Vol XXXVIII
No. 3

ISSN 0019-5014

CONFERENCE
NUMBER

JULY-
SEPTEMBER
1983

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

SUMMARIES

A STUDY OF FACTOR SHARES IN MAHARASHTRA AGRICULTURE

R. E. Waghmare and M. P. Dhongade*

The input-output data of important crops studied under Cost of Cultivation Schemes operated in the State of Maharashtra were utilized for examining the changes in factor shares due to use of high-yielding variety (HYV) seeds, irrigation and improved method of cultivation over the use of local varieties, unirrigated cultivation and traditional method of cultivation respectively. The study covered the crops of paddy (1973-74), bajra (1973-74), jowar (1971-72, 1973-74, 1977-78), cotton (1976-77), wheat (1975-76) and sugarcane (1973-74 and 1977-78). A comparison of the factor shares in respect of local and HYV paddy, unirrigated and irrigated wheat indicated that the relative share of capital has increased as against a decline in the share of labour, indicating thereby a substitution between labour and capital has taken place in HYV paddy and in irrigated wheat. The increase in the share of profit both in HYV paddy and irrigated wheat indicated that the management with the technological change was better. In the case of jowar and cotton, the share of both labour and capital has declined while that of profit increased sharply especially in non-traditional varieties over traditional varieties of cotton. Analysing the change in factor shares of wheat with improved method over traditional method of cultivation, it was observed that the share of both labour and capital has declined in the improved method of wheat. However, the sharp rise in the share of profit in the latter method indicates the significant role of management in the improved method of wheat cultivation.

The study of hired labour shares due to improved technology in jowar, cotton, paddy and wheat showed a marginal decline over the traditional technology. However, over a period of time, the share of hired labour in the cultivation of jowar and sugarcane crop showed an increase. Comparing the changes in the factor shares for sugarcane and jowar over a period of time, it was observed that there was a decline in the share of profit in sugarcane cultivation while there was neither an increase nor a decrease in the share of profit in jowar cultivation.

ESTIMATION OF FACTOR SHARES: AN INTER-CROP, INTER-TEMPORAL AND INTER-SPATIAL STUDY

K. Sain†

In the context of global changes in farm technologies bearing on shares and combination of factors used in farming all over the world and, especially,

* Field Officer and Head, respectively, Department of Agricultural Economics, Mahatma Phule Agricultural University, Rahuri, District Ahmednagar, Maharashtra.

† Director-in-Charge, Comprehensive Scheme: Cost of Cultivation of Principal Crops in West Bengal, Bidhan Chandra Krishi Visva Vidyalaya, Kalyani, West Bengal.

in the developing economies, efforts are made in this paper to estimate the rewards of some major factors of production engaged in growing the principal crops of paddy, wheat and jute in certain specified regions of India. The main objectives of this exercise are, first to note the relative shares of land, human labour, capital and farm entrepreneur in the cultivation of these crops grown in the same region, secondly, to note the changes, if any, in their relative shares in the same regions and for the same crops over different years, and, thirdly, to study the variations, if any, in these shares over different regions. Some of these variations in relative shares are put to tests of significance to ensure the need for recombination of these factors for future farm improvement. The data collected in connection with the cost of cultivation studies since the beginning of the 1970s are used in this paper. The main findings of this exercise are: First, there are wide intra-crop variations in the percentage shares of land, human labour, capital and farm entrepreneur in the per hectare revenue of paddy, wheat and jute in each of the years of the 1970s in different States of India. Secondly, inter-temporal variations in these shares for land, human labour and capital are not marked and statistically significant. Thirdly, there have been significant inter-temporal variations in the percentage shares of the farmer entrepreneur in total revenue per hectare in the cultivation of all the three crops. These shares have tended to decline towards the end of the seventies and became negative in some cases. Fourthly, inter-crop variations in the shares of these four factors of production were not marked. Finally, inter-spatial or inter-State differences in the relative shares of these factors in total revenue per hectare were not marked in the cultivation of paddy, wheat and jute. Special attention is called for protecting the interests of the factors of production at equitable levels, especially, of the entrepreneur farmers for encouraging them to adopt farm innovations and to strive for farm improvement while reformulating farm plans and farm price policies so that the per capita daily availability of foodgrains and other farm products increases and the per capita real income and national welfare are enhanced.

RESOURCE PRODUCTIVITY AND FACTOR SHARE IN CROP PRODUCTION IN CENTRAL DISTRICTS OF PUNJAB

H. K. Bal, Bant Singh and H. S. Bal*

With an abrupt increase in the prices of oil products since 1973-74 the cost structure and input-mix in farming have been experiencing a rapid change. This has affected the allocation, utilization and payment of various factors of production. The present study was aimed at to examine the (*i*) efficiencies, (*ii*) factor share and (*iii*) the productivities of various factors in crop cultivation in the central districts of Punjab at two points of time, *i.e.*,

* Associate Professor of Business Management, Assistant Farm Economist and Farm Economist, respectively, Punjab Agricultural University, Ludhiana.

