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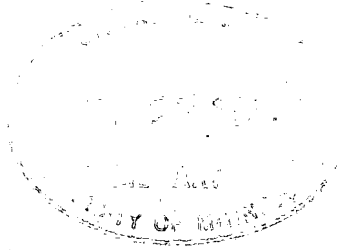
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STUDIES OF EAST INDIAN JUTE AND PADDY FARMS OVER TIME²

Little is known about which factors account for dynamic change or for stagnation in India's agriculture. Though statistics at the macro-economic level suggest upward trends, not much is known at the micro level to point to a rational explanation of these changes. On the other hand, successful macro-economic policies require a knowledge of economic decision-making processes at the farm level. As a contribution to meeting this need this micro-economic study, based on 85 farms over a six-year period, was undertaken in East India. It is an empirical attempt to understand the decision-making processes of East Indian farm households, classified by farm size. The study is based on detailed cost accounting records and, using statistical sampling techniques, important planning implications for East Indian agriculture and its development are drawn. Those concerned with growth of agricultural economy in a developing country may also find interesting the method and approach used in the study.

I. *Introduction*

THIS study consists of an inquiry conducted over a period into how farmers of the East Indian Region organize and operate their farms and live from their produce over time. It is a fragmentary approach to problems concerned with identifying the factors which determine progressive changes or stagnation in a rural economy of a developing country. Once these factors can be identified, the solution to problems of development in low-income non-industrialized regions is at least approached. Lasting solutions have so far not been found to them.

Unfortunately, little is known about which factors account for dynamic change or for stagnation in the rural sector of India's economy. Though statistics at the macro-economic level suggest that there are upward trends, particularly in the production of agricultural commodities, not much is known at the micro level to point to a rational explanation of these changes. On the other hand, successful macro-

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economic policies require a knowledge of economic decision-making processes at the micro-economic level. As a contribution to meeting this need, this micro-economic study, based on 85 farms over a six-year period, was undertaken in East India.

Objectives of the study

Two objectives were pursued:

- (a) A quantitative determination of production and consumption levels, of savings and investment, of total inventories and levels of indebtedness and of the degrees of monetization of transactions of farms, all differentiated by farm size (in terms of acres) and tenancy status.
- (b) The determination of the interrelationships of factors of production and consumption, etc. at the farm level in order to help towards a better understanding of the working of the decision-making unit of East Indian farm households. The determination of the magnitude of factors at the farm level and the interrelationships between these factors can only be achieved when time series are studied.

While we were primarily interested in the second objective, the achievement of the first was a pre-condition for understanding the process of economic change at the farm level.

Data used and method of selection

Data already collected and accumulated at the Indian Central Jute Committee, Calcutta, Bengal (ICJC) were extensively used. This institution supplied primary data for 200 farms for the period 1948-9 to 1954-5. Though these data were used by the ICJC for different purposes, it was possible to rearrange them so that they could serve the present purposes. The data were drawn from five subsamples, the composition of each sample being based on purposive, stratified, non-proportionate sampling, thus:

- (a) each subsample was chosen for its location in the jute-growing tracts of the East Indian region;
- (b) in each area selected for sampling a total census was taken and stratified according to jute growers and non-jute growers;
- (c) a size distribution (in terms of acres) of jute farms was then undertaken; and

- (d) selection of the number of farms for the subsample was not proportionate to the distribution classes but was such that each important class of farms was represented.

Each of the subsamples had 40 members but its composition changed over time, so that the 40 farms selected in 1948-9 were not identical with the 40 farms used in 1954-5. Given these data, derived from the sources described above, the following method was used in establishing model groups for the study of economic change over time. First, farms were identified which stayed in the subsamples throughout the period of observation, that is from 1949-50 onwards. The farms fulfilling this requirement were classified according to certain major characteristics. It was assumed that farm size (in acres) and tenancy status had an influence on farm organization and operation, and therefore farms were grouped according to these characteristics. Then model groups of farms thus classified were determined. For these groups yearly averages were computed. The data for the individuals thus selected together with their group averages served as the basis for the analysis. Farms of under half an acre were eliminated.

Nature of primary data

The primary records supplied by ICJC provided data for a period of six years. In their raw form they represented monthly observations for all farms and when arranged provided both financial and physical budgets. The basic data were collected by a permanent field staff of the ICJC stationed in each of the five centres in which subsamples were drawn. The data were collected in co-operation with the selected farmers and checks were made to reduce errors in reporting. Data on farm operations etc., were secured daily or weekly from each of the farms in the sample. Data on family budgets were gathered weekly or monthly depending on how accurately the details were remembered by farmers. Data on farm structure were collected once a year. To ensure that the data used justified further analysis, data were used only from those farms whose data showed internal consistency within their physical and financial budgets. If this internal consistency was not observed, the farm was eliminated from the analysis.

