
5.0-9.9	438	292	-146	307	268	-39
10.0 and above	441	344	-97	358	270	-88
All	437	320	-117	329	258	-71
	TOBACCO (IRRIGATED)			TOBACCO (DRY)		
Upto 4.9	775	935	160	506	489	-17
5.0-9.9	779	1169	390	491	868	377
10.0 and above	850	1439	589	428	980	552
All	820	1298	478	453	888	435
	COTTON (IRRIGATED)			COTTON (DRY)		
Upto 4.9	622	922	300	471	352	-119
5.0-9.9	733	1106	373	404	414	10
10.0 and above	817	1457	640	410	653	243
All	762	1248	486	413	573	160

Source : Patel N.T. (1978)

the consequence of a relatively greater use of improved technique of production on the large-sized farms.[16/]

To be precise, there is no substantial difference in land productivity over farm sizes so far as rice in Tamil Nadu, and bajra (kharif), paddy (dry), and wheat (dry) in Gujarat are concerned. In this respect, farm size groups, 5.68-10.52 hectares for groudnut and below 2.02 hectares for cotton cultivation are the optimum ones in Tamil Nadu. The optimum farm size groups in Uttar Pradesh are upto 1.04 hectares for wheat, barley and sugarcane, and above 3.07 hectares for paddy (late). In Gujarat, as seen above, large farm size generally yields higher productivity than small size and this is more true for tobacco and cotton cultivation. Thus, the land productivity over farm sizes varies not only with crops but also with regions.

Again no consistent trend is seen in net farm business income over farm sizes. However, it generally increases with the increase in farm size for rice and groudnut in Tamil Nadu, and decreases with the increase in farm size for cotton in Tamil Nadu, and wheat, barley (irrigated) and sugarcane (planted) in Uttar Pradesh.

Similar is the story with respect to net profit, particularly in Tamil Nadu and Uttar Pradesh. In these two states, there is no

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16/ See Brannon (1978) pp.17-18.

commodity whose net profit witnesses a monotonous trend over farm size in either direction. However, in Gujarat, the net profit increases (or loss declines) with the increase in farm size in 7 out of the 10 commodities considered, in the remaining three commodities the trends are not unidirectional. The 7 farm products are paddy (irrigated), paddy (dry), wheat (irrigated), tobacco (irrigated), tobacco (dry), cotton (irrigated), and cotton (dry). On the whole, there appears a direct relationship between net profit and the farm size. Thus, the small farmers are at a disadvantage in this respect.

The data on cropping pattern in the Padra district of Gujarat are provided in Table 21 for comparison purposes. It is seen that tobacco and cotton are the leading crops in the district. A relatively greater proportion of the land is devoted to cotton and lesser proportion to wheat cultivation by the large farmer than the small farmer. This is similar to the earlier finding from the cropping pattern in all-India.

Marketed Surplus by Size

It is true that the small farmer sells a relatively smaller proportion of his produce and also of the total marketed surplus

Table 21 : Cropping Pattern (Padra, Baroda District, Gujarat)

(Percentages)

Acreages under	Irrigated Farms			Dry Farms		
	Upto 5 acres	5-9.9 acres	10 acres & above	Upto 5 acres	5-9.9 acres	10 acres & above
Bajra (Kharif)	10.1	11.5	8.9	9.9	5.1	4.4
Cotton	22.2	19.4	18.7	27.3	39.5	44.5
Banana	4.8	5.0	7.2	0	0	0
Tobacco	23.7	24.7	32.6	25.6	15.2	17.6
Wheat	11.4	8.7	7.3	6.6	4.9	6.6
Paddy	6.5	12.0	9.7	14.5	13.6	7.5
Bajra (Summer)	9.2	4.9	4.8	0	0	0
Others	12.1	13.8	10.8	16.1	21.7	19.4
All	100.0	100.0	100.0	100.0	100.0	100.0

Source : Patel, NT (1978)

than does the large farmer. However, it is pertinent to know the actual shares. Table 22 presents these data.

