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# LABOUR MARKET IN AGRICULTURE : A STUDY OF GUJARAT DISTRICTS

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## I

### INTRODUCTION

The traditional diffidence of economists to accept the labour market as an area amenable to economic analysis is gradually weaning partly on account of a tremendous increase in the contents of their tool-box, but mainly on account of the realisation that hardly any market functions with the perfection of the mechanism that traditional theory may suggest. If all markets behave imperfectly then why should the labour market alone be regarded as having 'peculiarities' which hinder the application of economic logic? The argument can further be stretched, without any loss of substance, to the case of the rural labour market of an economy predominated and characterized by traditional agriculture where the degree of imperfection in the working of the market mechanism may be higher. The labour market is a mechanism for the allocation of labour and for the determination of its price; and one may theoretically argue that since labour is being allocated and wages are being paid, the existence of a market cannot be denied. An analytical approach to the labour market can, however, afford neither to assert on this basis that the labour market works perfectly well in the rural sector nor accept a blanket denial of the labour market mechanism on the basis of the traditional character of agriculture. The problem that needs investigation from an economic view point is, to what extent the allocation and pricing of labour occurs in accordance of the logic that economic theory provides. The simple economic logic of a labour market analysis would in this context manifest itself in the following relationships : (1) wage demand relationship; (2) wage-supply relationship, and, (3) wage determination in terms of demand for and supply of labour.

## II

### HYPOTHESES

Applying this logic to the labour market in Indian agriculture what type of propositions can be hypothesized? Let us take the demand side first. So long as the coefficients of production are fixed, and on the available fixed quantum of land, a farmer is utilizing labour at an optimum level,<sup>1</sup> a wage rate change will not lead to any change in demand for labour. If the current use of labour is less

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1. 'Optimum' being used here to mean the labour required to get the maximum yield from the farm, irrespective of labour cost.

than the required quantity for getting the maximum yield from the farm, because the current wage exceeds the marginal value product of an additional unit of labour, a fall in the wage rate is expected to bring about an increase in the demand for labour. Alternately, if the factor proportions can be varied, a change in relative price of labour will negatively affect the demand for labour.

In the traditional form of agriculture and with small size of holdings, the availability of adequate or even excess supply of family labour limits the first possibility; and the use of traditional technology limits the scope of factor substitution to a large extent. But the same, however, does not apply to large sized farms using substantial amount of hired labour; and to cultivators who are opting for modern technology and inputs which allow some variations in factor proportions for obtaining a particular level of output. In fact, the use of family labour and hired labour side by side as is the practice in large sized farms, enhances the scope for an inverse relationship between wage rate and the demand for hired labour. A low rate of wages may induce the cultivators to opt for larger amount of hired labour in order to provide the family members with a greater amount of another good, *i.e.*, leisure, which may, however, be increasingly sacrificed when higher wages have to be paid for hired labour. This flexibility which is a reality in Indian farming induces one to expect that the demand for hired labour is likely to be a function of wages.

It is true that with the small size of farms and traditional technology, the above flexibility makes demand a function of wages only to a limited extent as the minimum and the maximum amounts of hired labour are fixed not far off from each other, and however high or low wages may vary, demand for labour may not vary much because of limited and fixed requirements of total labour. But, it has been found that the demand for hired labour per unit of land tends to increase with the size of holdings.<sup>2</sup> Further, it has also been found that with the adoption of modern practices and inputs, the demand for hired labour increases,<sup>3</sup> and at the same time the possibility of varying factor proportions (in the event of relative change in prices of factors) increases.<sup>4</sup>

There are, however, more severe limitations on the supply of labour behaving as a function of wages in rural India. The two necessary conditions for making such a relationship possible are a free mobility of labour among employers and the availability of alternative employment. The widespread phenomenon of 'attached' labour in traditional agriculture and large scale unemployment, both disguised and open, further inhibit the allocative efficiency of wages. The Second

2. Cf. Studies in the Economics of Farm Management, Combined Report 1954-55 to 1956-57, U.P., Punjab, West Bengal, Madhya Pradesh (Combined Report 1955-56 to 1956-57), West Godavari District (Andhra Pradesh) 1958-59, Sambalpur District (Orissa) 1957-58, and Madras, 1956-57, Directorate of Economics and Statistics, Ministry of Food, Agriculture, Community Development and Co-operation, Government of India.

