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Rural Poverty and Agricultural Performance in India

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Rural Poverty and Agricultural Performance in India

by Montek S. Ahluwalia*

This paper examines time series evidence on rural poverty over the past two decades. The time series shows that the incidence of poverty fluctuates in response to variations in real agricultural output per head, but there is no significant time trend. There is a statistically significant inverse relationship between rural poverty and agricultural performance for India as a whole, suggesting that agricultural growth by itself tends to reduce the incidence of poverty. The analysis for individual states presents a somewhat different picture. The inverse relationship between output per head and rural poverty is observed in several states but there is also evidence that there are processes at work which tend to increase the incidence of poverty, independently of variations in agricultural output per head.

1. INTRODUCTION

Recent years have seen the development of an extensive and disquieting literature on trends in rural poverty in India and their relationship to agricultural growth. A recurring theme in much of this literature is that agricultural growth has been accompanied by a steady deterioration in distributional terms, involving not only an increase in relative inequality but also an increase in absolute impoverishment. Indeed, it is argued that these trends are the natural consequence of the type of agricultural growth which can be expected within the existing institutional structure in Indian agriculture.¹ This latter proposition has important implications for policy. It raises doubts about the scope for achieving even the fairly minimal welfare objective of alleviating absolute poverty in the future, at least through the kind of agricultural development that is currently deemed feasible, i.e., growth without radical institutional change.

The object of this paper is to evaluate the empirical basis for this assessment of past trends and future prospects. The principal sources of data for our study are the various consumption surveys conducted by the National Sample Survey (NSS) which report the distribution of the population across per capita expenditure classes. These surveys have been used in several existing studies on rural poverty but these studies typically have not made full use of the available information. Some of them, for example, Rajaraman [1975] and Lal [1976], rely upon comparisons between two arbitrarily chosen points in time. Bardhan [1971] reports four

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observations for India as a whole between 1960–1 and 1968–9 but only two for the individual states. An early study by Minhas [1970] was based on data for seven years, but his time series extends only up to 1967–8.² In this paper we will expand the data base cover NSS data for 14 different years spanning the period 1956–7 to 1973–4. This expanded data set provides the basis for a systematic time series analysis of trends in rural poverty for India as a whole as well as for individual states.

Throughout this paper, our concern is principally with the extent of absolute poverty in rural India, defined with respect to a fixed poverty line in terms of real per capita consumption. We have attempted, first, to document changes in incidence of poverty over time, and second, to relate these changes to some measures of agricultural performance. The analysis is based on two alternative measures of the extent or incidence of absolute poverty. The first measure is the percentage of the rural population below the fixed poverty line. The second measure is Sen's Poverty Index, which takes account not only of the percentage of the population in poverty but also of the gap between the poverty line and the mean consumption of the poor, as well as the extent of inequality amongst the poor. While the bulk of the debate has been conducted in terms of the percentage measure, the Sen Index has obvious advantages in measuring the true intensity of the poverty problem.³

The paper is organised as follows. Section II deals briefly with the construction of poverty lines in terms of per capita current expenditure. Section III presents our results on trends in the incidence of rural poverty over the period 1956–7 to 1973–4 for India as a whole as well as for the individual states. Section IV attempts to relate observed changes in poverty to agricultural performance. A summary view of the evidence on changes in rural poverty and factors affecting these changes is presented in Section V.

II. THE POVERTY LINE IN CURRENT PRICES

The first step in our analysis is the definition of an appropriate poverty line for measuring absolute poverty. A fundamental limitation of this approach is that any such line is necessarily arbitrary. In this paper we finesse the problem by choosing our poverty line primarily to conform to past practice, without attempting to justify it as measuring some objectively defensible minimum standard. Accordingly, the poverty line used throughout this paper is a consumer expenditure level of Rs. 15 per person for 30 days at 1960–1 rural prices. This line has a well-established pedigree in the Indian literature. As shown by Bardhan [1971], an expenditure level of Rs. 15 in 1960–1 at rural prices roughly corresponds to Rs. 20 per person at all-India 1960–1 prices, which is the minimum level originally adopted by the Planning Commission in 1962.⁴ Dandekar and Rath [1971] also adopted this line on the grounds that it corresponded to the expenditure level at which food consumption (on average) provided the 'norm' of 2250 calories per day. However, it is important to emphasise that attempts to interpret this line as guaranteeing a nutritional minimum could be seriously misleading.⁵ Suffice to say that this level of expenditure represents an extremely low level of living and one that has been widely accepted as a 'minimum level' in the policy debate.

TABLE I

RURAL POVERTY LINES; CONSUMPTION PER PERSON FOR 30 DAYS
(RS. IN CURRENT PRICES)

	1956-57	1957-58	1959-60	1960-61	1961-62	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1970-71	1973-74
Andhra Pradesh	14.1	14.1	15.4	15.5	15.7	16.2	19.4	21.2	24.3	25.0	25.9	28.3	37.5
Assam	15.0	17.0	15.8	16.3	16.1	18.4	21.4	23.6	31.0	35.7	33.9	33.1	42.9
Bihar	15.6	17.1	16.1	15.8	16.3	18.6	23.7	28.3	36.2	39.5	29.5	32.5	53.2
Gujarat	16.5	16.5	15.8	16.8	17.1	17.8	22.3	22.9	25.7	26.9	26.9	29.1	41.3
Karnataka	13.9	13.9	15.4	15.6	15.6	17.1	22.8	26.7	27.9	29.2	28.4	29.3	42.9
Kerala	15.9	15.2	16.3	16.1	17.1	17.6	21.3	24.2	25.9	27.7	31.4	34.5	44.4
Madhya Pradesh	14.2	14.8	14.2	14.1	14.5	16.8	19.6	22.0	28.5	30.9	27.5	27.9	43.6
Maharashtra	15.7	15.8	16.5	16.0	15.7	17.7	24.2	25.4	28.0	29.3	28.3	30.7	44.2
Orissa	13.8	14.0	14.4	14.5	14.8	19.0	20.7	23.5	27.7	30.3	31.6	30.7	40.9
Punjab & Haryana	15.7	16.0	16.4	15.9	16.5	18.2	22.1	21.9	27.1	30.7	30.7	30.8	43.4
Rajasthan	14.1	13.5	—	14.7	13.8	15.2	19.4	20.6	24.6	25.4	26.8	25.4	41.7
Tamil Nadu	16.1	16.1	17.2	16.4	18.5	19.8	22.6	23.5	28.7	28.2	29.0	28.5	39.7
Uttar Pradesh	14.6	15.6	14.9	14.5	15.2	19.3	23.8	23.9	30.6	34.2	26.0	26.5	43.9
West Bengal	18.1	19.5	19.9	18.1	19.0	24.0	24.6	25.3	30.2	43.6	36.0	37.3	50.0
ALL INDIA	14.6	15.1	15.3	15.0	15.5	17.7	21.3	23.3	28.5	30.9	27.8	28.8	42.9

Sources: The Consumer Price Indices for Agricultural Labourers used in preparing this table relate to the agricultural year July-June and are taken from the *Indian Labour Journal*. This source does not report estimates for some of the states (Tamil Nadu, Uttar Pradesh and Rajasthan) for years preceding 1964-5. For these states we have used estimates prepared by Jose [1974] supplemented by Lal [1976]. Price indices for 1957-8 were obtained by averaging calendar years 1957 and 1958 from the *Indian Labour Journal* except in the case of Gujarat, Maharashtra, Tamil Nadu, and Uttar Pradesh, where we use averages of 1956-7 and 1958-9 as reported by Lal [1976].

Since commodity prices vary significantly across states, the same real consumption level requires different levels of consumer expenditure across states. Bardhan [1971] estimated the level of consumption expenditure for each state in 1960–1, which is equivalent to consumption expenditure of Rs. 15 at all-India rural prices. We have adopted these estimates as our base year estimates of the poverty line in each state.