(*a*) pre-price hike period (1972-73) and (*b*) post-price hike period (1980-81). The data of 50 holdings from the "Comprehensive Scheme to Study the Cost of Cultivation of Principal Crops" for the above two time periods were taken and Cobb-Douglas model was employed for this analysis. Human labour, draught power, irrigation, fertilizer value including weedicides, and rental value of land were taken as the independent variables and value of the farm output (crops only) as the dependent variable. It was noted that the elasticities of production (in value) of human labour, draught power and rental value of land have declined in 1980-81 over 1972-73, but that of irrigation has increased over this period. The average farm size has decreased from 8.17 hectares in 1972-73 to 6.22 hectares in 1980-81 Per hectare use of human labour has decreased from 636.11 man-hours in 1972-73 to 568.11 man-hours in 1980-81. The average level of use of other factors has increased over this period. Similarly, the factor share of human labour has also decreased from about 43 per cent in 1972-73 to only about 21 per cent in 1980-81, whereas the factor shares of all other factors have increased over this period. This indicates substitution of human labour with other factors, mainly with irrigation and fertilizer and weedicides. Marginal value productivities in both the time periods were higher than the factor cost with human labour and fertilizers having sufficiently higher marginal value productivities. This indicates that production (in value terms) can be increased further at some net gain.

IMPACT OF TECHNOLOGICAL ADVANCE ON FACTOR SHARES IN PUNJAB AGRICULTURE

Joginder Singh and I. S. Chatha†

The study was undertaken to examine the relative change in the share of factor inputs as a result of technological advance in Punjab agriculture. The secondary data from "Farm Accounts in Punjab" was collected for 1966-68 and 1978-80 periods for different regions of the State. The regression model and identity model were applied for this purpose. The regression model showed that the divisible as well as indivisible technologies had similar effect on the share of land and labour. The share of labour due to both types of technologies increased. The share of land due to technology increased in zone I and zone III. Zone II representing the central districts of the State showed a decline in the share of land mainly due to marginal improvement in the land in these districts during the period.

The identity model brought out varied contribution of different factors in different zones of the State. On the whole, farm size and human labour contributed toward increasing per hectare farm income inequality in the post-technology period over pre-technology period. The share of divisible

† Extension Specialist (Farm Management) and Assistant Economist (Marketing), respectively Department of Economics and Sociology, Punjab Agricultural University, Ludhiana.

as well as indivisible technology reduced during the period. This indicated that the both types of farm technology were neutral to scale.

FACTOR SHARES IN TRADITIONAL FARMING IN ASSAM—A CASE STUDY IN MAJULI—A RIVER ISLAND

K. C. Borah*

Efficiency of agricultural operation can be deduced from the combination of factors of production in farm operation. The relative share of factors used in farming depends on the type of factors and level of technology used. But the fact is that most of the farming in Assam is carried on under traditional way. Hence, keeping in mind the growing importance to study the combination of factors of production in the production process in agriculture, an attempt is made in this paper to examine empirically the factor shares in traditional farming in Assam. The paper is based on the findings of a survey of three representative villages of Majuli, a sub-division of Sibsagar district of Assam. In the analysis of the cost of variable factor it is observed that human labour constituted two-thirds of the total variable cost whereas the percentage share of manure and fertilizers used worked out to less than one per cent. In the case of fixed cost, depreciation accounted for about half of the total fixed cost. The marginal value product of different resources worked out to be much less than that of the respective costs of factors used. The ratio of output to factors tends to decline according to farm size, indicating diseconomies of scale in traditional farming. In fact our findings although it is relevant to only a particular area, do shed considerable light on the possible nature of agricultural operation in Assam in general.

FACTOR SHARES AND FARM SIZE: A CASE STUDY OF DELHI WHEAT FARMS

R. P. Singh†

The new agricultural technology is said to be neutral with respect to economics of scale or farm size. However, many believe that the benefits of this technology are much higher for the large farmers as compared to the small farmers as the former possess the requisite resources to adopt this technology. The present paper attempts to assess the real situation by determining and comparing the relative and absolute factor shares accruing to 'small', 'medium' and 'large' categories of farmers in Najafgarh block of the Union Territory of Delhi. The study utilizes data on various aspects of farm

* Department of Economics, Dibrugarh University, Dibrugarh, Assam.

† Scientist, Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi.

management for three years 1979-80 to 1981-82, collected from 65 randomly selected farm households. Relative and absolute factor shares were computed and compared for land, labour, power and capital inputs for various categories of farms. The study revealed that the total input cost for all inputs was maximum on small farms (Rs. 2,215) followed by medium (Rs. 1,824) and large (Rs. 1,676) farms. The yield was also highest on small farms (35 quintals/ha.). In relative terms, the maximum share accrued to the factor land ranging from 0.60 to 0.63 for the different categories of farms. This was followed by capital, labour and power. Individually, for the various inputs the actual factor shares were not very different for the various categories. For instance, the factor share of land for the three categories of farms ranged between 0.60 and 0.63; for capital the share ranged between 0.19 and 0.20; for labour it was 0.09 to 0.10 and for power it varied between 0.08 and 0.094. This similarity among factor shares inputwise between different categories of farms suggests that the existing farm technology is neutral to scale. However, differences in productivities among the various categories led to differences in incomes accruing to the various factors categorywise. For instance, the average absolute factor share for land was Rs. 3,390 in the case of small farms while it was only Rs. 2,711 for large farms. For capital input the income accruing to small farms was Rs. 1,113 while it was only Rs. 884 for the large farms. Incomes accruing to the other two factors were also higher on small farms as compared to the other categories. This is indicative of the bias of existing technology towards small farms.