Table 22 : Agricultural Output and Marketed Surplus by Size (1960-61)

Size Class (Acres)	Total value of output	Total value of marketed surplus	Proportion of output marketed
	(Rs. Ten Millions)		%
Below 5	1790 (25.2)	411 (16.3)	23.0
5 - 9.9	1610 (22.7)	429 (17.0)	26.6
10 - 24.9	1927 (27.1)	681 (27.1)	35.3
25 and above	1779 (25.0)	1005 (39.6)	56.5
All	7106 (100)	2526 (100)	35.5

Note: Numbers in parentheses are percentages of total.

Source: Patnaik (1975)

While the smaller farmer sells only 23 per cent of his produce, the farmer with 25 acres and more of land sells as much as 57 per cent of his output. The small farmer while contributes to one-fourth of the total produce, his contribution is only less than one-sixth to the total

marketed surplus. In contrast, the contribution of the largest farmer is one-fourth to agricultural production and two-fifth to marketed surplus from agriculture. The proportion of output marketed and that of total marketed surplus decline monotonously with the increase in the size of holding. Thus, it is clear that the large farmer benefits more from increases in agricultural price than does the small farmer.

Seasonal Sales by Size:

Due to poor holding power and storage facilities, the small farmer markets a greater proportion of his total sales at a relatively lower price during the post-harvest period than the large farmer. This is evident from the data in Table 23. Nearly 50 per cent of paddy and 84 per cent of Jute's total sales of the small farmer takes place within the first three months of the corresponding post-harvest period. The corresponding per centages of the largest farmer are 32 and 57. The proportion of early sales increases consistently with the increase in farm size. This implies that if the price support and public distribution policies could help reduce the seasonal price differences, the small farmer would derive more benefit than the large farmer.

Table 23: Distribution of Seasonal Sale of Paddy and Jute in Nowgong (Assam) (1968-69)

(Percentages)

Size Class (hectares)	PADDY		JUTE	
	Post harvest period (Jan.-March)	Rest of the year (9 months)	Post harvest period (Sept.-Nov.)	Rest of the year (9 months)
Below 1.83	49.0	51.0	84.2	15.8
1.83-2.43	37.4	62.6	63.9	36.1
2.44-3.24	37.0	63.0	58.4	41.6
3.25-4.25	35.1	64.9	60.7	39.3
Above 4.25	32.4	67.6	56.7	44.3

Source : Goswami and Gogoi (1971)

Market Dependence by Size

It is argued that an increase in farm price, though good for the farming community as a whole, may go against the interest of the small farmer.[17] This is true if the small farmer sells less of farm products than he buys or he sells less of his products than his purchases of all products and that increase in farm prices leads to increases in other prices.

The data on market dependence of rural households for food-grains by holding size in two states are given in Table 24. It is seen that the small farmer (upto 5 acres of land) purchases nearly 50 per cent in Andhra Pradesh and 34 per cent in Rajasthan of his grain requirements from the market.[18] Further, the small farmer supplements his farm income by other occupations during the off-seasons and he has hardly any savings. All this mean that the rise in agricultural prices may not, in fact, bring any substantial improvement in the total welfare of the small farmer. Still worse is the position of agricultural labour with some and without any land. The small size of the former class of households depends on the market for as much as 71 per cent in Andhra Pradesh and 67 per cent in Rajasthan of their total food grains requirements. The similar data for

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17/ See Rao (1978)

18/ In fact, these per centages are underestimates, for these are simple averages of the first two size groups and the farmers in the smallest size group have greater dependence on market and are more in number than in the next size group.