The second step in our analysis is the definition of equivalent poverty lines for different years in terms of consumer expenditure in the current prices for each year. This requires identification of a suitable price index for the rural poor. Price indices for the 'average' consumer are clearly not suitable since the poor spend a much greater proportion of their budget on items whose prices displayed very high inflation rates in the 'sixties (e.g. food and especially coarse grains).⁶ In the absence of price indices specially designed for the rural poor, we have followed Bardhan [1971] in using the Consumer Price Indices for Agricultural Labourers (CPIAL), prepared by the Labour Bureau, as the most appropriate for our purpose. These indices are available for India as a whole and separately for each state.⁷

Applying the CPIAL to the base year estimates of the poverty line in terms of consumption expenditure per person in 1960–1 prices, we can calculate equivalent poverty lines for each of the years for which NSS consumption distributions are available. The resulting estimates of the poverty line for each state, and for India as a whole, for fourteen years spanning the period from the late 'fifties to the early 'seventies, are shown in Table 1. These estimates are obviously subject to all the limitations arising from the use of the CPIAL as the price index. Ideally, we should use separate price indices for different groups comprising the poor, especially distinguishing landless labourers relying on wage income from subsistence farmers who rely upon own consumption.⁸ More seriously, it can be argued that the very approach of using a base weighted price index is flawed since it cannot reflect the impact of changing relative prices upon the commodity composition of consumption.⁹ In defence of our estimates we can only state that they are certainly in line with past practice, and are probably the best estimates possible given available data.

III. TRENDS IN RURAL POVERTY 1956–7 TO 1973–4

The poverty lines presented in Table 1 have been used in conjunction with the NSS consumption distributions to estimate our two alternative poverty measures: the percentage of the rural population below the poverty line and the Sen Poverty Index. These estimates are obtained from a two-stage procedure. First, we estimate the Lorenz curve of the consumption distribution for each year using the method of Kakwani and Podder [1976]. The estimated parameters of the Lorenz curves are then used to obtain point estimates of the two poverty measures.¹⁰ This procedure has been used to estimate the incidence of poverty over time for rural India as a whole as well as for each state separately.

(a) All-India Results

Our estimates of the two poverty measures for rural India as a whole are presented in Table 2. The NSS data permit two different estimates of the

TABLE 2
NSS BASED ESTIMATES OF RURAL POVERTY IN INDIA

	<i>Percentage of Rural Population in Poverty</i>		<i>Sen's Poverty Index*</i>	<i>Size of Poverty Population (millions)</i>	
	<i>Estimate I</i>	<i>Estimate II</i>		<i>Derived from Estimate I</i>	<i>Derived from Estimate II</i>
1956-7	54.1 (Sub-sample 1) (Sub-sample 2)	n.a. (53.5) (54.7)	0.23 (0.22) (0.24)	181.0	n.a.
1957-8	50.2 (Sub-sample 1) (Sub-sample 2)	53.4 (48.6) (51.7)	0.22 (0.21) (0.23)	171.0	182.0
1958-9	46.5 (Sub-sample 1) (Sub-sample 2)	n.a. (47.9) (44.9)	0.19 (0.20) (0.19)	162.0	n.a.
1959-60	44.4 (Sub-sample 1) (Sub-sample 2)	48.7 (46.3) (42.5)	0.17 (0.18) (0.16)	158.0	173.0
1960-1	38.9 (Sub-sample 1) (Sub-sample 2)	42.0 (38.4) (39.3)	0.14 (0.14) (0.15)	141.0	152.0
1961-2	39.4 (Sub-sample 1) (Sub-sample 2) (Sub-sample 3)	42.3 (41.5) (39.8) (36.9)	0.14 (0.15) (0.14) (0.13)	146.0	157.0
1963-4	44.5 (Sub-sample 1) (Sub-sample 2)	49.1 (46.0) (45.7)	0.16 (0.17) (0.17)	171.0	189.0
1964-5	46.8 (Sub-sample 1) (Sub-sample 2)	50.4 (46.8) (46.8)	0.17 (0.18) (0.17)	184.0	198.0
1965-6	53.9 (Sub-sample 1) (Sub-sample 2)	51.1 (54.7) (53.0)	0.21 (0.22) (0.21)	216.0	205.0
1966-7	56.6	57.4	0.24	231.0	235.0
1967-8	56.5	57.9	0.24	235.0	241.0
1968-9	51.0	53.5	0.20	217.0	227.0
1970-1	47.5	49.1	0.18	210.0	217.0
1973-4	46.1	47.6	0.17	214.0	221.0

*As explained in note 3, this index ranges from 0 to 1.

percentage of the rural population in poverty in India as a whole. Estimate I is obtained by applying the all-India poverty line for various years (see Table 1) to the NSS consumption distribution for rural India. Estimate II is obtained as a weighted sum of the estimated percentages in poverty in individual states, obtained from the NSS distributions for individual states and the state specific poverty line. As there were substantial interstate differences in prices in the base year, and furthermore, inflation occurred at different rates across states, it can be argued that Estimate II, which is based on state specific poverty lines, is a better estimate of the percentage of the rural population in poverty.

The most important feature of the results presented in Table 2 is the marked fluctuation over time in the extent or incidence of rural poverty. The percentage in poverty declines initially from over 50 per cent in the mid-'fifties to around 40 per cent in 1960-61, rises sharply through the mid-'sixties, reaching a peak in 1967-8, and then declines again. The Sen Index also displays the same pattern. Since this index reflects not only the percentage below the poverty line, but also the average shortfall of this group from the poverty line, it is reasonable to conclude from the range of variation in this index that we are measuring substantial fluctuations in the intensity of poverty and not merely marginal shifts of large numbers from a position slightly above the poverty line to a position slightly below.

It is important to determine whether the observed fluctuations arise solely from the sampling variation over time in our estimates, or whether they reflect genuine changes in the incidence of poverty arising from underlying economic factors. Fortunately, NSS surveys are conducted on the basis of interpenetrating sub-samples and differences between estimates of the incidence of poverty based on different sub-samples for the same year provide an indication of the range of variation in sample estimates. Separate tabulations of the data by sub-sample are available for the earlier years (up to 1965-6) and have been used to obtain sub-sample estimates of each of our poverty measures for India as a whole (see figures in parentheses in Table 2). The range of variation between sub-sample estimates for the same year is clearly much smaller than the variations observed over time. This suggests that the measured fluctuation in the incidence of poverty reflects real changes in the severity of the poverty problem over time.

The existence of fluctuations over time implies that we cannot generalise about underlying trends on the basis of comparisons between selected endpoints. For example, Bardhan [1971] reported a sharp increase in the incidence of rural poverty between 1960-1 and 1968-9 while Lal [1976] has argued that the incidence of rural poverty declined between 1956-7 and 1970-1.¹¹ Our estimates for these years (derived by a different estimation method) confirm the direction of change between these particular endpoints as reported in each study, but they also point to the danger of using such comparisons for any assessment of underlying trends. This can only be done on the basis of the time series as a whole.

A linear time trend fitted to each of our two estimates of the percentage in poverty and our estimates of the Sen Index yields the following results (terms in parentheses are t ratios).

Estimate I	=	46.56 (15.25)	+	0.211 T (0.67)	$R^2 = 0.04$
Estimate II	=	47.74 (14.10)	+	0.262 T (0.81)	$R^2 = 0.06$
Sen Index	=	0.191 (10.06)	+	0.0001 T (0.04)	$R^2 = 0.00$

These results provide no evidence for asserting a trend increase or decrease in rural poverty over the period as a whole. The increasing incidence of poverty over the 'sixties reported by Bardhan appears as an upswing in a pattern of cyclical variation. We note that our conclusion also differs from Minhas [1970], who reported a decline in the percentage of the rural population in poverty over the period 1956/7 to 1967/8. This difference is due to identifiable differences on some key issues in estimating rural poverty.¹²

The absence of any discernible trend in the incidence of poverty obviously implies an increase in the absolute numbers of people in poverty because of the growth in rural population over the period. The absolute size of the poor population also fluctuates over the period, as shown in Table 2, but in this case, fitting a time trend to each estimate (P_1 and P_2 respectively) yields the following results:

P_1	=	150.36 (11.74)	+	4.546 (3.76)	$R^2 = 0.54$
P_2	=	153.99 (11.67)	+	4.855 T (3.84)	$R^2 = 0.60$

In other words, the absolute number of the rural poor has grown significantly over time, increasing on average by about five million every year.