ECONOMIC ANALYSIS OF FARM FACTOR SHARES IN DIFFERENT ZONES OF THE PUNJAB STATE

P. S. Khattra and B. S. Hari*

The present study is an attempt to generate unbiased estimates of factor shares through appropriate functional forms in various agro-climatic zones of the Punjab State. Besides, the economic repercussions of relative factor shares were also examined. Commensurate with the objectives of this study, the primary data of three distinct crop zones pertaining to the year 1978-79 were used from the "Comprehensive Scheme to Study the Cost of Cultivation of Principal Crops in Punjab." The constant elasticity of substitution function being most appropriate for this type of study was tried and had to be rejected in favour of the Cobb-Douglas function. The relative rewards of land, farm machinery, variable expenses and human labour were critically examined. The reward of land varied significantly among all the zones. The share of fixed expenses was significantly greater in zone I than that in zones II and III. The reward of variable expenses failed to exhibit significant variability between zones (I and III). The reward of human labour failed to show significant

* Assistant Professor of Agricultural Economics and Assistant Farm Economist, respectively Department of Economics and Sociology, Punjab Agricultural University, Ludhiana.

inter-zonal variation at 0.05 probability level. The significant inter-zonal variation in factor shares may be attributed to significant inter-zonal differences in factor proportions and wages of human labour.

The product optimization in zone I called for siphoning off of excessive expenditure from intermediate inputs to land. Simple reduction of excessive expenditure on farm machinery and draught animals in zone II and on land and variable inputs in zone III would have added to the farm profitability. The upshot of this study is that land of zone I notwithstanding, investment on factors of crop production attained the optimum levels, besides providing some evidences of excessive use of funds.

TEMPORAL AND SPATIAL CHANGES IN THE FACTOR SHARES IN CROP PRODUCTION IN HARYANA

R. N. Pandey, A. C. Gangwar and B. S. Panghal†

During the post-green revolution period the spectacular increase in the output of foodgrains has been attained in Haryana due to the combined effect of many factors such as increase in irrigation facilities, use of fertilizers and plant protection chemicals, seeds of high-yielding varieties, farm machinery and power, etc. This paper attempts to analyse the changes in the individual cost items over time and place by making use of the published data of the "Studies in the Economics of Farm Management in the Punjab: 1962-63" covering the Jind, Karnal and Kurukshetra districts. A similar set of data was taken for the same area from the "Cost of Cultivation Scheme and Impact of Drought on the Farming Community in Haryana" for 1978-79. To compare these changes over space the data from 60 farmers for 1978-79 from an agriculturally backward region of the State (Mahendragarh district) were used. The cost of cultivation data for 1962-63 was adjusted to 1978-79 prices to make the comparisons meaningful. The relative share of land in total farm assets increased from 65 per cent in 1962-63 to 87 per cent in 1978-79 whereas the share of farm livestock and dwellings declined. The market price of land during this period has increased by more than five times. The total investment in farm assets per hectare of net cultivated area increased by 340 per cent (including land) and 61 per cent excluding the value of land. Although the absolute share of human labour in the total cost per hectare increased during the post-green revolution period, its relative share declined due to increased expenditure on fertilizers and chemicals, farm machinery and implements, irrigation, etc. The average total cost per hectare of wheat, gram, bajra and sugarcane was Rs. 1,906, Rs. 826, Rs. 739 and Rs. 3,718 in 1962-63 (at 1978-79 prices) and the respective costs increased to Rs. 3,123, Rs. 1,267, Rs. 1,044 and Rs. 5,544 in 1978-79. The average cost per hectare of total cropped area was Rs. 1,680 in 1962-63 and Rs. 2,385 in 1978-79 in the agriculturally advanced region. In the agriculturally backward region

† Department of Agricultural Economics, Haryana Agricultural University, Hissar.

due to its agro-climatic peculiarities and poor irrigation facilities the risk of crop failure was quite high. This motivated the risk averting farmers to reduce the expenditure on the modern inputs like HYV seeds, fertilizers, chemicals, farm machinery and implements. The average cost per hectare of total cropped area in the backward region (Rs. 1,400) was only about 60 per cent of the agriculturally advanced region (Rs. 2,385). With the expansion of assured irrigation facilities which provide more stability in agriculture, the relative share of modern yield increasing inputs in the total cost of cultivation of crops increases and that of the traditional inputs declines.

FACTOR SHARES IN RAINFED *KHARIF* CROPS ON ARID LANDS OF RAJASTHAN

D. V. Singh*

In the arid zone with extreme variability in yield and incomes the factor shares can be determined on the basis of their shares in the total cost of cultivation. Land, labour and capital are the important inputs which account for 18.8, 40.5 and 40.7 per cent of total income respectively. There is a further scope for improvement in the share of capital as investment in farming in this area is a bare minimum. The share of land is very low in view of its poor fertility and low opportunity cost. The share of land and capital tends to increase and that of human labour to decrease with an increase in the size of farm. However, by introducing management as one of the factor inputs the proportionate share of other factors tends to decline. The decline in the share of other factors is insignificant when the share of management is low, and vice versa.