As can be seen from Table 1, 85 farms were selected for the study. These farms constituted about 42 per cent. of the original list of 200 farms. This relatively low percentage was consequent on the criteria

applied: namely (a) each farm had to stay throughout the period of observation, that is 6 successive years; (b) data for each farm had to show internal consistency, and checks on magnitudes of items, derived in two independent ways, had to show identity of results or only insignificant differences; (c) the farms selected had to have at least half an acre.

TABLE I. *Size of subsamples, 1949-50 to 1955-6*

State	District	Centre	Size of sample	Farms of		
				Up to 2 acres	2-4 acres	4-7 acres
Assam	Nowgong	Nowgong	22	..	10	12
West Bengal	Hooghly	Monahapur	29	7	11	11
West Bengal	Jalpaiguri	Belakoba	13	..	5*	8†
Orissa	Cuttack	Kendrapara	21	..	7	14
All farms			85	7	33	45

* Share-croppers. † Cash tenants, owner operators from 1954-5 onwards.

The 85 farm records were sample material collected in four randomly selected jute-paddy tracts in the East Indian Region. Since it was clear that these areas had different environments, each village selected was considered a separate universe. Within each village farms were classified according to size and tenancy status. The sample size is given in Table 1, after the size and tenancy classifications had been carried out.

The individual subsamples were determined by studying frequency distributions of farms according to size. These subsamples represent farms which fell at one time—not necessarily in all years—into a certain size group. It was assumed that if farms fell in one year into a particular size group, their decisions with regard to farm organization and operation would not differ significantly, particularly since they produced the same products, namely jute and paddy.

The approximate derived size of the population universe is shown in Table 2. It is generally assumed that farmers growing jute and paddy divide their land 30:70 for the production of these crops. This would mean that about 4.5-5.0 million acres of land in the East Indian region were occupied by jute-paddy operators. Any generalizations drawn later on are restricted to the universe from which the material was derived; namely the East Indian jute-paddy tracts of West Bengal, Assam, Orissa and Bihar.

TABLE 2. *Total jute acreage and corresponding 'assumed' paddy acreage on farms in East Indian region**

Crop	1949-50	1950-1	1951-2	1952-3	1953-4	1954-5
	<i>million acres</i>					
Jute	1.1	1.4	1.9	1.7	1.2	1.2
Paddy	3.0	3.2	4.4	3.9	2.8	2.8

* Data published in *Estimates of area and production of principal crops in India 1953-54 and 1954-55*, Directorate of Economics and Statistics of Ministry of Food and Agriculture, New Delhi.

The local universe and the samples

Each sample or subsample was drawn from a local universe that was an entire village. Complete censuses taken of these served as bases for evaluating the representativeness of the samples and to give an indication whether structural change had taken place within the villages.

One of the best indicators of structural change of farms in a given area is the percentage difference between frequencies of total population according to farm size at two different points of time. The relative frequency distributions of farms by size (acreage), village and year are given below. The percentage differences between relative frequencies are given on the right-hand side of the table.

In the three centres for which percentage changes could be computed obvious changes have taken place.

In BELAKOBA there was a general trend toward smaller farms. Farms larger than 6 acres diminished in numbers, while the number of farms between 0 and 3 acres increased. Since the total number of farms increased considerably too, one can assume that the split-up of larger farms into smaller ones was probably due to population increase on a constant acreage.

In MONAHAPUR the number of farms in the area declined and it seems that consolidation of holdings took place. There were fewer farms in the smallest size group in 1956-7 than in 1948-9. The largest increase of farms was registered in the group of 3-6 acres. The decrease in the total number of farms explains why the number of farms in the largest size group could increase considerably.

The trends in Belakoba and Monahapur are opposites—while in Belakoba the number of small farms increased, in Monahapur the number of small farms decreased. One reason for the decrease of

small farms in Monahapur could be the fact that there are possibilities of outside employment in nearby Calcutta.

TABLE 3. *Relative frequencies of farms by centre* and year; percentage difference between frequencies and years (numbers of farms in brackets)*

<i>Farm size (acres)</i>	<i>Percentage of total population</i>		<i>Percentage difference between frequencies 1948/9 and 1956/7</i>
	<i>1948-9</i>	<i>1956-7</i>	
<i>Belakoba</i>			
0-3	3.7	20.3	+16.6
3-6	52.0	47.3	-4.7
6-10	28.6	21.8	-6.8
10+	15.7	10.6	-5.1
	$\frac{100.0}{(241)}$	$\frac{100.0}{(414)}$	
<i>Monahapur</i>			
0-3	91.0	73.8	-17.2
3-6	5.9	19.8	+13.9
6-10	3.1	4.8	+1.7
10+	0.0	1.6	+1.6
	$\frac{100.0}{(299)}$	$\frac{100.0}{(187)}$	
<i>Kendrapara</i>			
0-3	78.1	52.7	-25.4
3-10	17.8	43.7	+25.9
..
10+	4.1	3.6	-0.5
	$\frac{100.0}{(354)}$	$\frac{100.0}{(391)}$	
<i>Purnea</i>			
0-3	n.a.	39.9	n.m.
3-6	n.a.	23.4	n.m.
6-10	n.a.	13.0	n.m.
10+	n.a.	23.7	n.m.
		$\frac{100.0}{(363)}$	

* Excluding the village of Nowgong for which frequencies could not be computed.
n.a. = not available. n.m. = not measured.