(b) Results for Individual States

Our estimates of the two poverty measures for individual states are reported in Tables 3(a) and 3(b) respectively. In general, the time pattern of the incidence of poverty in individual states follows the pattern of fluctuation described for India as a whole. The incidence of poverty for almost all states, using either of the two poverty measures, declines up to the early 'sixties and then begins to rise again, reaching a peak in 1967/8 or 1968/69, and declining again thereafter.

Once again, we have tested for the existence of an underlying trend by fitting a linear time trend to each of our poverty measures for individual states. The results are summarised in Table 4. Only two states (Assam and West Bengal) show a significant trend increase in poverty, according to both our poverty measures. Andhra Pradesh and Tamil Nadu show a trend decline in the incidence of poverty although in Tamil Nadu this is significant only when we use the Sen Index. For all other states there is no significant time trend in the incidence of rural poverty using either measure.

TABLE 3(a)
PERCENTAGE OF RURAL POPULATION IN POVERTY BY STATES

	1957-8	1959-60	1960-1	1961-2	1963-4	1964-5	1965-6	1966-7	1967-8	1968-9	1970-71	1973-4
Andhra Pradesh	53.5	48.8	50.1	47.2	45.6	41.5	45.4	47.9	46.0	47.3	41.0	39.8
Assam	28.0	31.4	25.6	29.4	24.4	24.2	31.3	46.8	38.4	47.3	35.3	39.3
Bihar	59.7	55.7	41.5	49.9	52.3	54.3	59.4	74.4	70.9	59.4	59.0	58.4
Gujarat	*	41.5	31.6	39.7	45.7	49.8	50.7	54.1	50.8	42.8	43.8	35.6
Karnataka	41.3	48.9	39.1	35.4	50.5	55.1	63.9	59.5	56.9	58.8	47.2	46.9
Kerala	59.6	62.3	57.8	50.3	52.8	60.7	70.7	67.1	63.4	64.6	62.0	49.3
Madhya Pradesh	57.7	46.4	43.8	40.0	43.6	42.1	47.2	58.3	62.3	56.0	52.9	52.3
Maharashtra	*	54.5	48.4	43.6	48.2	59.1	57.8	63.2	57.2	54.8	46.6	49.8
Orissa	66.6	63.4	62.4	49.3	60.0	61.9	62.1	64.2	64.7	71.2	65.0	58.0
Punjab & Haryana†	28.0	24.2	18.8	22.3	29.4	26.5	26.5	29.5	33.9	24.0	23.6	23.0
Rajasthan	33.4	n.a.	32.3	33.0	32.6	31.8	30.8	37.1	35.9	41.4	41.8	29.8
Tamil Nadu	67.8	64.4	53.9	51.0	52.0	57.4	59.5	62.7	58.1	60.6	57.3	48.3
Uttar Pradesh	52.3	36.7	37.9	35.4	56.6	53.7	47.1	55.2	60.2	46.4	40.6	47.3
West Bengal	62.3	61.4	40.4	58.3	63.3	64.0	56.5	64.3	80.3	74.9	70.1	66.0
INDIA												
Estimate II (Weighted Averages)	53.4	48.7	42.0	42.3	49.1	50.4	51.1	57.4	57.9	53.5	49.1	47.6

* Figures for Gujarat and Maharashtra are not available separately for the year 1957-8 since NSS tabulations for that year refer to the old Bombay State including both Maharashtra and Gujarat. The poverty incidence for Bombay State is 56.2 and this figure has been used with the combined weights for Gujarat and Maharashtra to calculate the all-India weighted average.

† NSS data report a single distribution for the old Punjab State (including Haryana) up to 1963-4, after which separate distributions are reported for Punjab and Haryana. The poverty incidence for the years after 1963-4 is based on a pooling of the data for the two states, using rural populations of Punjab and Haryana as recorded in the 1971 Census as weights. It should be noted, however, that parts of the old Punjab States were merged into Himachal Pradesh and the Union Territory of Delhi. Our procedure ignores this problem but the error is likely to be extremely small.

TABLE 3(b)

SEN'S POVERTY INDEX FOR INDIVIDUAL STATES

	1957/8	1959/60	1960/1	1961/2	1963/4	1964/5	1965/6	1966/7	1967/8	1968/9	1970/71	1973/4
Andhra Pradesh	0.22	0.17	0.18	0.18	0.16	0.14	0.16	0.18	0.17	0.18	0.13	0.14
Assam	0.07	0.08	0.05	0.06	0.06	0.05	0.08	0.13	0.10	0.14	0.08	0.11
Bihar	0.29	0.23	0.15	0.19	0.21	0.22	0.25	0.41	0.37	0.26	0.25	0.24
Gujarat	0.15	0.12	0.12	0.16	0.17	0.20	0.22	0.20	0.16	0.15	0.10	
Karnataka	0.17	0.19	0.13	0.12	0.18	0.21	0.30	0.27	0.24	0.25	0.17	0.17
Kerala	0.29	0.29	0.25	0.21	0.21	0.29	0.33	0.31	0.28	0.31	0.29	0.20
Madhya Pradesh	0.27	0.19	0.17	0.14	0.17	0.15	0.17	0.26	0.29	0.24	0.21	0.20
Maharashtra		0.21	0.18	0.15	0.17	0.24	0.22	0.27	0.22	0.20	0.16	0.18
Orissa	0.32	0.28	0.31	0.20	0.26	0.26	0.26	0.27	0.23	0.33	0.30	0.23
Punjab & Haryana	0.10	0.07	0.05	0.07	0.10	0.08	0.08	0.08	0.11	0.05	0.07	0.06
Rajasthan	0.14	n.a.	0.10	0.12	0.11	0.11	0.10	0.14	0.14	0.17	0.16	0.09
Tamil Nadu	0.34	0.30	0.24	0.22	0.21	0.23	0.25	0.26	0.24	0.25	0.22	0.17
Uttar Pradesh	0.22	0.13	0.14	0.12	0.23	0.21	0.17	0.23	0.25	0.17	0.13	0.15
West Bengal	0.26	0.25	0.14	0.20	0.26	0.26	0.22	0.27	0.40	0.33	0.31	0.31

TABLE 4
LINEAR TIME TREND FOR POVERTY INCIDENCE BY STATE

	<i>Percentage of Rural Population in Poverty as Dependent Variable</i>			<i>Sen's Poverty Index as Dependent Variable</i>		
	Constant	Time	R ²	Constant	Time ($t \times 10^{-2}$)	R ²
Andhra Pradesh	52.50 (31.84)	-0.671** (4.25)	0.64	0.204 (18.38)	-0.38** (3.58)	0.56
Assam	23.47 (5.29)	1.060** (2.50)	0.38	0.049 (2.85)	0.38** (2.30)	0.35
Bihar	50.83 (9.15)	0.752 (1.41)	0.17	0.214 (4.38)	0.44 (0.95)	0.08
Gujarat	42.18 (7.27)	0.199 (0.37)	0.02	0.158 (5.00)	0.02 (0.05)	0.00
Karnataka	42.76 (7.65)	0.800 (1.49)	0.18	0.166 (4.66)	0.35 (1.03)	0.10
Kerala	59.84 (13.04)	0.022 (0.05)	0.00	0.276 (9.10)	-0.04 (0.14)	0.00
Madhya Pradesh	44.95 (9.39)	0.559 (1.22)	0.13	0.186 (5.57)	0.20 (0.64)	0.04
Maharashtra	51.85 (10.12)	0.116 (0.25)	0.01	0.198 (6.29)	0.03 (0.11)	0.00
Orissa	61.30 (16.64)	0.117 (0.33)	0.01	0.284 (10.88)	-0.10 (0.39)	0.01
Punjab & Haryana	25.26 (8.997)	0.058 (0.22)	0.00	0.084 (6.17)	-0.07 (0.56)	0.03
Rajasthan	30.91 (8.120)	0.300 (0.86)	0.08	0.1163 (5.62)	0.08 (0.39)	0.02
Tamil Nadu	62.59 (17.15)	-0.514 (1.47)	0.18	0.303 (13.66)	-0.62** (2.93)	0.46
Uttar Pradesh	43.92 (7.68)	0.375 (0.68)	0.04	0.179 (5.55)	0.01 (0.02)	0.00
West Bengal	52.72 (9.073)	1.143* (2.05)	0.30	0.190 (5.20)	0.84** (2.41)	0.37

*Indicates that the coefficient on Time is significant with the sign indicated at the 10 per cent level for a two-tail test.