Table 24 : Market Dependence of Rural Households for Food Grains

(Percentages)

Holding Size	Class of Households							
	Producer Households		Agricultural labour with some land		Agricultural labour without land		All	
	Andhra Pradesh	Rajas-than	Andhra Pradesh	Rajas-than	Andhra Pradesh	Rajas-Than	Andhra Pradesh	Rajas than
0 - 2.49	58.7	35.3	81.0	87.4				
2.50 - 4.99	41.7	32.1	60.6	46.2				
5.00 - 7.49	31.6	23.8	43.8	17.1				
7.50 - 9.99	38.7	19.2	12.8	85.1				
10.00 - 14.99	22.9	18.5	19.9	15.1				
15.00 and above	15.5	25.1	14.4	16.9				
All classes	34.7	26.6	63.1	47.3	99.4	74.0	53.5	29.3

Source : India, Ministry of Food, Agriculture, Community Development and Cooperation (1969): Report on the Agricultural Prices Commission on Price Policy For Kharif Cereals for the 1968-69 season, pp.49-50.

other states are not available. However, the pattern is likely to be more or less same for the entire economy.[19]

Price Policy and the Small Farmers' Income

The price support policy would help the small farmer more than the large farmer if it induces greater growth rates in the prices, productions, and yields of and or/profits from the crops in which the former devotes a larger proportion of his land than in the crops in which he devotes a greater proportion of his land holdings. Besides, reduction in seasonal price fluctuations would help the small farmer more than the large farmer, because as was seen above the small farmer sells a larger proportion of his marketed surplus immediately after the harvest when the prices are relatively low than does the large farmer.

In the last section, it was seen that the small farmer devotes a relatively larger proportion of his land in the cultivation of rice, wheat, ragi, sugarcane, barley and jute, than does the large farmer. In contrast, he devotes less of his land for growing jowar, bajra, cotton, gram, groundnut, seasamum, and maize. The data on growth rates in prices, productions and yields of and acreage under most of these

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19/ See Mitra (1977), p. 120

commodities are given in Table 7. The time series data on profits from various commodities are not available but on profit in a particular year in some states are available and some of them were reported in Tables 18, 19, and 20. In what follows, these data are analysed to infer some useful conclusions.

The growth rates in the crops dominated by the small farmer are neither consistently greater nor lesser than those in the crops of the large farmers. Therefore, it is rather difficult to look at the growth rates in 4 variables, in 3 different periods and of 9 commodities (all but tobacco, Table 7) and to conclude as to whether the growth was more in the small farmer's crops or large farmer's crops. In fact, the correct approach would be to first obtain the weighted average growth rates, weight being the proportion of the total land devoted in the cultivation of the corresponding crop, and then to add them for each group of farmers. If that is done, the conclusion needed here could be easily inferred. In this paper, such computations have been carried out for trends in prices and production of the 9 commodities reported in Table 7.

The formula used for obtaining the weighted growth rates was the following:

$$g_j^* = \frac{\sum_{i=1}^{9} g_i \lambda_{ij}}{\sum_{i=1}^{9} \lambda_i} \qquad \ldots \quad (6)$$

where g^*_j = weighted growth rate in the particular variable for farm size class j

g_i = growth rate in the particular variable of crop i

λ_{ij} = share of total land devoted in the cultivation of crop i by the farm size class j.

The computed weighted growth rates in price and production for the small (below 2 hectares) and large (10 hectares and more) farmers during the two sub-periods are given in Table 25.

Table 25 : Weighted Annual Growth Rates

(Percentages)

Variable	Small Farmer		Large Farmer	
	1955-56 to 1964-65	1965-66 to 1974-75	1955 - 56 to 1964-65	1965-66 to 1974-75
Price	5.14	9.87	4.76	9.71
Production	3.40	3.56	3.31	2.93

The weighted annual growth rates both in price and production are greater for the small farmer than for the large farmer in each of the two sub-periods. Thus, the small farmer has benefited more than the large farmer from the growth rates. Whether these rates and the differences in them are due to the deliberate price support policy or not is a debateable issue.