In KENDRAPARA there was an increase in the total number of farms in the area, accompanied by a decrease in the number of small farms. If the number of farms in these areas increased, but small farms decreased in numbers, it follows that the increase in larger sized farms

must have been accompanied by increases in the agricultural area used.

Thus in all centres given in the tables significant changes have taken place. However, these changes are not all in the same direction. Given the changes between the two censuses, are these changes also reflected in the sample farms selected? In Belakoba both groups show decreases in farm size, corresponding to the change between the local censuses.

The trend given in the census figures for Monahapur is reflected in the subsample figures in this village. Individual farms in the smallest size group (up to 2 acres) increased their acreage over time; so did medium- and larger-sized farms. Finally in Kendrapara the subsamples of this village reflected the tendencies in the changes between the two censuses.

Thus, the samples express changes in farm structure which correspond to the changes in the agricultural structure of the villages. The size groups which are selected within each village for the study of change in the farm business-farm household situation over time are also groups which are found to be the most frequent in the respective areas.

II. *The measurement of economic change*

Economic change is difficult to measure at the farm level in general, but particularly when climatic factors play an important part in determining the magnitude of physical and economic variables which usually serve as change indicators. Leaving climatic influences aside, any change in the level of production or in amounts of inputs must be conceived of as a result of decisions taken. Working with some principles of rationality, the farm operator will direct resource allocation so that either income, or satisfaction to himself or his family, is increased. The application of these principles, however, is limited to the effect on farm organization. Hence, for the discovery of economic change or stagnation it is necessary to study all relevant factors which explain the organization of these East Indian farms.

Since the rationality of organizational decisions based on some psycho-socio criteria rests on the subjective evaluation of benefits and losses incurred from it, and cannot be measured objectively by interpersonal comparison, we exclude these decisions as causes or explanations for organizational change at the farm level. Our concern lies

only with action patterns based on economic expectations. Thus, we assume income improvement to be the goal of these jute-paddy farms under study.

If income improvement is the accepted goal, all organizational factors which are related to income must be used as indicators of change. And since, in a closed system of farm organization, factors of production are not only related to income but are inter-related as well, it follows that changes in income must be studied in relation to all organizational factors in order to understand the decision-making process. This requires budgeting of inputs and outputs both in physical and financial terms; in physical terms in order to show whether real changes have taken place; in financial terms in order to show how and why these factors are used in certain quantities and combinations.

Budgeting of farm inputs for reasons of establishing the financial success or failure of a farm is extremely difficult in agricultural areas where few inputs or services are bought in the market and a considerable amount of farm produce never reaches the market but is home consumed. Only when repeated checks and cross checks are made is it possible to make a correct assessment of transactions in kind. In the ideal case, this would mean the weighing of all quantities earned or consumed in kind.¹

Budgeting of farm income and output produced data on income and expenditure as well as on return to management and capital. Levels of these items were assessed in the following way:

Total income of the farm household. To income earned off the farm was added income earned through sales of farm products, home consumption (quantity consumed multiplied by market price) and changes in crop inventories.²

Total expenditures of the farm household consisted of expenditures on agriculture, consumption of home-grown products out of production or inventories, consumption purchases, capital expenditures and rental fees.

¹ Production of farm products was actually weighed on the farm plots with the help of the field staff of ICJC stationed at the villages. Consumption of farm products was estimated weekly by the farmer and through interview by the field staff. If unexpectedly high consumption figures were quoted, the field men asked for explanations. Since the field men had lived in the village for years, they were able to evaluate realistically the consumption levels quoted.

² Total income was also independently arrived at by multiplying total production by market price and adding off-farm income.

(For all factors employed, no alternative cost principle was applied and expenses were charged only for those items for which real market values could be computed. No evaluation was made when the by-product was consumed on the farm (e.g. straw used as feed or bedding for livestock, manure used on the land or as fuel).)¹

Labour costs (family, hired labour and operator) were assumed to consist of actual consumption in cash and kind (purchases and home consumption plus cash wages for hired labour). Total income and expenditures provided us with the information necessary to determine

Return to management and capital

This factor is defined as that amount of total income (cash and kind) which is left after all expenditures on agriculture and household have been paid. Its components are savings in cash, positive changes in crop and household inventories, decreases in indebtedness and capital expenditures. Thus, it does not represent a net return to capital and management but includes depreciation for the factors employed.² It shows, however, the amount of gross savings after consumption and expenditures on agriculture that can be used for maintenance and development, or for other purposes.³

Return to management and capital is considered as the success factor with which all other organizational factors have to be linked. If any internally generated change is taking place, it must be discovered by studying the changing levels of this success factor. The levels of this factor, however, reflect price and weather fluctuations as well as organizational decision-making. Thus changing levels of the success factor must be studied with changes in the amount of inputs, their combination and their efficiency of use.