A STUDY OF FACTOR SHARE IN BANANA CULTIVATION IN JALGAON DISTRICT OF WESTERN MAHARASHTRA

K. S. Birari and D. V. Kasar†

This paper seeks to examine the proportion of various factors in the total cost of cultivation of banana and to estimate the relative factor share in banana output in a well-known banana growing region of Western Maharashtra. The study is based on a sample of 80 banana growers drawn from eight villages of Raver and Yawal tehsils of Jalgaon district by systematic random sampling method. The data on cost of cultivation of banana collected for the year 1979-80 from the sample banana growers were utilized for this study. Tabular method of analysis was used for estimating the proportions of various factors

* Scientist-I (Agricultural Economics), Central Arid Zone Research Institute, Jodhpur, Rajasthan.

† Department of Agricultural Economics, Mahatma Phule Agricultural University, Rahuri, District Ahmednagar, Maharashtra.

in the total cost of cultivation of banana with the help of cost concepts normally used in farm management studies. The relative factor share in banana output was estimated in proportion to the factor elasticities obtained by fitting the Cobb-Douglas type of production function. It is noted that the rental value of land accounted for the highest share, *i.e.*, 29.34 per cent of the total cost followed by the items like fertilizers (25.71 per cent), human labour (9.86 per cent), manures (9.23 per cent) and irrigation (7.45 per cent). The proportion of other items of cost was relatively low in the total cost of cultivation of banana. The functional analysis indicated that 96 per cent of the variation in the yield of banana was explained by the area under banana, human labour, manures and fertilizers. The sum of their elasticities showed constant returns to scale in banana cultivation. As regards the relative factor share, it is revealed that the area under banana alone accounted for about 67 per cent of the output of banana. The next in importance were fertilizers, human labour and manures with 17.70 per cent, 8.93 per cent and 6.38 per cent of banana output respectively in the area under study. This means that the land in hectares and fertilizers in kilograms were the important factors contributing to a larger extent in the total output of banana. It is, therefore, necessary to rationalize the use of these variables for increasing the banana output in the area under study.

FACTOR SHARES IN HARYANA AGRICULTURE: A DISTRICTWISE ANALYSIS

U. K. Pandey, K. S. Suhag and Veena Manocha*

The present study investigates the factor shares and value shares of output in Haryana agriculture under different periods and the impact of technological change on factor proportions and their shares in output based on total factor productivity approach. The study involves the measurement of growth rates of output and input indices for each of the seven districts in Haryana during period I (pre-green revolution period, 1956-57 to 1965-66) and period II (green revolution period, 1966-67 to 1973-74) and eleven districts during period III (post-green revolution period, 1974-75 to 1981-82) with the help of secondary data. The disaggregation of total input growth rate into the growth rates of traditional and modern inputs has also been done. Besides, the individual contribution of traditional and modern inputs has been assessed with the help of regression analysis. The study reveals that the traditional inputs accounted for the bulk of total factor inputs during the pre-green revolution period while in the subsequent periods (green revolution and post-green revolution periods) the share of modern inputs has considerably increased. In the pre-green revolution period commercial crops had the highest value shares in the output but during the green revolution and post-green revolution periods cereals

* Scientist (Evaluation Cell), Assistant Professor (Agricultural Economics) and Assistant Statistician (Evaluation Cell), respectively, Haryana Agricultural University, Hissar.

ranked first while commercial crops ranked second. In the subsequent periods, the increasing value share of cereals in the output was at the cost of pulses, coarse grains and oilseeds respectively. Due to green revolution the output growth had considerably increased amongst districts and State. The effect of post-green revolution is clearly visible in all the districts and State besides the newly created districts (Sirsa, Kurukshetra, Sonepat and Bhiwani). Undoubtedly, considerable growth has occurred in modern inputs during the post-green revolution period but productivity has also fallen steeply amongst the districts and in the State. Modern inputs had negative impact on the output performance during the pre-green revolution period. However, both traditional and modern inputs had positive and significant impact on the output only in the green revolution period. The districts which had better resource endowments had realised the benefit of technological change in the State. Thus, the diversity (variability) in Haryana agriculture had further widened in the subsequent periods.

TECHNOLOGICAL IMPROVEMENT—LABOUR CONTRIBUTION AND ITS SHARE

P. S. Lalitha†

Technological change has led to considerable increase in agricultural output and income. Traditional inputs have contributed to this increase along with the modern farm inputs like chemical fertilizers and mechanical devices among others. As a result, with technological change there has been a change in the factor mix and this is likely to bring about a change in the factor share. The present study is an attempt to assess the labour proportions and its share in four agriculturally advanced districts, one each from Punjab, Haryana, Tamil Nadu and Western Uttar Pradesh based on data collected for the reference year 1982-83 from 326 farmers spread over the categories of bullock operators (BO), pumpset operators (PO), tractor operators (TO) and tractor-cum-pumpset operators (TPO). The respondents were operating around 8 to 16 acres of land with 70 to 90 per cent of the area under irrigation. The Punjab farmers recorded relatively more area under irrigation and a higher crop intensity and among the different types of farms TPO ranked first by both of these attributes, followed by PO, TO and BO in the same order. The quantum of labour utilized per acre was the maximum in the case of TPO followed by PO, TO and BO in the same order. Among the States, however, it was the maximum in Tamil Nadu followed by Western Uttar Pradesh with Haryana and Punjab trailing behind. The benefit of technological change measured in terms of value of gross produce was the maximum in TPO followed by PO, TO and BO in the same order. Among the States, it was maximum in Punjab. The labour share was not encouraging when compared with the share to material-inputs or when compared with the contribution it makes towards achieving the benefit.