A comparison of the growth rates in the two sub-periods indicates that the difference in growth rates in price was more in the first period (5.14 - 4.76) than in the second period (9.87 - 9.81), while quite the opposite was true for growth rates in production (3.40 - 3.31, 3.56-2.93). Since the price policy became more active and continuous only during the second period, it seems the policy has favoured the small farmer not through a relatively high price but through a relatively high production.

The profitability data of various crops are not available on all-India basis and so an analysis similar to price and production of the small versus large farmer is not possible. However, the profitability data of tables 18, 19, and 20 could be analysed to provide some tentative suggestions in this respect.

It is obvious from the data in Table 18 that in Tamil Nadu cultivation of cotton is more profitable than thatof groundnut or rice. Since, the large farmer devotes a relatively greater part of his land in cotton cultivation and lesser part in rice cultivation than the small farmer, the former is better-off than the latter in Tamil Nadu.[20/] All the crops for which profitability data are included in Table 19 are cultivated more by the small farmer than the large farmer and hence it is not useful to analyse those data for the purpose in hand.

20/ It is assumed here that the cropping pattern in Tamil Nadu is similar to that in all-India.

It was observed earlier that the small farmer employs a greater portion of his land in the cultivation of wheat and bajra, and lesser in cotton cultivation than the large farmer in Gujarat. Data in Table 20 suggests that the profit per unit of land is generally more in cotton cultivation than in wheat or bajra cultivation. Thus, as in Tamil Nadu, the large farmer grows more profitable crops than does the small farmer in Gujarat.

Thus, while the small farmer's crops have achieved higher growth rates, their cultivation is less profitable. Due to data limitation, the trends in seasonal price fluctuations cannot be analysed. Hence, no definite conclusion can be inferred with respect to the impact of price policy on the small versus large farmer.

Measures for Accelerating Small Farmers' Income

The price support policy is only one instrument to increase small farmers' income. Further, its effectiveness could be enhanced through a variety of measures. A brief discussion of these is attempted.

Public Investment in Agriculture

Doubts have been raised as to whether increase in farm price is good for the small farmer. Lipton has argued that increase in farm prices is good not only to the large farmer who sells a bulk of

his produce and depends on the market only marginally for foodgrains but also to the "deficit farmer" or net food buyer. This is because, it leads to increase employment and wages, and availability of cheaper credit.[21] The concern then is that does this positive effect of high farm prices exceeds its negative effect which arises through the small farmer's purchases of agricultural products? The answer could be affirmative if the aggregate production in agriculture were highly price sensitive. Hitherto, we have seen that this is not the case atleast in India. Thus, it is doubtful that high prices are good for the small farmer. Rao, among others, has therefore, recommended public investment in agriculture for the purpose.[22] This could be in the form of providing better transport facilities between farm and 'mandis' (wholesale markets), more godowns for storage of foodgrains, more funds for relevant research in agriculture leading to technical progress and thereby to increased factor productivity, better and more irrigation facilities, development of market yards (proper weights and measures) and their regulation, and so on. These investments provide direct and proportionate benefits to all farmers in contrast to high farm prices, whose benefits are shared by farmers in proportion to their marketed surplus.

21/ See Lipton (1977), pp. 67-8.

22/ See Rao (1978).

Rao and Subbarao have studied the losses arising to the farmers from marketing of their produce due to various imperfections in the market.[23] The authoris conclude that the most important source of losses arise from the poor infrastructure, which is common to all classes of farmers. Further, they found that the losses peculiar to the small farmers (such as those arising from sales being effected in the villages instead of in the bigger markets, heavy post-harvest sales due to lack of storage facilities, economies of scale associated with bulk purchases/sales, and oligopolistic practices by the money lenders) are "not so large as is generally believed, especially when the losses are related to their total income."[24] This finding also supports the argument for public investment in agriculture.