In the broadest sense, returns to management and capital are dependent upon management and quality and amount of resources combined, as well as consumption levels of the farm household.⁴

¹ So-called by-products were added to income only when they were sold in the market.

² That is, it relates to the farm-household as a whole, not to the farm business alone (Ed.).

³ Determining net return to capital and management in an agricultural setting where the concept of depreciation in an accounting sense is unknown would require that arbitrary depreciation schedules are applied. Since replacement demands do not arise out of arbitrarily assigned depreciation but rather in a discontinued form as the need arises, we preferred to arrive at first at the gross return to capital and management. Later on we were interested in studying capital expenditures in relation to product increases and thus were able to indicate whether capital expenditures represented replacements or net additions to capital.

⁴ It must be mentioned at this point that family consumption might vary with income and thus determine, in part, savings. While this is true, we must bear in mind that we are

While decisions will be reflected in the levels of the success factor, changes in this factor must be interpreted in relation to changes in components of income or expenditure and in the amount of inputs and their combination in physical terms. For an interpretation of farm behaviour we selected the following other variables: (a) on the income side: off-farm income (rents received, wages earned, earnings from implements rented out), sales of farm products (and composition of sales), home consumption, and positive changes in inventories; (b) on the expenditure side: agricultural expenditures, rents paid, purchases in cash, wages in cash, home consumption. Besides the above variables, we were interested in studying amounts and physical combinations of inputs as well as their efficiency of use.

The following factors were selected for this study:

- (a) amounts of basic resources (land, labour, power, productive livestock, implements);
- (b) intensity indexes of resource use (percentage of land cropped more than once, labour and power equivalents per net acre sown, labour and power equivalents per gross-cropped acre, implements per labour equivalent, productive livestock per net acre sown);
- (c) pattern of land utilization (crops in the two seasons, amount of land occupied by homestead, fallow land);
- (d) consumption equivalents;
- (e) yield per crop acre and production levels per unit of productive livestock.

Finally, the question must be answered as to whether farms of certain size groups will be able to earn positive returns to management and capital, not only to meet replacement demands but also for development of productive capacity, that is, income-earning capacity. Thereby it seems important to find out whether farm operators do make rational decisions with regard to short-run fluctuations in the market and with regard to long-run perspective. In answering these questions concern is concentrated primarily on the following points: Do changes in product prices have any influence on resource allocation? Do changes in product prices determine inventory and purchase policies of farmers? Do changes in income determine levels of consumption per consumption equivalent?

interested in actual savings and not what could be saved. It is also realistic to assume that family labour is supplied at varying reservation prices which are directly related to income levels.

III. *Empirical results of measuring economic change on farms*

Returns to management and capital, and the capacity for internal economic development at the farm level

As mentioned earlier, returns to management and capital are an important indication in determining the internal generating capacity for economic development at the farm level. In order to evaluate the levels of returns, Table 4 presents averages of returns to management and capital under several assumptions. In all groups, positive returns are obtained on average. Differences between groups are due to size and other factors. The amount of off-farm income (item 3) is generally larger than the return to management and tenant's capital. This means that without off-farm income practically all farm-household groups produce negative returns to management and tenant's capital as is shown by item (4) in the table.¹

In other words, given the consumption and production levels of the sample farms, all groups would have to increase their degree of indebtedness by a yearly amount stated under item (4). This means that, in the long run, these farmers would lose their present tenure status to those agriculturists or landlords who are in a position to provide credits. Even if we assume that all farmers are owner-operators—see item 5, Return to management and total (tenant's and landlord's) capital—the position of the farmers would not improve significantly. Only one out of nine groups of farms would achieve returns substantially above the break-even point; two groups have very small positive returns, while the rest would still get hopelessly into debt.

Since we can safely assume that capital expenditures represent mostly replacements (and not net additions), it is possible to estimate a net return to management and tenant's (and total) capital when off-farm income equals zero. Item 7 shows that under this plausible assumption all tenants would still get hopelessly into debt. Item 8 indicates that even if these farmers were owner operators, only one out of nine groups would show substantial positive returns; one group would break just about even, while the rest would still suffer from eventual overwhelming indebtedness.

Granted that the expenditure levels are partly dependent on the amount of off-farm income, the farmers in this study, though all of them achieved positive returns to management and capital, stored

¹ This assumes that production and consumption would remain constant.