**Indicates significance at the 5 per cent level for a two-tail test.

Our results for Punjab and Haryana are particularly worth noting in view of the findings of other studies that the incidence of rural poverty has increased in this region, despite the visible success of the Green Revolution in raising output. For example, Bardhan [1971] found that the incidence of poverty in Punjab and Haryana increased between 1960–1 and 1967–8 and Rajaraman [1976] reported that the incidence of poverty in Punjab (excluding Haryana) increased between 1960–1 and 1970–1. We find that while both conclusions stand as long as we compare these particular endpoints, they are misleading in respect of underlying trends. The incidence of rural poverty in Punjab and Haryana appears to have been unusually low in 1960–1 and estimates for this year therefore should not be used as the base for comparison.¹³ Consideration of the time series as a whole clearly does not suggest a trend increase in the incidence of poverty.

The main conclusion to be drawn from these results is that the incidence

of poverty in rural India does not show any sustained trend over the past two decades. What we observe in most of rural India is a pattern of fluctuation with an increase in the incidence of poverty in one sub-period followed by a decrease in another. This pattern obviously calls for some explanation in terms of the economic factors affecting the rural economy and this is attempted in the next section.

IV. AGRICULTURAL PERFORMANCE AND RURAL POVERTY

Ideally, the observed changes in the incidence of poverty over different sub-periods should be explained in terms of some explicit model of the determinants of rural poverty and the behaviour of these determinants over the sub-periods. In this context, it is obviously relevant to consider the rate of agricultural growth, the factors determining its distribution across farm sizes, its impact on tenancy conditions, its effect on the demand for labour, etc. A complete exploration of the impact of these factors on the economic condition of different socioeconomic groups in the rural economy is obviously beyond the scope of this paper. Instead, we shall confine ourselves to examining the relationship between the incidence of poverty and some aggregative indices of agricultural performance over the period 1956-7 to 1973-4. Once again the analysis is presented separately for India as a whole and for the individual states.

(a) *The All-India Evidence*

We begin by postulating that an important determinant of the extent of rural poverty is the level of agricultural production relative to the size of the rural population. Agriculture is not the only source of income in rural areas but it is the dominant source, and besides, the scale of non-agricultural income generating activity in rural areas almost certainly depends upon the level of agricultural production. If there is any 'trickle-down' mechanism at work in the rural economy we should expect increases in agricultural production per head to reduce the incidence of absolute poverty. Does the available evidence support this view?

The first point to note about the Indian experience of the past two decades is that the growth of agricultural output has only just kept pace with the growth of the rural population. The result is a stagnation in output per head, which can be seen from the following results reporting linear time trends fitted to three different indices of output per head of the rural population (terms in parentheses are t ratios).

log (FRP)	=	5.547 +	0.0044 T	$R^2 = 0.08$
		(34.4)	(1.26)	
log (APRP)	=	5.563 +	0.0037 T	$R^2 = 0.10$
		(43.9)	(1.38)	
log (NDPARP)	=	5.167 -	0.0021 T	$R^2 = 0.04$
		(182.46)	(0.86)	

where FRP = the index of food production per head of rural population, APRP = the index of agricultural production per head of rural population, and NDPARP = NDP in agriculture (1960 1 prices) per head of rural

TABLE 5
INCIDENCE OF POVERTY AND AGRICULTURAL GROWTH

<i>Dependent Variable</i> <i>Alternative Poverty</i> <i>Measures</i>	<i>Estimated Coefficients on Independent Variables</i> (terms in parentheses are <i>t</i> ratios)			<i>Average of Current</i> <i>and Previous Year</i> <i>NDPARP</i>	<i>Time</i>	<i>R</i> ²	<i>F</i>
	<i>Constant</i>	<i>NDPARP</i>	<i>NDPARP</i>				
1) Percentage of Poor:							
Estimate I							
a	106.35 (5.49)	-0.338** (3.00)				0.43	9.0
b	128.791 (5.40)		-0.470** (3.30)			0.49	11.4
c	136.125 (4.84)		-0.505 (3.20)		-0.141 (0.64)	0.50	5.5
Estimate II							
a	96.302 (5.40)	-0.269** (2.59)				0.40	6.7
b	126.390 (6.70)		-0.447** (4.04)			0.62	16.3
c	127.24 (5.80)		-0.451** (3.64)		0.021 (0.09)	0.62	7.4
3) Sen's Poverty Index							
a	0.540 (4.54)	-0.0020** (2.95)				0.42	8.7
b	0.647 (4.20)		-0.0027** (2.97)			0.42	8.83
c	0.770 (4.61)		-0.0033** (3.48)		-0.0024 (1.52)	0.52	6.06

**Indicates that the coefficient is significantly different from zero with the sign shown at the 5% level for a two-tail test.

population. The extent of stagnation is particularly evident in the third equation, which uses NDP in agriculture (in constant prices) as the measure of agricultural income and which is the preferred equation for our purposes since NDP is a measure of value added.¹⁴ This stagnation parallels the observed lack of any trend improvement in the incidence of rural poverty over the period and can be argued to be one of its principal causes.