Technological Development

Increase in productivity is more rewarding than the increase in farm price in augmenting farmer s· income.[25] Even if a high price leads to an increase in production, it comes through a movement along the production function, hence through an increase in real cost of resources.[26] In contrast, technological development brings a shift in the iso-quant and thus results into increased production

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23/ See Rao and Subbarao (1976).

24/ Rao and Subbarao (1976), p.

25/ See Dantwala (1967)

26/ See Mellor (1968)

without any increase in factor inputs. It is for this reason that the price support policy is subordinate to technological development. However, the two are complimentary as the price policy has to ensure that the tempo of technical progress is maintained. If the increased production results into fall in prices, the farmers would have little incentive to adopt good techniques of production. Since the technical progress necessitates investment of large funds, the arguments for public inveestment in agriculture are further substantiated.

Fixation of Minimum and Procurement Prices

It is argued that the minimum prices should be fixed not only well before the sowing season but also such that they are valid for a longer (3 - 5 years) period with an allowance for changes in inputs' prices only.[27] Thamarajakshi observes that, "in the case of certain crops like groundnut, the problem for the Indian farmer is not so much the apprehension that prices might slump to uneconomic levels, as the uncertainty arising out of the high volatility in these prices over time, and the wide swings in their levels through the season."[28] Further, if the minimum prices could not ensure coverage of production costs of all classes of farmers, efforts could be made to

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27/ See Krishna (1967)

28/ See Thamarajakshi (1977), p. 389

reduce the small and affected farmers' production cost through supplying them inputs and credit for farming at the subsidized rates. Unless the support price covers the production cost, the objective behind it would be defeated. More or less similar logic applies to the fixation of procurement prices.

Rationing, Procurement, and Distribution

Khusro suggests that demand-restricting measures (rationing) must be applied as much to farmers as to non-farm consumers.[29] In the absence of these to-day, a part of the benfits accruing to farmers from high farm prices is nullified, for due to positive income effect, farmers consume more in the face of high farm prices. Admittedly, this kind of rationing is difficult to implement and perhaps this is the reason why it has not been practised so far.

Regarding procurement, the authorities could perhaps concentrate to collect grains from the large farmers only. Since procurement prices are lower than the corresponding market prices, procurement is a tax and it could be imposed on the ability to pay basis only. Incidentally it may be noted that there is no tax on income accruing from agriculture in India even though all other incomes are taxable. This provides an additional support to the argument here.

29/ See Khusro (1968)

As seen, both procurements and distribution have been a small fraction of the total production in the country. Such a meagre amount does not suffice the purpose of mitigating seasonal price fluctuations. An improvement through this process would call for increase in compulsory levies, storage facilities, building up of sizeable buffer stocks and opening of fair price shops in rural part of the country.

Since the price support policy aims at changing the income distribution in favour of agriculture, lump-sum transfers from non-agriculture sector to the agriculture sector have also been recommended.[30/] These have an advantage of not distorting the market mechanism but they would not remove uncertainty facing the agriculture, which is substantial in the case of India.

Conclusion

Whether the agricultural price in relation to the non-agricultural price is high or not but it is certainly true that the policy makers in India have caused the former to rise at a rate faster than the latter. While this trend is welcome for the agriculture sector as a whole, it is not quite certain as to whether it is in the interest of the small farmer. In the paper, it has been demonstrated that while the agricultural production as a whole is only insignificantly

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30/ See Blandford and Currie (1975)

related to the relative price, the land yield and marketed surplus are positively and significantly influenced by the relative or absolute price. Further, it has been shown that, although the small farmer is relatively better-off in terms of cropping intensity, irrigation facility, the area cultivated as proportion to total land available, and the rates of growth in prices and productions of his major crops, he is more engaged in the cultivation of less profitable crops. This only argues that the price support policy as well as the other economic policies still need to be so tailored as to bring relatively more benefits to the small farmer. Certain suggestions have been made towards the end of the paper to move into the much desired direction.

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