TABLE 4. Returns under different definitions: annual averages (1949-55) per farm in rupees

	Belakoba		Kendrapara		Nowgong		Monahapur		
	Farm size groups		Farm size groups		Farm size groups		Farm size groups		
	2-4 acres	4-7 acres	2-4 acres	4-7 acres	2-4 acres	4-7 acres	2-4 acres	2-4 acres	4-7 acres
1. Return to Management and Tenant Capital	+77	+166	+323	+523	+270	+453	+136	+869	+778
2. Return to Management and Total Capital	+419	+193	+443	+581	+355	+547	+156	+927	+880
3. Off-Farm Income	144	158	516	562	450	744	776	1,413	1,884
4. Return to Management and Tenant Capital assuming Off-Farm Income = Zero	-67	+8	-193	-39	-180	-291	-640	-544	-1,106
5. Return to Management and Total Capital assuming Off-Farm Income = Zero	+275	+35	-73	+19	-95	-197	-620	-486	-1,004
6. Capital Expenditures	0	30	23	68	104	149	24	337	232
7. Net Return* to Management and Tenant Capital when Capital Expenditures = Replacement and Off-Farm Income = Zero	-67	-22	-216	-107	-284	-440	-664	-881	-1,338
8. Net Return to Management and Total Capital when Capital Expenditures = Replacement and Off-Farm Income = Zero	+275	+5	-96	-49	-199	-346	-644	-823	-1,236

* Excludes Capital Expenditures.

most of these returns in terms of increases in crop and household inventory (see Table 5). In other words, they did not invest their returns in order to increase production capacity but pursued a stockpiling policy in marketable products.

One can only speculate on this phenomenon. In the first place re-investment alternatives which result in sure returns are hardly known in areas that are characterized by a high degree of weather risk. In the second place, the willingness to invest, say in irrigation, is often prevented from materializing because of dependence on communal or district decisions. Often, the only alternative to stockpiling or banking is acquisition of titles to land. Under these conditions the agricultural structure of areas is in constant flow. If land titles cannot be acquired and other alternatives of investments are not considered by the farmer, stockpiling seems to be a plausible policy because most of the peasant folk know of distress periods and famines.

TABLE 5. *Components of returns to management and tenant's capital (Average annual returns per farm in rupees, 1949-55)*

	<i>Betakoba: farms</i>		<i>Kendrapara: farms</i>		<i>Nowgong: farms</i>		<i>Monahapur: farms</i>		
	<i>2-4 acres</i>	<i>4-7 acres</i>	<i>2-4 acres</i>	<i>4-7 acres</i>	<i>2-4 acres</i>	<i>4-7 acres</i>	<i>-2 acres</i>	<i>2-4 acres</i>	<i>4-7 acres</i>
Savings:									
Cash (net) . . .	-4	+1	+32	+37	-30	+37	+106	+415	+289
Kind	+80	+130	+261	+470	+183	+212	+7	+117	+257
Capital expenditure	0	+30	+23	+68	+104	+149	+24	+337	+232

We must keep in mind, however, that the sample farms show a considerable amount of off-farm income which was not representative of the agriculture in the region.

What does this sample tell us about farms in the East Indian region? Since most of the jute farms in the East Indian region fall within the size groups mentioned, one may generalize first for all jute-paddy farms and second for all paddy farms. In the first place, jute-paddy farms within the size groups mentioned are in no condition to save consistently without a sufficient off-farm income. Moreover, without sufficient outside income, most jute-paddy farms will always face situations in which non-home-produced capital cannot be replaced without either getting into debt or cutting consumption expenditures to levels which endanger nutrition.¹ Hence the over-

¹ It is very questionable whether family consumption could be cut to levels such that farm household expenses equal farm income.

This study shows that, in general, average consumption levels were somewhat higher than levels quoted from the 1949-50 National Sample Survey for East India. The higher

whelming majority of farms is unable to generate any, financially potential, capacity for development, given present production techniques. In fact, most of these farmers have to make an all-out effort to avoid losing their present tenure status.

Secondly, since jute has an income advantage over paddy,¹ one-crop paddy farms will most likely have a smaller income than farms which also grow jute. Given the same consumption levels as jute-farm households, paddy farmers would not only be unable to develop capacity for improvement but would most likely get sooner and deeper into debt than jute farmers. Once unable to pay interest and principal on loans, the only way out would be to sell land or other forms of capital. Only when paddy farmers were able to supplement their incomes would it be possible for them to maintain their social and tenure status. Given the prevailing stage of rural and urban un- and under-employment, there appeared for the majority of peasant folk no possibility of additional earnings and thus the chances of income supplementation were slim. The prospects of tapping additional income (outside the farm) will be even slimmer in the future since population is increasing and with it the pressure on land.

Hence the conclusion is that for the vast majority of farms in the East Indian region there existed no internal financial generating capacity for development. This conclusion is based on the observation that the sample farms over a six-year period represented the most frequently occurring farms in terms of acreage.²

Changes in the amount and intensity of use of basic resources

Though fluctuations could be observed in the amount of resources used, as well as in the intensity with which these resources were employed, no trend could be discerned. Fluctuations in data were not related to economic phenomena but must be considered as having been caused by weather or other factors over which the operator had

consumption level is, however, mainly due to differences in definitions. NSS stated levels of consumption per person, while the present study stated consumption levels per consumption equivalents (using Lusk's coefficients). Since consumption equivalents per household are usually less than the number of persons per family (adults, children), the consumption levels of the two sources are not significantly different. Since about 90 per cent. of consumption expenditures goes for food, average consumption levels per equivalent cannot be cut much without endangering seriously the health of the person.