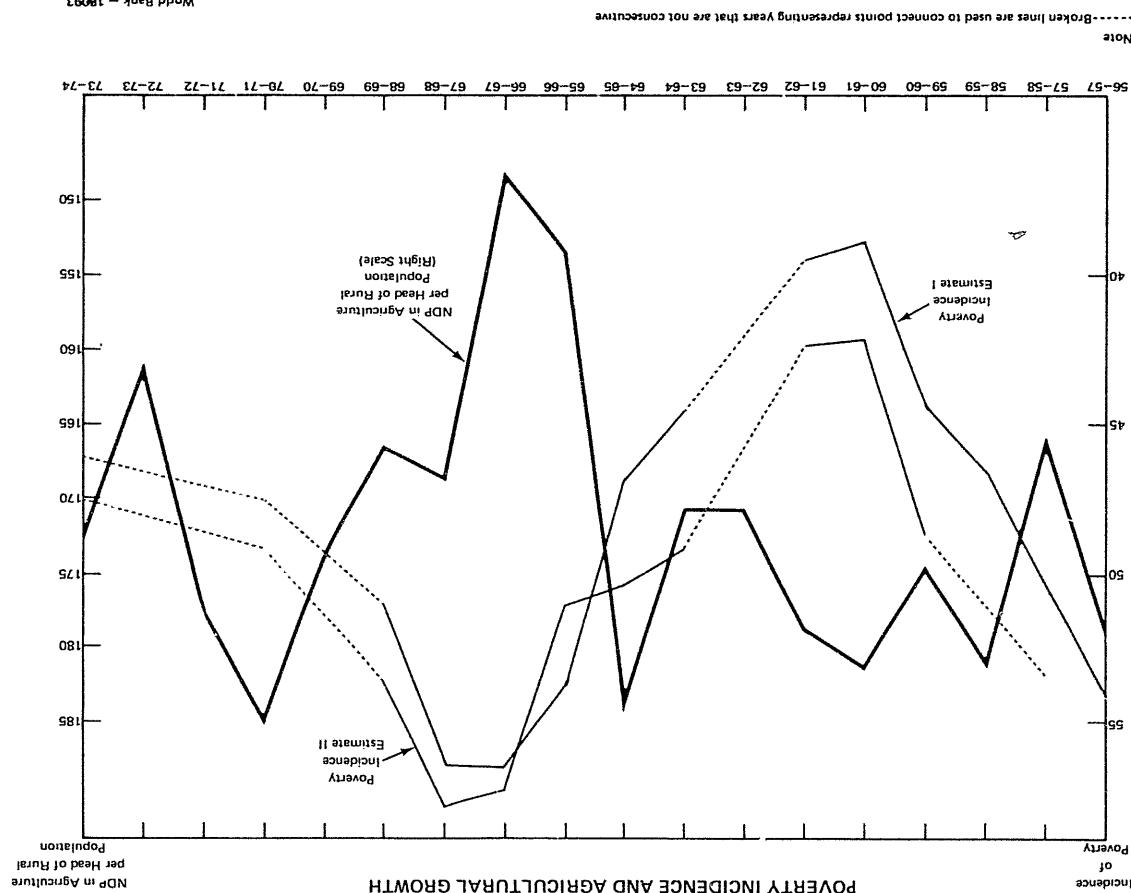
The relationship between the incidence of poverty and agricultural performance over the period under review can be more systematically examined through regression analysis. When this is done we find that improved agricultural performance is definitely associated with reductions in the incidence of poverty. Table 5 presents the results of some regressions along these lines using three alternative dependent variables (Estimate I and Estimate II of the per cent of population in poverty and the Sen Index) to measure poverty. Initially we hypothesise that the incidence of poverty depends upon the level of NDP in agriculture per head of the rural population (NDPARP). As shown in Table 5, the coefficient on this variable is negative and significant in all cases (Eqs. 1a, 2a, 3a). An alternative hypothesis is that the incidence of poverty depends not only on the current year's level of NDPARP but also on the level in the previous year.¹⁵ This is tested by using the average value of NDPARP for the current and previous year as the independent variable in the regressions. (We use the average value of the current and previous year rather than introduce both as independent variables solely because of the limited sample size.) As shown in Table 5 (Eqs. 1b, 2b, 3b), the explanatory power of the equations improves substantially and the regression coefficients are again negative and highly significant in all cases.

It can be argued that while NDPARP is inversely related to the incidence of poverty, there are other factors operating in the rural economy leading to an increase in poverty incidence over time. This hypothesis can be crudely tested by including time as an additional explanatory variable as in Eqs. 1c, 2c, 3c. We find that the coefficient on this variable is not significant in any equation, suggesting that there is no underlying time trend in the incidence of poverty after allowing for changes in poverty incidence associated with changes in NDPARP.

What can we legitimately infer from these results? There is clear evidence of an inverse relationship between rural poverty and agricultural performance. As shown in Figure 1, fluctuation in poverty incidence simply mirrors the movement in agricultural production per head and this inverse relationship is even more firmly identifiable when account is taken of the lags involved. Such empirical relationships are at best a crude basis for drawing inferences about complex causal mechanisms, but taken at face value they do suggest that there is some trickling down of benefits from increases in agricultural production.

(b) *The Evidence for Individual States*

Does the inverse relationship between poverty and agricultural growth also hold at the level of individual states? Testing for such a relationship at the state level is subject to two important limitations. The first is conceptual: the rural area of a single state is a more 'open' economic system than rural India as a whole and therefore all-India relationships may not hold for



individual states. For example, the effect of adverse agricultural conditions in a single state (especially in a particular year) on rural poverty in that state may be mitigated by temporary migration both to urban areas and to rural labour markets in other states. These 'cushioning' possibilities do not exist at the all-India level. The only way migration can mitigate the adverse effects of poor agricultural performance for the country as a whole is through migration to urban areas and that too is limited by the fact that a generally poor agricultural performance typically also has an adverse effect on non-agricultural employment opportunities.

The second limitation is of data. There is no time series of NDP in agriculture for individual states over the period under review. Our measure of agricultural output is therefore limited to an index of agricultural production for all crops constructed by A. V. Jose of the Centre for Development Studies (Trivandrum). We have used this index to construct an index of agricultural production per head of the rural population (IAPPH) for each state and used this as the explanatory variable measuring agricultural performance in our regressions.¹⁶ Since this is a gross output measure, which takes no account of the increased input intensity of agriculture over time, it probably overstates agricultural growth in terms of net value added.

These limitations are likely to make the empirical results at the state level somewhat weaker and this is indeed the case. There is some support for the hypothesis that the incidence of poverty is inversely related to agricultural output per head, but the corroboration is not complete. Indeed, there are interesting differences between the all-India and state-level results, which call for further investigation.

An important difference between the all-India experience and the experience for individual states is that whereas in the former case agricultural output per head of the rural population stagnated, this is not true for individual states. Table 6 presents the estimated (exponential) growth rates in IAPPH for individual states. Six states (Kerala, Orissa, Punjab and Haryana, Tamil Nadu, Uttar Pradesh and West Bengal) show significant growth in output per head. Yet, as shown in Table 4, none of these states show a significant trend decline in the incidence of poverty (except for Tamil Nadu on the Sen Index) and West Bengal actually shows a significant trend increase. The absence of a trend decline in the incidence of poverty in states that have experienced growth in agricultural output per head is clearly disturbing and calls for further investigation.

Following the approach adopted for the all-India analysis, we have estimated regression equations for individual states testing the hypothesis that the incidence of poverty depends on the level of agricultural output per head of the rural population.¹⁷ Table 7 presents the results of two regressions for each state, using the percentage of the rural population in poverty and the Sen Index respectively as the independent variables. The explanatory variable measuring agricultural performance is a two-year average of IAPPH where the averaging reflects the existence of lagged effects. We have also included time as an additional explanatory variable to test for the existence of underlying time trends in poverty incidence generated by factors operating independently of changes in the level of output per head. Our results can be summarised as follows.

TABLE 6
EXPONENTIAL TIME TRENDS IN AGRICULTURAL OUTPUT PER HEAD OF RURAL POPULATION
1956-57 - 1972-73
(terms in parentheses are t ratios)

	<i>Estimated Coefficients on</i>		<i>R</i> ²
	<i>Time</i>		
	<i>t × 10⁻²</i>		
Andhra Pradesh	4.608 (106.88)	-0.62 (1.46)	.12
Assam	4.54 (194.38)	-0.13 (0.58)	.02
Bihar	4.64 (45.44)	1.34 (1.35)	.11
Gujarat	4.85 (41.93)	0.86 (0.77)	.04
Karnataka	4.63 (79.42)	0.76 (1.34)	.11
Kerala	4.54 (278.17)	0.86** (5.42)	.66
Madhya Pradesh	4.53 (53.62)	-1.08 (1.32)	.10
Maharashtra	4.80 (53.94)	-3.27** (3.72)	.48
Orissa	4.64 (52.09)	2.65** (3.05)	.38
Punjab & Haryana	4.46 (86.93)	3.16** (6.30)	.73
Rajasthan	4.55 (46.66)	-0.29 (0.30)	.01
Tamil Nadu	4.59 (201.02)	1.01** (4.52)	.58
Uttar Pradesh	4.54 (90.80)	1.38** (2.83)	.59
West Bengal	4.56 (133.36)	0.79** (2.36)	.27

**Indicates that the coefficient is significant at the 5 per cent level for a two-tail test.

(i) There is clear evidence of a significant negative relationship between agricultural output per head and the incidence of poverty in seven states: Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, and Uttar Pradesh. Although only seven states of the fourteen conform to this pattern, it is important to note that these states account for 56 per cent of the rural population of India and about three-quarters of the rural population in poverty. Of the other states, it is worth noting that Orissa and West Bengal have negative co-efficients on the IAPPH variable with t ratios that are fairly high, although not high enough to ensure significance at the ten per cent level for a two-tail test.