3. H. B. Shivamaggi, "The Agricultural Labour Problem," *Economic and Political Weekly*, Vol. IV, No. 13, March 29, 1969, pp. A 41-46.

4. V. M. Jakhade, Presidential Address, "Agricultural Development and Income Distribution," *Indian Journal of Agricultural Economics*, Vol. XXV, No. 1, January-March, 1970, pp. 4-17; T. P. S. Chawdhari, R. N. Tripathy, T. V. S. Rao and J. N. Sharma : Resource Use and Productivity on Farms— A Comparative Study of Intensive and Non-Intensive Agriculture Area, National Institute of Community Development, Hyderabad, 1969; A Study of the High Yielding Varieties Programme in the Kota District, Rajasthan (Rabi 1968-69), Research Study No. 21, Agro-Economic Research Centre (for Gujarat and Rajasthan), Sardar Patel University, Vallabh Vidyanagar, 1969 (mimeo.).

Agricultural Labour Enquiry reported the extent of 'attached' labour at 27 per cent, and the free inter-employer mobility of labour is clearly limited at least to this extent, as "pirating" of workers working with other cultivators may definitely be against the code of employer cultivators in a village or any other area.<sup>5</sup>

So far as the condition regarding alternative employment opportunities is concerned, it hardly needs mention that they are extremely limited. Of the total 222 days of availability of employment on the average, the non-agricultural employment was reported to be only for 27 days by the Second Agricultural Labour Enquiry.<sup>6</sup> Looking for employment opportunities in the urban sector involves two almost intractable problems. First, the problem of unemployment in the rural areas is mainly of surplus 'labour' and not of surplus 'workers'. The Second Agricultural Labour Enquiry found that the agricultural workers were employed on an average for about 217 days in a year in the then Bombay State and had no employment for the rest of the year, while open unemployment was estimated at around 3.5 per cent. But it may be noted that during the busy seasons of the year all of them are fully employed<sup>7</sup> to the effect that some 'workers' migration to the urban sector might lead to a fall in agricultural production at the existing level of technology.<sup>8</sup> On the other hand, evidence regarding the additional demand for labour in the non-agricultural sector over and above the supplies available within that sector, revealed that a major shift of rural workers to urban areas is not warranted at present.<sup>9</sup> Thus, the condition of availability of alternative jobs, so as to make labour supply responsive to wage rates is not likely to hold.<sup>10</sup> The supply of labour, given and fixed as it would be on the basis of local demographic factors, does not seem to be wage elastic.

5. This seems to be a common limiting factor in inter-employer mobility even in the case of industrial employment in a country like the United States. (See Lloyd G. Reynolds : *The Structure of Labour Markets*, New York, 1951, pp. 51-53.) It is this phenomenon which contributes to lowering down the turnover rates and is sometimes characterized as 'Industrial Feudalism.' (See A. M. Ross, "Do We Have Industrial Feudalism?," *The American Economic Review*, Vol. XLVIII, No. 5, December, 1958.) While the predominant reasons for disallowing the "pirating" may be different in the U. S. industry from those in Indian agriculture, the shortage of labour in the former and social customs in the latter, the analogy is striking and not entirely meaningless. Particularly, it may be noted that not allowing the 'pirating' of one's labourers in Indian farms may also partly be a reflection of economically rational behaviour as there does occur stringency on the supply side of the labour market during the busy seasons.