¹ . . . even after cash costs have been subtracted, jute earned—on the average of the six years—about Rs. 130 more per acre than paddy (see tables on 'net' income difference between jute and paddy after cash costs—p. 80).

² Based on NSS, 1954-5.

little or no control. Averages of input combined by the farm-operator for purposes of production are given in Table 6 below. Net area sown is defined as acres sown at least once during the production year. This area can fluctuate for several reasons. Since all farmers are tenants (cash or kind), net area is dependent, in part, on the acreage rented in the short-run; on occasions part of the area is not used in order to restore soil fertility; and some variations in acreage might be due to weather fluctuations. Thus only when land is sold or bought do changes in input amounts become important. Since, however, land purchases took place in two groups only in one year and only small plots were bought it seems that no significant change took place in inputs of land.

Adult labour equivalents are defined as the permanent labour force on the farm measured by multiplying the number of workers by their respective coefficients.¹ Variations in labour equivalents are due to changes in the composition of the farmer's family and/or to varying labour demands caused by weather and met by hiring workers. Changes in number of labour equivalents are not related to income. One draft power equivalent is defined as one pair of bullocks. No significant change could be observed in this production factor. Implements are expressed in terms of rupees and consist mostly of wooden ploughs, hoes, sickles etc. This factor did not change significantly. One 'production livestock' unit is defined as one dairy cow or seven goats. This factor consisted entirely of dairy (buffalo) cows; it did not change significantly over time. The intensities of resource use are given in Table 6.

Intensity of resource use is defined as an input-input ratio, e.g. an acre of net or gross area sown combined with labour, power or productive livestock; or value of implements per labour equivalent; or the percentage of land double-cropped. The more of net area sown is double-cropped, the more intensively is land utilized. Also the more LE per acre of net area sown, the more labour is under-utilized, and similarly for power equivalent. The higher the value of implements per labour equivalent, the larger the capacity of one unit of LE. The larger the number of productive livestock per acre, the more intensively is the land utilized to provide feed for dairy cattle. The lower the

¹ Coefficients used are those quoted in the Agricultural Labour Report, 1954, of the Government of India:

1 working man (above 15 years of age) = 1 labour equivalent (LE)

1 working woman (above 15 years of age) = 0.75 labour equivalent (LE)

1 working young person (below 15 years of age) = 0.5 labour equivalent (LE)

TABLE 6. *Intensity indexes of basic resources, 1949-50 to 1954-5 average indexes*

Village	Production of net area sown more than once a year	Labour equivalents	Power equivalents	Productive livestock units	Value of implements per labour equivalent	Labour equivalent	Power equivalent
		per acre of net area sown				per acre of gross cropped area	
		%	equivalents			equivalents	
<i>Size 4-7 acres</i>							
Nowgong	38	0.5	0.2	0.5	11	0.4	0.2
Belakoba	16	0.4	0.2	0.4	10	0.4	0.2
Monahapur	42	0.8	0.2	0.8	12	0.5	0.1
Kendrapara	31	0.3	0.1	0.2	15	0.3	0.1
<i>Size 2-4 acres</i>							
Nowgong	52	0.6	0.4	0.5	14	0.5	0.3
Belakoba	0.2	0.5	0.2	0.2	7	0.4	0.2
Monahapur	63	1.1	0.3	0.3	26	0.5	0.2
Kendrapara	41	0.7	0.3	0.5	16	0.5	0.2
<i>Size -2 acres</i>							
Monahapur	40	1.8	0.1	1.2	0.8	1.3	0.1

number of labour (power) equivalents per gross-cropped area, the more labour has been utilized.

In general, no significant change in intensities of resource uses could be observed. Again, fluctuations are not due to economic phenomena (prices, income) but rather to weather fluctuations.¹

Resource allocation and changes in product prices

Table 7 gives a summary of our findings with regard to response to price as measured by changes in the acreage of crops. In certain of the farm groups price response can be observed. These responses, however, are very small (in terms of acreage changes). At the most a change of one-quarter acre in rotation from one year to another took place in spite of large changes in price-ratio, in one of the 4-7 acre size groups.

There is usually a direct relationship between crop acreage and crop price—thus, when price of jute rises, acreage of jute will increase. However, it is felt that more research using larger samples will be needed to establish more definitely any price responses and competitive relationships between crops. The indications are that in size groups of up to 4 acres no price response can be expected but that price response might be measurable on larger farms.