† Manager (Evaluation), Punjab National Bank, Head Office, New Delhi.

The benefit from technological improvement was higher, among the States in Punjab, followed by Haryana and Western Uttar Pradesh and the least in Tamil Nadu. However, the share of labour was higher at around 20-22 per cent in Punjab and Tamil Nadu. It was less in Haryana (around 13-16 per cent) and the least in Western Uttar Pradesh (around 8-14 per cent). With the exception of Punjab, thus, the share of labour was less in both Haryana and Western Uttar Pradesh where the benefit from technological change was more. In Tamil Nadu, though the relative share was more, the benefit as such being minimum, the picture is not quite encouraging. Between the different types of farms, TPO has gained the maximum from technological change in all the States, but the same registered the maximum share to labour, among different types of farms, only in Tamil Nadu. While the labour share in the case of TPO was less in Uttar Pradesh, it was the least in Punjab and Haryana. Even though technological change has benefited the adopting farmers, the contributing inputs did not get proportionate share. With technological improvement labour share has declined. Compared to the share of material inputs also, the share of labour was less showing that labour was not given a due share.

FACTOR SHARES AND INCOME DISTRIBUTION IN AGRICULTURE: A VILLAGE LEVEL STUDY IN WEST BENGAL

S. Satish*

Factor shares in Indian agriculture are generally estimated by employing neo-classical production functions which suffer from loss of generality due to several inherent assumptions which do not hold true to reality. Hence the need to develop a methodology for estimating the factor shares especially at the macro level is obvious. An attempt is made to estimate the factor shares, share of labour and the property ownership in the agricultural income generated, with specific reference to Panchami village, West Bengal. The study reveals there is no real agricultural surplus in the village. The share of the labour was around 66 per cent and the per capita income from agriculture for the large farmers was significantly less than that for the landless agricultural labourers, owing to the larger family size, lower employment and high income leakage through interest on borrowings in respect of the large farmers.

A COMPARATIVE ANALYSIS OF FERTILIZER PRICES AND CONSUMPTION IN HARYANA AGRICULTURE

Himmat Singh and B. S. Tomer†

The breakthrough in agriculture with the introduction of high-yielding varieties has increased the demand for fertilizers in spite of increase in the ferti-

* Rural Development Centre, Indian Institute of Technology, Kharagpur, West Bengal.

† Associate Professor and Assistant Professor, respectively, Department of Agricultural Economics, Haryana Agricultural University, Hissar.

lizer prices. An attempt has been made in the present study (*a*) to estimate the growth rates in fertilizer prices and compare with fertilizer consumption growth rates in Haryana during 1975-76 to 1981-82 and (*b*) to analyse the share of fertilizer cost in the total cost of production of major crops in the State. The study reveals that on an average, the fertilizer prices in Haryana have increased at the annual compound growth rate of 7.30 per cent. Phosphatic fertilizers had the highest growth rate (12.20 per cent) while nitrogenous fertilizers the minimum growth rate of 3.80 per cent. As regards fertilizer consumption, its rate of increase is more than the rate of increase in the prices (16.10 per cent against 7.30 per cent) during the same period. The rates of increase in phosphorus and potash consumption have been found to be 22.20 per cent and 16.70 per cent respectively which are more than that of nitrogen (15.30 per cent). The study has further revealed that except in barley and rapeseed and mustard, in all other major crops of Haryana, namely wheat, paddy, cotton, sugarcane, potato, bajra and gram, the share of fertilizer cost has decreased. On an average, the share of fertilizer cost decreased from 12.64 per cent in 1975-76 to 8.88 per cent in 1981-82. This signifies the need for reducing the price of other farm inputs also rather than only of fertilizers.

CHANGES IN RELATIVE FACTOR SHARES IN AGRICULTURAL PRODUCTION (A CASE STUDY)

Ram Iqbal Singh, V. Prasad and S. M. Dingar*

The purpose of this paper is to examine how relative factor shares change with the change in agricultural technology and shift in prices of factor inputs over time with regard to agricultural production. The findings are based on 13 years' data, compiled from a continuous study on "Impact of Modern Technology on Agricultural Production" undertaken during 1966-67 to 1978-79 in district Kanpur in Uttar Pradesh. With a view to examine the changes in the relative factor shares over a period of 13 years, a comparison at three points of time, *i.e.*, from 1966-67 to 1969-70, from 1970-71 to 1978-79 and from 1966-67 to 1978-79, was made. An examination of growth rates for different factor inputs at three points of time gave interesting results. The growth rates for human labour and seed were found higher during 1971-79 (peak period of modern technology) as compared to 1966-70 (starting phase), which was mainly due to the adoption of Multiple Cropping Programme on a larger area. Under such situation, the growth rate for bullock labour was found lower, because it was substituted by human labour. Against this situation, the growth rates for manure and fertilizers and irrigation were lower during the period (1971-79) as compared to the starting phase (1966-70). The main reason for this decline was the abrupt rise in their prices which resulted in their limited

* Department of Agricultural Economics and Statistics, C. S. Azad University of Agriculture and Technology, Kanpur.

utilization. For the period 1966-79, the growth rate was highest for irrigation followed by manure and fertilizers, human labour and seed.