(ii) Where the state level results differ substantially from the all-India results is in the estimated coefficients on the time term. At the all-India level we found no significant time trend in poverty incidence operating independently of the effect of agricultural output per head. The results for

TABLE 7
RURAL POVERTY AND AGRICULTURAL GROWTH BY STATES
(TERMS IN PARENTHESES ARE T RATIOS)

	Percentage of Rural Population in Poverty as Dependent Variable				Sen's Poverty Index as Dependent Variable				
	Constant	IAPPH	Time	R ²	Average of Current and Previous Year		IAPPH ($\times 10^{-2}$)	Time	R ²
					Average of Current and Previous Year				
Andhra Pradesh	96.38 (5.58)	-0.479** (2.62)	-0.607** (3.86)	0.74	0.46 (3.36)	-0.26* (1.87)	-0.37** (3.04)	0.63	
Assam	-2.05 (0.02)	0.25 (0.28)	1.358 * (1.96)	0.38	-0.04 (0.12)	0.09 (0.26)	0.44 (1.61)	0.29	
Bihar	95.82 (8.58)	-0.42** (4.47)	1.286** (3.44)	0.78	0.64 (7.57)	-0.40** (5.54)	0.91** (3.21)	0.82	
Gujarat	35.71 (1.59)	-0.00 (0.02)	0.956 (1.50)	0.27	0.23 (2.08)	-0.08 (0.99)	0.57 * (1.82)	0.33	
Karnataka	86.90 (3.31)	-0.474* (1.87)	1.716** (3.07)	0.56	0.52 (3.39)	-0.37** (2.51)	0.96** (2.95)	0.59	
Kerala	83.70 (1.35)	-0.298 (0.46)	0.829 (1.37)	0.22	0.33 (0.78)	-0.09 (0.20)	0.41 (0.98)	0.14	
Madhya Pradesh	88.72 (18.83)	-0.454** (2.45)	-0.052 (0.09)	0.51	0.49 (3.66)	-0.31** (2.38)	-0.20 (0.52)	0.45	
Maharashtra	114.25 (4.16)	-0.548** (2.40)	-0.818 (1.16)	0.48	0.60 (3.62)	-0.35** (2.55)	-0.59 (1.39)	0.50	
Orissa	76.41 (6.43)	-0.167 (1.53)	1.063 * (1.86)	0.31	0.39 (4.53)	-0.12 (1.48)	0.54 (1.30)	0.22	
Punjab & Haryana	38.74 (4.09)	-0.175 (1.62)	0.811 (1.76)	0.29	0.14 (2.76)	-0.06 (1.21)	0.22 (0.91)	0.15	
Rajasthan	21.34 (2.00)	0.49 (0.70)	0.710** (2.76)	0.53	0.05 (0.66)	0.05 (0.54)	0.35 (1.78)	0.33	
Tamil Nadu	165.68 (5.52)	-1.050** (3.52)	0.577 (1.61)	0.62	0.94 (4.62)	-0.64** (3.18)	0.03 (0.11)	0.69	
Uttar Pradesh	123.64 (7.03)	-0.864** (4.71)	1.674** (3.75)	0.75	0.63 (7.14)	-0.49** (5.36)	0.80** (3.56)	0.79	
West Bengal	110.94 (2.46)	-0.631 (1.37)	1.966** (2.77)	0.49	0.67 (2.42)	-0.50 (1.79)	1.33** (3.09)	0.55	

*Indicates coefficient is significant at the 10 per cent level for a two-tail test.

**Indicates coefficient is significant at the 5 per cent level for a two-tail test.

individual states show that the coefficient on time is significant in a number of states, and in all these cases (except Andhra Pradesh) it is significantly positive. If we accept the argument that the time term picks up the net impact of variables excluded from our analysis, these results suggest that in these states—Assam, Bihar, Gujarat, Karnataka, Orissa, Rajasthan, Uttar Pradesh, and West Bengal—there may be factors at work in the rural economy which by themselves tend to increase the incidence of rural poverty. Identifying these factors is clearly crucial for understanding the causal mechanisms determining rural poverty. Unfortunately, our data provides no basis for developing and testing specific hypotheses along these lines. However, it is interesting to note that this group includes all the states of the eastern region where conditions of tenancy are most adverse for small farmers.

(iii) For most of the states for which the coefficient on the time term is positive, there is also a significantly negative coefficient on the IAPPH variable. This suggests that while there were factors operating in the rural economy which tended to increase the incidence of poverty, agricultural growth leading to higher output per head tended to offset the adverse impact of these factors. Can we conclude from this that increases in agricultural output per head are in themselves always beneficial? The key assumption underlying this argument is that such increases can be achieved, within the existing institutional structure, without affecting the other factors which operate to increase the incidence of poverty. This is clearly a strong assumption. Some of the factors whose effect is captured by the time term obviously operate independently of any attempt to increase agricultural output. Increasing population pressure on land leading to a reduction in size of landholdings is an obvious example of such a process which is particularly relevant in rural India. However, there are other processes which may have an adverse effect on poverty and which may be speeded up if we attempt to accelerate the pace of agricultural growth. These include technological change in agriculture which has a net labour displacing effect and which may therefore weaken the economic position of both landless labour and small farmers who rely in part on wage employment.

The scope for reducing the incidence of poverty through raising agricultural output per head in the future is therefore crucially dependent upon whether this can be done without technological changes that are excessively labour displacing. The regressions reported above cannot address this question satisfactorily since the observed variation in agricultural output over the period is dominated by weather-induced fluctuations and the impact of such variations on poverty may be different from the impact of a more rapid expansion in agricultural output over time.

(iv) Finally, the most disquieting feature of our results is the evidence from Punjab and Haryana which does not support the hypothesis that improved agricultural performance will help reduce the incidence of poverty. This region has experienced a dramatic growth in agricultural output per rural person but there is no evidence of a downturn in the incidence of poverty. Nor is there a significantly negative coefficient on the output per head variable in the regressions reported in Table 7. The

Punjab-Haryana experience may have been wrongly described by some authors as a case of *increasing incidence* of poverty despite rapid agricultural growth, when the evidence shows no significant time trend, but it is scant reward for the most successful agricultural performance of any state if the poorest 25 per cent of the rural population experienced stagnant levels of real consumption.

How do we account for this outcome? One approach is to attribute it to the particular nature of the agricultural growth experienced in this region. Stagnation in real consumption levels at the lower end of the scale could arise from strongly labour-displacing technological changes accompanying agricultural expansion, exemplifying the malign effects of some types of growth. However, there is also a benign explanation, attributing the lack of any reduction in poverty incidence to the fact that there has been heavy migration into rural Punjab in response to the growth of labour demand. It can be argued that the poorest quarter of the rural population in Punjab and Haryana contains an increasing proportion of in-migrants, and although real consumption levels of the poorest quarter appears stagnant over time, this group consists increasingly of individuals whose consumption is higher than it would have been if they had not migrated. In other words, 'trickle-down' benefits have taken the form of increased employment benefiting migrants from other states, rather than increased wages benefiting the pre-existing poor. Such supplementary evidence as is available certainly points to a substantial growth in labour demand and in-migration into the region together with an increase in average real wages, developments which are difficult to reconcile with the malign view of the impact of agricultural growth.¹⁸

A further aspect of the Punjab results which must be kept in mind is that poverty in this region is closer to being a problem of low end poverty than in other states. As such, the insignificant coefficients on the IAPPH variable may arise from the fact that even if trickle-down processes do exist in the rural economy, they may not reach all the way down to the very poor. It has long been recognised that for such groups, poverty alleviation will require special programmes of assistance and support and not merely a general improvement in productivity. The evidence provides some support for this view. If we redefine the poverty line for this region to be 20 per cent higher, and use the resulting estimates of the incidence of poverty as dependent variables in our regression equations, we find a statistical improvement over the results reported in Table 7. When the dependent variable is taken as the percentage poor, we find a positive coefficient on time and negative coefficient on the IAPPH variable with both coefficients significant at the five per cent level. When the Sen Index is used, the coefficients have the same sign but they remain insignificant at the ten per cent level (although gaining in significance compared to Table 7).