TABLE 7. *Response to crop price changes (paddy, jute) measured by changes in crop acreage (early season) 1949-54*

Village	Size group	Price response in same or next year
	<i>acres</i>	
Belakoba . . .	2-4	none
	4-7	none
Kendrapara . . .	2-4	insignificant
	4-7	some
Nowgong . . .	2-4	insignificant
	4-7	some
Monahapur . . .	-2	none
	2-4	none
	4-7	none

Inventory and production policy in relation to changes in the price of jute

Table 8 summarizes findings with regard to jute inventory policies. As can be seen, three groups of farms lost in one year alone a con-

¹ Differences in intensities as between size groups are worth observing. It seems that the relatively large number of LE per 'net' acre in the smaller size groups is partly offset by a larger percentage of land double-cropped in that group.

siderable amount of money from a stockpiling policy which resulted in storage when prices were high. The largest loss in a single year in the other three groups was insignificant. It is important to point out that the rational action by producers in increasing jute acreage in the year when jute prices were high (and thus substituting jute for paddy) was followed by the irrational response of storing jute during the year of highest jute prices, losing thereby the price advantage. From this observation doubts are raised whether these farmers operate their holdings according to principles of increasing income.

TABLE 8. *Jute inventory changes viewed as response to jute price fluctuations. 1949-55*

Village	Size group <i>acres</i>	Sell regardless of jute price	Largest loss in a single year due to wrong inventory policy <i>Rs.</i>
Belakoba	2-4	no	-13
	4-7	no	-34
Kendrapara	2-4	no	-177
	4-7	no	-249
Nowgong	2-4	no	-20
	4-7	no	-208
Monahapur	-2	yes	..
	2-4	yes	..
	4-7	yes	..

Acreage allocation and the income advantage of different crops

None of the farm groups sold any significant amount of paddy over the entire period. Most sample budgets showed that instead of selling paddy, farm households purchased paddy and rice in considerable quantities. If paddy were grown on jute acreage, all farm groups would have been self-sufficient in paddy. Thus we must conclude that farmers grew jute in order to gain an income advantage. Measured on a per acre basis, this income advantage of jute over paddy was considerable for most groups even when cash costs of jute and paddy production were subtracted. This can be seen from Table 9.

This obvious income advantage raises the question of why these farms did not specialize in jute production. Cash expenditures per acre of jute are larger than those of paddy as can be seen in Table 10. Jute has high seasonal labour demands and thus requires labour to be hired for cash. It could be that jute acreage expansion is limited by the amount of such cash outlays called for at a time when cash

TABLE 9. 'Net' difference in income between jute and paddy per acre after cash expenses have been subtracted. Period 1949-55

Village	Farm size acres	Per acre 'net' difference in income after cash cost between jute and paddy*
Belakoba	2-4	+206
	4-7	+203
Kendrapara	2-4	+117
	4-7	+49
Nowgong	2-4	+132
	4-7	+200
Monahapur	-2	+60
	2-4	-11
	4-7	+68

* If positive, income difference in favour of jute.
If negative, income difference in favour of paddy.

TABLE 10. Average cash expenditure per acre of jute and paddy, by farm groups

Village	Farm size acres	Average cash expenditures per acre	
		Jute	Paddy
		Rs.	Rs.
Belakoba	2-4	10	3
	4-7	11	0
Kendrapara	2-4	20	5
	4-7	100	15
Nowgong	2-4	85	26
	4-7	200	53
Monahapur	-2	94	94
	2-4	89	72
	4-7	60	42

reserves are low. On the other hand it is possible that cash expenditures per jute acre rise disproportionately as jute acreage increases, thus reducing the income advantage over paddy. Further research will be necessary to determine the factors which limit jute acreage per farm.

Changes in household expenditure in relation to income

Average levels of consumption expenditures per consumption equivalent are given in Table 11. Since most (about 80 per cent.) of all household expenses are for food, and most of the food consumed is home-grown, changes in prices of food (paddy, rice etc.) are reflected

in levels of consumption when measured in money terms. Most food consumption consists of paddy and rice and therefore paddy or rice consumption must be measured in real terms if the effect of prices or incomes on consumption levels is to be measured. Therefore, Table 11 shows also the average paddy and rice consumption per consumption equivalent.

It was found that consumption levels in most groups deviated little from the average in any particular year. There was, however, some income effect in one group of farms (Nowgong). When farm income was high, farmers substituted rice for paddy consumption. Differences in consumption levels as between groups were due to differences in consumption habits and to income levels but in general, and within each group, changes in prices and income had no effect on real consumption levels.

TABLE 11. *Average annual consumption levels per consumption equivalent in money and real terms by groups and villages 1949-55*

Village	Farm size	Consumption expenditures	Paddy	Rice
		Per consumption equivalents		
	acres	Rs.	mds.	mds.
Belakoba	2-4	229	10	0
	4-7	238	11	0
Kendrapara	2-4	200	12	0
	4-7	256	13	0
Nowgong	2-4	163	7.2	4.1
	4-7	244	8	3.5
Monahapur	-2	288	2	4.2
	2-4	404	0.8	10.1
	4-7	315	0.8	6.0

The relative importance of components of total income is given in Table 12 for each farm group. As can be seen, off-farm income made an important contribution to total income in seven out of nine groups. It must be mentioned that off-farm income, being highest in Monahapur, was possible because of employment opportunities in nearby Calcutta. In Belakoba, which is located away from important centres, off-farm income was relatively small. The composition of total income did not change over the period.