The relative contribution of factor inputs in the total cost showed that during the peak period (1971-79) the share of human labour was the highest followed by irrigation, manure and fertilizers and seed, while in the starting phase (1966-70), the share of manure and fertilizers was the highest followed by that of human labour, bullock labour and irrigation. During 1966-79 period, almost a similar trend as that in 1971-79 was observed with regard to the relative contribution of different factor inputs in the total cost. The relative contribution of factor inputs in the compound growth rates of total cost and total income showed a similar trend in the two periods. For the whole period, *i.e.*, 1966-79, the share of human labour in the total income was the highest followed by manure and fertilizers, bullock labour and irrigation. Thus, from the above findings it may be concluded that (*i*) the relative factor share of human labour in the total cost and total income increases with the increase in the area under HYV crops and intensity of cropping, (*ii*) human labour provides a good substitute for bullock labour with the increase in the area under multiple cropping and (*iii*) the relative contribution of factor inputs to total cost is affected by the rise in prices of these inputs.

THE IMPACT OF MINIMUM WAGE ACTS FOR AGRICULTURAL LABOUR ON THE DISTRIBUTIVE SHARES OF AGRICULTURAL INCOME BETWEEN LABOUR AND CULTIVATOR

S. K. Chakravorty†

In recent years the minimum wages for agricultural labour in West Bengal have been revised upwards several times to raise the incomes of labourers. But it is not known how far labourers have been actually benefited in the present peculiar state of West Bengal's agriculture. The objective of the present paper is to examine how far the labour has actually benefited and its impact on the general agriculture of West Bengal. Necessary data were obtained from field surveys in six villages in Birbhum district of West Bengal where the quantum of employment of hired labour and total labour was recorded separately for each farm against other costs and production which gave the following two regression equations on small farms with physical quantities of hired labour and total labour respectively: $x_1 = 666.36 + 8.1201\ x_2 + 0.9731\ x_3$; $x_1 = 115.18 + 5.8626\ x_2 + 2.9590\ x_3$, 8.1201 and 5.8626 being the regression of each unit of hired labour and total human labour respectively on production. The coefficient of determination R^2 was 0.7179 and 0.4884 respectively.

The above analysis suggests that the higher is the market wage rate, the higher would be the substitution of hired labour by self labour among the small

† Agro-Economic Research Centre, Santiniketan, West Bengal.

farms. This substitution obviously leads to shrinkage of employment opportunities for hired labour. The bigger cultivators also reacted by wage cutting policy and denial of age-old practices of loans and advances to the poor labourers during agricultural lean seasons which resulted in more hardships and more starvation for these labourers during lean seasons.

The long run impact of this situation involving total agriculture of the State is not also negligible. Because the minimum wage acts have tended to raise the share of labour without raising its productivity it means curtailment of the income of the farmers, which is already meagre in this State. It is thus concluded that the minimum wage acts without adequate infrastructural developments have neither benefited the labour nor the overall agriculture of West Bengal.

ROLE OF SUBSIDY IN CHANGING SHARE OF INPUTS IN PRODUCTIVITY IN AGRICULTURE IN DISTRICT FATEHPUR, UTTAR PRADESH

T. R. Singh, R. Saran and Y. S. Chauhan*

An attempt is made in this paper to examine the changes in intensity of resource use, and investment on the beneficiary and non-beneficiary farms and to work out the share of input factors in production in the two categories of farms in Malwan block in Fatehpur district of Uttar Pradesh during 1981-82. For the study 25 beneficiary farms and 25 non-beneficiary farms were selected randomly from five randomly selected villages. Thirty per cent subsidy was granted to the beneficiary farms. It was observed that capital investment, gross and net income, family labour income and farm business income were higher on the beneficiary farms than on the non-beneficiary farms. The shares of different inputs in total cost per hectare were also higher on the beneficiary farms as compared to those on non-beneficiary farms.

To study the role of subsidy on input factors, the share of different input factors in productivity was studied for the farm as a whole and for important crop enterprises separately. It was observed that the share of capital was higher on the beneficiary farms than on the non-beneficiary farms. The share of land was lower and that of organization was higher on the beneficiary farms. With regard to the share of different crops in the capital input, it was found higher on the beneficiary farms for all the crops than on the non-beneficiary farms. The share of labour was almost equal in both the categories. The share of land was lower for all the crops of beneficiary farms and the share of organization was higher on the beneficiary farms for all the crops than on the non-beneficiary farms.

For the dairy enterprise the study revealed that the share of capital input was 75 per cent on the beneficiary farms and 66 per cent on the non-beneficiary

* Department of Agricultural Economics and Statistics, C. S. Azad University of Agriculture and Technology, Kanpur.

farms. The share of labour was also higher on the beneficiary farms but the share of organization was lower on these farms. It may be concluded that with the help of subsidy the farmers were able to invest more in capital expenditure and to generate more income and employment.