(c) *The Evidence on Relative Inequality*

Thus, far, the distributional implications of increases in agricultural output per head have been examined solely in terms of the impact on absolute poverty. It is also useful to examine the evidence on relative inequality in consumption (and changes in inequality over time) in order to determine

TABLE 8

RELATIVE INEQUALITY OF CONSUMPTION: GINI COEFFICIENTS

	1956-7	1957-8	1959-60	1960-1	1961-2	1963-4	1964-5	1965-6	1966-7	1967-8	1968-9	1970-1	1973-4
Andhra Pradesh	0.33	0.30	0.3	0.32	0.31	0.31	0.31	0.28	0.28	0.29	0.28	0.28	0.30
Assam	0.26	0.29	0.24	0.23	0.22	0.20	0.21	0.25	0.19	0.20	0.19	0.19	0.22
Bihar	0.32	0.29	0.40	0.28	0.29	0.29	0.31	0.32	0.31	0.28	0.27	0.27	0.29
Gujarat	*	0.33	0.26	0.27	0.30	0.30	0.29	0.30	0.29	0.29	0.28	0.28	0.24
Karnataka	0.38	0.32	0.29	0.37	0.29	0.28	0.31	0.31	0.30	0.32	0.29	0.29	0.28
Kerala	0.35	0.34	0.33	0.33	0.30	0.34	0.30	0.30	0.32	0.42	0.33	0.32	0.32
Madhya Pradesh	n.a.	0.41	0.34	0.30	0.34	0.35	0.31	0.32	0.29	0.32	0.33	0.32	0.29
Maharashtra	*	0.29	0.29	0.28	0.29	0.28	0.29	0.29	0.26	0.29	0.26	0.26	0.28
Orissa	0.32	0.31	0.33	0.30	0.28	0.27	0.28	0.25	0.30	0.29	0.29	0.29	0.30
Punjab &													
Haryana†	0.32	0.30	0.37	0.35	0.30	0.32	0.33	0.31	0.30	0.28	0.30	0.29	0.29
Rajasthan	0.41	0.36	0.32	0.37	0.31	0.32	0.32	0.35	0.34	0.40	0.33	0.29	
Tamil Nadu	0.32	0.32	0.31	0.31	0.31	0.30	0.29	0.28	0.28	0.29	0.27	0.28	
Uttar Pradesh	0.30	0.30	0.30	0.32	0.30	0.30	0.29	0.28	0.28	0.31	0.29	0.25	
West Bengal	0.27	0.27	0.26	0.28	0.27	0.24	0.27	0.26	0.25	0.23	0.27	0.30	
ALL INDIA	0.33	0.34	0.32	0.33	0.32	0.30	0.30	0.30	0.30	0.29	0.31	0.29	0.28

*The NSS tabulations for 1957-8 report the distribution for the old Bombay state which yields a Gini coefficient of 0.297. Separate distributions for Maharashtra and Gujarat are not available.

†After 1963-4, the consumption distribution is available only separately for Punjab & Haryana. Our estimates for these years are obtained after pooling distributions for Punjab & Haryana using weights proportional to rural population size in the 1971 census.

whether it supports the benign or malign view of the distributional impact of agricultural growth in India.

The view that agricultural growth within the present institutional constraints does not contribute to poverty alleviation, and indeed may even generate absolute impoverishment for the poor in the sense of declining real incomes, implies that we should also see increased relative inequality in the distribution of consumption. This would be the case as long as the consumption function is monotonic, since income increases for the non-poor would be reflected in increased consumption for these groups while stagnant (or reduced) incomes for the poor will lead to stagnant (or lowered) consumption levels.¹⁹

TABLE 9
LINEAR TIME TRENDS IN GINI COEFFICIENTS OF CONSUMPTION DISTRIBUTION
(TERMS IN PARENTHESSES ARE T RATIOS)

	<i>Estimated Coefficients on Time</i>	<i>R</i> ²	
	<i>Constant</i> ($\times 10^{-2}$)		
Andhra Pradesh	0.33 (35.51)	-0.295** (3.31)	0.52
Assam	0.27 (17.48)	-0.461** (3.15)	0.50
Bihar	0.33 (15.54)	-0.291 (1.43)	0.17
Gujarat	0.31 (18.39)	-0.263 (1.68)	0.24
Karnataka	0.35 (18.81)	-0.410** (2.29)	0.34
Kerala	0.33 (15.14)	0.001 (0.002)	0.00
Madhya Pradesh	0.37 (21.23)	-0.456** (2.74)	0.43
Maharashtra	0.29 (32.20)	-0.123 (1.47)	0.19
Orissa	0.31 (22.65)	-0.192 (1.47)	0.18
Punjab & Haryana	0.35 (23.6)	-0.345** (2.45)	0.34
Rajasthan	0.37 (16.74)	-0.334 (1.57)	0.20
Tamil Nadu	0.33 (56.84)	-0.384** (6.85)	0.82
Uttar Pradesh	0.32 (32.18)	-0.254** (2.78)	0.44
West Bengal	0.26 (20.08)	-0.055 (0.45)	0.02
All India	0.34 (73.23)	-0.324** (7.06)	0.82

*Indicates that the coefficient is significant at the 10 per cent level for a two-tail test.

**Indicates significance at the 5 per cent level for a two-tail test.

The NSS data provide the basis for documenting trends in the inequality of consumption expenditure in nominal terms. Ideally, we should examine trends in the distribution of real consumption since changes in the distribution of nominal consumption may reflect no more than differential movements in the price indices. However, in the absence of fractile specific price indices we can only compare inequality in nominal terms. Such comparisons remain of interest since the available evidence suggests that while they may exaggerate the extent of the change in inequality, they nevertheless point in the right direction.²⁰ Table 8 presents the Gini coefficients of the distribution of rural consumption expenditure for India as a whole and for the individual states. We have tested for the existence of a linear time trend in each case and the results are presented in Table 9. Far from finding an increase in relative inequality, we find that the evidence points in the opposite direction. There is a significant *decrease* in relative inequality for India as a whole and for seven of the fourteen states. Of the other states, all except Kerala have a negative coefficient on the time term, although none of these coefficients is statistically significant. It is particularly worth noting that the Gini coefficient for Punjab and Haryana shows a statistically significant decline in inequality over the period as a whole.

The absence of any marked increase in relative inequality as measured by the NSS is yet another reason for questioning the view that agricultural growth has been accompanied by absolute impoverishment for the rural poor. As shown in Table 6, six states (Kerala, Orissa, Punjab and Haryana, Tamil Nadu, Uttar Pradesh and West Bengal) show a significant trend increase in output per head of the rural population. We note that none of these states experienced the increase in relative inequality which should have occurred if growth was accompanied by absolute impoverishment. Indeed three of them (Punjab and Haryana, Tamil Nadu and Uttar Pradesh) show a significant decline in consumption inequality.

V. CONCLUSIONS

The twin objectives of this paper were to document trends in rural poverty in India and to examine the relationship between rural poverty and agricultural performance. Our principal empirical findings and the caveats accompanying them can be summarised as follows:

(i) The evidence reviewed provides a fairly firm basis for documenting trends in rural poverty in India. We find that the Indian experience over the past two decades cannot be characterised as showing a trend increase in the incidence of poverty in India as a whole. The same conclusion holds for all the individual states except Assam and Bengal, which show a significant trend increase in poverty. In general, the time series shows a pattern of fluctuation, with the incidence of poverty falling in periods of good agricultural performance and rising in periods of poor performance. Given the importance of weather-induced variations in Indian agriculture, there can be little doubt about the importance of such fluctuations and it is crucial to keep these in mind in assessing underlying trends.