Since components of income have not changed over time, it is important to find out whether adjustments on the expenditure side took place, such that savings increased. An analysis of components of cash

TABLE 12. *Components of total income in relative terms by groups. Six-year average**

Village	Farm size	Sales of farm products	Off-farm income as share in total income	Home consumption rent in kind, and inventory changes
	acres	% of total income		
Belakoba . . .	2-4	16	14	70
	4-7	30	12	58
Kendrapara . . .	2-4	10	35	55
	4-7	14	34	52
Nowgong . . .	2-4	36	30	34
	4-7	36	31	33
Monahapur . . .	-2	17	51	32
	2-4	24	41	35
	4-7	24	38	38

* Monetized component of total income roughly equals sum of sales of farm products and off-farm income.

and kind expenditures shows that fluctuations in the levels of components took place throughout the period, but no trend could be discerned. For this reason only averages are given in the tables below.

TABLE 13. *Components of cash expenditures in relative terms*

Village	Farm size	Rent	Repair on farmhouse	Crop cultivation	Capital	Feed for livestock	Household
	acres	% of cash expenditure					
Belakoba . . .	2-4	0	1	4	0	5	90
	4-7	1	1	6	6	5	81
Kendrapara . . .	2-4	3	0	24	3	0	70
	4-7	4	0	17	5	5	69
Nowgong . . .	2-4	1	1	16	12	0	67
	4-7	2	5	21	10	0	61
Monahapur . . .	-2	1	0	5	3	7	84
	2-4	3	0	11	19	10	57
	4-7	2	0	13	10	13	62

As can be observed, the major share of expenditure in all groups went for household purchases. Expenditure on crop cultivation was the next most important cost item. Within each village no essential differences between groups with regard to components could be observed. But between villages important differences could be noticed. These differences, however, were due to differences in natural-economic environments.

As could be observed with regard to cash expenditures, household expenditures were the major cost item in kind. Agricultural expenditures in kind were important in Kendrapara and Monahapur. This means that hired labour costs were high in these farm groups and that

additional labour (power) was necessary to perform agricultural operations. Rent in kind made up a large share of farm expenditures in the 2-4 acre groups of Belakoba (50 per cent.), Kendrapara (16 per cent.) and Nowgong (22 per cent.). This large percentage is due to share-cropping arrangements in Belakoba and to kind-rent arrangements in the other two villages. Rent in kind required a disproportionately larger share of farm income than rental fees in cash.

TABLE 14. *Components of kind expenditure in kind*

<i>Village</i>	<i>Farm size</i>	<i>Expenditures household</i>	<i>Rent</i>	<i>Agriculture</i>
	<i>acres</i>	<i>% of expenditure in kind</i>		
Belakoba	2-4	50	50	0
	4-7	96	3	1
Kendrapara	2-4	72	16	12
	4-7	76	4	20
Nowgong	2-4	73	22	5
	4-7	85	9	6
Monahapur	-2	76	..	24
	2-4	68	..	32
	4-7	81	..	19

The share of components of household expenditures did not change significantly over time. Differences between villages were due to simple differences, like size of household, consumption levels per consumption equivalents etc.

IV. *Conclusions*

In all farm groups no significant change took place over the period covered by the inquiry. Components of income and expenditure remained the same and inputs as well as expenditures in real terms remained fairly constant. Net return to management and capital was small and was only obtained through off-farm income. For the majority of farms in the East Indian region falling into the size categories of the sample, but not able to supplement farm income through outside employment, the capacity to generate financial or physical resource for internal development would appear to be zero.

With a constantly growing population, East India faces large food and fibre shortages which will grow unless population growth is held in check. Agricultural development to support general economic development will not take place unless the government can provide incentives for agriculturists to produce more from the land and can

secure for the farm operator a return to management and capital which will permit him to risk investments in production-increasing inputs. To assure a climate in which agricultural development can take place requires government support of agriculture along the lines of supplying commercial fertilizer at, or below, production cost, controlling commodity markets, fostering village industry growth and evolving a land tenure system which will guarantee a better and more intensive use of farm resources. The latter requires that a study be set up to attempt measurement of internal economic change on farms larger than 7.5 acres which, though constituting only 12 per cent. of farm households, occupy 40 per cent. of the agricultural land.¹ If it could be shown that (a) such farms have internal economic generating capacity and (b) utilize their resources better than smaller farms, then policy should be directed toward fostering agricultural development in these farm groups to assure the required total growth.

¹ Based on NSS, 1954-5.