CHANGES IN SHARE OF INPUT FACTORS IN PRODUCTIVITY IN DEVELOPING AGRICULTURE

S. R. Yadav and I. U. Ansari†

The paper makes an attempt to study the changes in the share of input factors of production in developing agriculture in district Kanpur in Uttar Pradesh, based on data collected from 120 farmers—50 progressive, 40 less progressive and 30 traditional farmers—selected randomly from five villages of Kalyanpur block in the district. The progressive and the less progressive farmers were classified on the basis of adoption of modern technology in agriculture. From the study it was observed that on the progressive farms capital investment was higher than that on the other two categories of farms. There were no significant differences in the size of holding, family size and adult worker per family. The intensity of cropping, area under irrigation and fertilizer use per hectare were significantly higher on the progressive farms than on the traditional farms. The input, output, net income, family labour income, farm business income and input-output ratio were higher on the progressive farms as compared to the other two categories.

The share of input factors in productivity was studied at the farm level and for different crops. It was observed that on the progressive farms the shares of capital (seed, fertilizer, irrigation, pesticides and overhead cost), labour, land and organization were 32.68, 21.30, 15.16 and 30.86 per cent respectively while the corresponding shares of inputs in the less developed farms were 34.77, 21.07, 18.8 and 25.14 per cent and on traditional farms were 31.31, 21.36, 23.57 and 23.7 per cent. As regards the input factor share for different crops on different categories of farms, the share of capital (manure and fertilizer, seed, machinery and irrigation) was higher on the progressive farms and low on the traditional farms. The share of labour inputs in all the crops was almost equal in all categories of farms. The share of organization (net profit) tends to increase for all crops with the increase of modern inputs in agriculture as the share of the organizer was highest on the progressive farms and lowest on the traditional farms for all crops.

The finding shows that the share of the organizer was higher in modern agriculture as compared to the traditional agriculture. There was no change in the proportion of labour share with the change of technology in agriculture. The share of land is declining with the increase of technology while that of capital increases with the increase in modern technology. It is concluded

† Assistant Professor and Research Scholar, respectively, Department of Agricultural Economics and Statistics, C. S. Azad University of Agriculture and Technology, Kanpur.

that there is substantial scope for altering the distribution of output in favour of labour and organizer by introducing modern technology.

IMPACT OF TECHNOLOGY ON FACTOR PROPORTIONS AND OUTPUT—A CASE STUDY OF HASDEO-KHARUNG-MANIYARI COMMAND AREA

T. S. Ramchandran*

An attempt is made in this paper to discuss the present system of irrigation in the Hasdeo, Kharung and Maniyari Command area in Bilaspur district of Madhya Pradesh and the impact of improved water management technology on output and also on other factors of production like labour, on wages and employment. The empirical study is based on the findings of farm and water management studies, crop-cutting experiments and other socio-economic investigations and field observations undertaken in the project area. The study reveals that the most important factor for the tremendous increase in yields is controlled and timely irrigation. The increase in yields as revealed by the crop-cutting experiments conducted in nine cultivators' fields in the Sarwan-Deori village in *kharif* 1982 was 175 per cent, which was brought out by yield-increasing technology adopted in water management. Other improved practices like transplantation, use of improved seeds and application of fertilizers act as minor contributory factors in increasing the productivity. Controlled irrigation practised in the project area has also resulted in increasing the demand for labour and the wage rate. The study stresses the need for upward revision of targets fixed for the project areas for institutional growth and infrastructure development.

AN ECONOMIC STUDY OF WATER MANAGEMENT SYSTEMS IN TAMIL NADU—PRODUCTION FUNCTION APPROACH

G. Subramaniyan and Kasipalam†

The main objectives of this study are three-fold: (*a*) to investigate the economic feasibility of the silt system compared to the existing traditional system, (*b*) to investigate the nature of production function relationships for banana crop under traditional and silt system and (*c*) to investigate whether there is any technological breakthrough in production function relationships, if so, whether it is factor-neutral or biased. The study is based on primary data collected from 50 farmers cultivating banana under the two systems, randomly selected from Udangudi block in Tirunelveli district, Tamil Nadu. The economic feasibility of a system is found out by comparing annual amortized

* Senior Economist, Command Area Development Programme, Bilaspur, Madhya Pradesh.
† Madurai Kamaraj University, Madurai, Tamil Nadu.

cost and annual returns from that field. The annual amortized cost is worked out with different years of life expectancy and with different rate of interest. The study clearly shows that the cultivation of banana under silt system is more profitable than under the traditional system. To investigate the nature of production function relationships for banana under different water management systems and to investigate whether the technology is factor-neutral or biased, we estimated Cobb-Douglas production function through the principle of least squares. The study shows that the technological change in production relationship for banana is factor-neutral.