(ii) The evidence on the relationship between rural poverty and agricultural performance is more difficult to evaluate for two reasons. In

the first place, the evidence itself is somewhat mixed. Much depends upon the level of aggregation at which the analysis is conducted with the all-India results presenting a somewhat different picture from that obtained at the level of individual states. Furthermore, the evidence necessarily is difficult to interpret since we are implicitly searching for causal relationships in what are at best observed correlations. The all-India evidence is entirely consistent with the hypothesis that the incidence of rural poverty is inversely related to agricultural performance measured in terms of agricultural NDP per rural person. Taken at face value, this correlation suggests that faster agricultural growth, by raising agricultural NDP per rural person, might have led to a reduced incidence of poverty. The absence of any adverse underlying time trends further supports this view.

(iii) The state level analysis presents a somewhat different picture. On the one hand we find a significant inverse relationship in at least seven states accounting for three-quarters of the rural poor. On the other hand the state level analysis also shows that there may be processes at work in the rural economy which tend to increase poverty over time. These results are open to the interpretation that agricultural growth offsets the adverse impact to other factors so that if only agriculture can grow fast enough, it is likely to reduce the incidence of rural poverty. However, this interpretation rests crucially on the assumption that increased agricultural output can be obtained without exacerbating those unidentified factors which tend to increase rural poverty, and which are reflected in the time term in our regressions. It is in this context that the evidence from Punjab and Haryana is disquieting, although, again, there are a number of reasons why this evidence may be misleading.

It is a familiar feature of empirical research that the results of related investigations do not always point in the same direction. Clearly a great deal of judgment must enter into weighing the different pieces of evidence before presenting a composite picture. The role of judgment is further enlarged when we are trying to infer the nature of complex causal processes through observed associations between aggregative variables. In our view the all-India results should be given substantial weight, if only because of the greater reliability of the data series used, and these results do point to a beneficial impact on absolute poverty from increases in agricultural output per head. In other words, there is evidence of some 'trickle down' associated with agricultural growth. At the same time, the state level evidence on the existence of underlying forces within the rural economy which tend to increase the incidence of poverty is extremely important. What are these forces, do they vary across states, and to what extent can they be mitigated? These are important, indeed key, questions for policy. Aggregative analysis of the type attempted in this paper can help to raise these questions but it cannot hope to answer them.

NOTES

1. For a sampling of the Indian debate on this question, see Bardhan [1971], Byres [1972], Dandekar and Rath [1971], Lal [1976], Raj [1976], and Rajaraman [1975]. For a more general assertion of the operation of this process in a number of developing countries, see Griffin and Khan [1976].

2. Minhas' study was based on a combination of NSS data and national accounts data. For a discussion of the implications of using national accounts data see Ahluwalia [1978].

3. For a detailed discussion see Sen [1974]. The index can be written as $I = x \{1 - \frac{c^*}{\bar{c}_p} (1 - G_p)\}$ where x is the percentage of the population below the poverty line c^* , \bar{c}_p is the mean consumption of the poor, and G_p is the Gini coefficient of the distribution amongst the poor. The index ranges from 0 to 1.

4. See Planning Commission [1962].

5. Not only is it extremely difficult to measure the actual calory intake from the consumer expenditure level as recorded in the NSS, it is also arguable that the use of 2250 calories as a minimum requirement is inappropriate (See, for example, Bliss and Stern [1975]) For a discussion of the difficulties in translating the notion of a nutritional minimum into a poverty line in terms of consumption expenditure, see Sukhatme [1977].

6. For an attempt to construct tractile specific price indices for the rural population in the 'sixties see Vaidyanathan [1974]. Vaidyanathan finds that the price index for the poor rose slightly faster than for the non-poor.

7. See footnote to Table 1 for details on data sources used and several assumptions made to obtain estimates for missing years.

8. The distinction is important if only because it is incorporated in the valuation procedures used by the NSS. Consumption out of home-grown stock is valued at farm gate prices while consumption out of wages (whether paid in money or in kind) is treated as purchased consumption and valued at retail prices. For a discussion of the appropriateness of the CPIAI, see Minhas [1971].

9. This problem can only be resolved if the poverty line in current prices is determined for each year separately as the solution to the programming problem of defining the minimum cost budget needed to achieve some specified minimum requirements in nutritional and other terms, subject to any desired set of taste and preference constraints. Needless to say, no such exercise yielding poverty lines over time has been conducted for India or for any of the states.

10. This procedure has an important advantage in that it avoids the need for interpolation in estimating the percentage below the poverty line when the line falls between the limits of one of the discrete expenditure classes used by the NSS to report the distribution of the population. For a more detailed discussion see Ahluwalia [1978].

11. Lal's findings are based on data for five states only, and furthermore, on the incidence of poverty within the so-called weaker sections of the population. This comparison is somewhat questionable for the purpose of determining change in the incidence of rural poverty since it is possible that the incidence of poverty in the weaker sections may decline while the incidence of poverty in the rural population as a whole may increase. This can happen if the proportion of the rural population in the 'weaker sections' category rises sufficiently over the period.

12. Minhas' results follow from two assumptions. In the first place, he combines the NSS estimate of the distribution of rural consumption with an estimate of the level of rural consumption per person which is based on a national accounts consumption series. Since his national accounts data show higher levels of consumption in later years compared to the NSS, this tends to reduce the incidence of poverty over time. Much more crucial for the outcome, however, is Minhas' choice of the GDP deflator as the relevant price index for constructing equivalent poverty lines. Since the CPIAI shows a much faster inflation rate than the GDP deflator, use of the latter yields lower estimates of poverty in later years. For a discussion of the results obtained using Minhas' approach with our data, see Ahluwalia [1978].

13. One possible reason for this is the small size of the sample. The sample size for Punjab and Haryana in 1960-1 was only 142 households compared with 243 in 1959-60 and 224 in 1961-2.

14. It is well known that the index of foodgrains production and the index of production of all crops exaggerate the growth in net value added because they are gross output measures which do not take account of the increased input intensity of agriculture from the late 'sixties onwards.

15. A lagged effect of this sort is entirely plausible given the nature of access to the capital market. In a bad agricultural year small farmers and landless labourers may attempt to cushion the adverse impact on their consumption by resorting to borrowing. These loans are typically available at very high interest rates and may have to be repaid in the next year so that a bad agricultural year depresses the level of disposable income in the following year. A similar

argument applies when assets are run down in a bad year and income of the next year is partly diverted to building them up again. It should be noted that the crucial assumption in this explanation is not the existence of a high interest rate as such but rather a capital market imperfection in which a high rate must be paid for borrowing but a corresponding high rate cannot be obtained for any surpluses generated in good years. Clearly if the capital market were perfect in the sense that borrowing rates and lending rates were equalised we would be much closer to the world of permanent income theorists in which consumption would be substantially insulated from fluctuations in current income.

16. The index of output per head of the rural population is obtained by dividing the output index for each state by a rural population index which is constructed on the assumption that the rural population in each state grew over the period 1956-7 to 1972-3 at the same compound annual rate as observed between the decennial censuses of 1961 and 1971.

17. This approach to examining the relationship between poverty and agricultural performance is preferable to relating estimated trends in the incidence of poverty to trends in agricultural output per head since it makes full use of the available information.

18. See, for example, Lal [1976] and Johl [1975].

19. Note that if all incomes increase, but incomes of the rich increase more than incomes of the poor, then the inequality of consumption may either rise or fall depending upon the relative income increases and the shape of the consumption function. Thus a decrease in inequality in consumption is consistent with an increase in inequality in income, but our focus here is not on whether income inequality increased, which it probably did, but whether agricultural growth produced absolute impoverishment.

20. See, for example, Vaidyanathan [1974].

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