IMPACT OF TECHNOLOGICAL CHANGE ON FACTOR SHARES IN FARM INCOME

Balishter*

The present study was conducted in Bichpuri block of Agra district of western Uttar Pradesh with a view to estimate the relative factor shares in farm income for the tractor operated farms and bullock operated farms. Out of 52 villages in the block, four villages in which the number of tractors were maximum were purposively selected. For the selection of farms two separate lists of tractor operated farms and bullock operated farms were prepared. The total number of tractor operated farms in the sample villages was 36. All the 36 tractor operated farms were selected. An equal number of bullock operated farms were also selected. The required data were collected by personal interview method with the help of a set of schedules and questionnaires for the agricultural year 1981-82. Cobb-Douglas production function was used as an analytical tool to estimate the factor shares in farm income. The factors included were farm size, irrigated area, fertilizer, human labour and bullock labour. The results show that among different factors the highest contribution to the farm income was made by farm size. However, the contribution of farm size to farm income was higher in the case of bullock operated farms as compared to the tractor operated farms. Thus it may be inferred that with the increase in farm tractorization the relative share of land decreases. Although the share of human labour was negative both in the case of tractor operated farms and bullock operated farms, the negative share was more in the case of the former than in the latter. Thus tractorisation decreases the share of human labour in farm income. Therefore we should be cautious in encouraging farm tractorisation which displaces human labour. The share of irrigated area in farm income ranked second after farm size for the bullock operated farms. The share of fertilizer was higher for tractor operated farms as compared to the bullock operated farms. The share of bullock labour was positive but non-significant in the case of tractor operated farms while it was negative in the case of bullock operated farms.

* Department of Agricultural Economics, R. B. S. College, Bichpuri, Agra, Uttar Pradesh.

IMPACT OF CHANGES IN FACTOR PRICES ON FACTOR SHARES IN AGRICULTURE IN DISTRICT GHAZIPUR, U.P. (A CASE STUDY)

G. N. Singh, R. K. S. Kushwaha and S. P. Tewari†

The present study aims to find out the extent of changes in factor shares with the changes in factor prices, on the one hand and to work out the elasticities of factor substitution, on the other, based on an intensive enquiry of 100 farmers selected randomly from ten villages of Deokali block in district Ghazipur, Uttar Pradesh at three points of time, *i.e.*, 1970-71, 1975-76 and 1981-82 with the same sample. The farmers were categorised into three size-groups, *viz.*, 0-1, 1-2 and 2 and above hectares and their number was kept in probability proportion to their number falling under each category. The average size of holdings of the sample farms came to 0.95 hectare. The analysis clearly indicates that the sharp rise in the prices of all the inputs has adversely affected the level of their use in high-yielding varieties of wheat and paddy which in turn has an adverse effect on their level of output and income. The net income per hectare and the price-cost ratio have been steadily declining in both the crops due to increased cost of production, on one hand and low level of yield, on the other. Taking the farm business as a whole, it was observed that the value of output and input per hectare showed a steady rise during the study period due to rise in the price of farm products and inputs. But the level of net income per hectare declined during 1981-82 and 1975-76 over 1970-71 because of the fact that the rise in factor prices was much higher than the rise in the prices of farm products. The elasticity of substitution between chemical fertilizers and farmyard manure was quite high as compared to the elasticity of substitution between human and bullock labour in both the crops.

It may thus be concluded that profits from high-yielding varieties of wheat and paddy have been declining under pressure of rising input prices. The increase in factor prices has also resulted in a shift in the factor shares. The exorbitant rise in the prices of input factors has adversely affected the level of their utilization, on the one hand and the level of productivity and net income, on the other. Thus, if the conflicting trends in input and output prices are not arrested, farming will soon cease to be a paying proposition. Therefore, to maintain the tempo of increased productivity and income, the prices of input factors particularly purchased ones, should not be allowed to rise beyond the reach of the majority of the farmers.

† Agricultural Economist, Research Assistant and Registrar, respectively, C. S. Azad University of Agriculture and Technology, Kanpur.

SHARE OF FACTORS OF PRODUCTION IN INDIAN AGRICULTURE: RESULTS OF A FIELD SURVEY

Nitish Datta*

This paper attempts to examine the trend in factor shares and how the different systems of irrigation influenced the factor rewards, based on a field survey of only 30 farm households selected from three villages of Nadia district in West Bengal. The irrigated land was demarcated into three types. The first type of irrigated land gets cheap irrigation through Government deep tubewells. The second type of irrigated land gets the advantages of irrigation through shallow tubewells. In the third type the farmers do not have both these facilities but purchase irrigation from nearby shallow tubewells. The study mainly concentrates on only two crops: winter paddy—crop 1 and summer paddy—crop 2. The percentage of produce going to different factors of production (FS_i) is calculated as follows:

$$FS_i = \frac{\text{Cost of factor i} \times 100}{\text{Total value of produce}}$$

where i = 1 for land, i = 2 for labour, i = 3 for fertilizer, i = 4 for irrigation and i = 5 for surplus. FS_1 is determined by (1) the bargaining power of the landlord vis-a-vis the share-cropper and (2) irrigation and type of irrigation. FS_2 for crop 1 is generally greater than FS_2 for crop 2. Farms having 5 acres and more land pay less reward to labour. In some cases, small farms in the size class of 0.1-0.99 acre also pay less to labour. Crop 2 is more fertilizer intensive than crop 1. FS_2 and FS_3 do not vary due to heterogeneous irrigation pattern. The mean of FS_3 for crops 1 and 2 is 4.75 and 10.48 respectively. The mean of FS_4 is minimum for the first type of irrigation for both the crops and maximum for the third type of irrigation for both the crops. The same trend persists for the mean of FS_5. Small peasants cultivate the third type of irrigated land and big farms own land under the first type of irrigation. So small farmers are adversely affected by the heterogeneous irrigation system.

* Lecturer in Economics, N. V. College, Nabadwip, Nadia, West Bengal.