6. Report on the Second Agricultural Labour Enquiry, Vol. I—All-India, 1956-57, Labour Bureau, Ministry of Labour and Employment, Government of India, 1960.

7. W. Ladejinsky, "The Green Revolution in Punjab : A Field Trip," *Economic and Political Weekly*, Vol. IV, No. 26, June 28, 1969, pp. A 73-83.

8. This is evident from the fact that the marginal value productivity of human labour is positive, and also in some cases higher than the wage rate. See for instance, T. P. Abraham and S. D. Bokil, "Resource Productivity in Agriculture with special reference to Labour," *Indian Journal of Agricultural Economics*, Vol. XXI, No. 1, January-March, 1966, pp. 91-103 ; G. D. Agrawal and W. J. Foreman, "Farm Resource Productivity in West U. P.," *Indian Journal of Agricultural Economics*, Vol. XIV, No. 4, (Special Number), October-December, 1959, pp. 115-133 ; Raj Krishna, "Some Production Functions for the Punjab," *Indian Journal of Agricultural Economics*, Vol. XIX, Nos. 3 and 4, July-December, 1964, pp. 85-97 ; W. D. Hopper, "Allocation Efficiency in a Traditional Agriculture," *Journal of Farm Economics*, Vol. 47, No. 3, August, 1965, pp. 611-624 ; C. H. Hanumantha Rao: *Agricultural Production Functions, Costs and Returns in India*, Asia Publishing House, Bombay, 1965 ; V. N. Misra : *Factors Affecting the Adoption of Improved Agricultural Practices and Its Impact on Agricultural Productivity in Dinara Block of Shahabad District, Bihar* (unpublished Ph.D. Thesis), Banaras Hindu University, Varanasi, 1968.

9. Cf. A. M. Khusro : *Economic Development With No Population Transfers*, Occasional Paper, Institute of Economic Growth, Asia Publishing House, Bombay, 1962.

10. Yet in some village studies it has been found that "the agricultural workers tend to cluster in the areas where there is a possibility of high daily wages." See V. S. Vyas (Ed.) : *Agricultural Labour in Four Indian Villages*, Agro-Economic Research Centre (for Gujarat and Rajasthan), Sardar Vallabhbhai Vidyapeeth, Vallabh Vidyanagar, 1964, p. 16.

Consequently, the role of market forces of demand for and supply of labour in the determination of wage rates, would be virtually ineffective. The demand conditions which might otherwise have been effective in pushing wages up or down are also virtually rendered ineffective by the supply conditions. Probably once excess supply is a common phenomenon in the market, a slight difference in the degree of the 'excess' between different spatial and temporal segments of the market may hardly make an impact on wages. A marginal increase in demand does not raise the wages, nor does a small increase in supply depress them. Moreover the fixation of minimum wages under the Minimum Wages Act 1948, which is applicable to agriculture all over the country, proceeds primarily on the basis of subsistence approach, leaving aside the market forces—in fact, the objective of this piece of legislation has been to check the operation of market forces in lowering down wages below subsistence in the condition of excess supply of labour. Even when the minimum wage fixing authorities consider factors other than subsistence, the factors that feature in their consideration are such as paying capacity and productivity irrespective of the local supply conditions.

An empirical verification of the above propositions has been attempted below with the help of a simple model consisting of three functions postulating the determinants of demand for and supply of labour and wage rate with a view to testing the efficiency of economic mechanism of the labour market for hired labour in Gujarat agriculture. Because of the lack of comparable time-series data on the relevant variables at the appropriate levels, we have taken districts as observations for study and made a cross-section analysis at a point of time, 1960-61. It may be pointed out that the findings of the cross-section analysis may not necessarily be applicable to a temporal situation; and, a time-series analysis but not at a highly aggregative level, can give us a more reliable idea of the working of the rural labour markets.

### III

#### THE MODEL : VARIABLES AND RELATIONSHIPS

The function used is of the following nature :

$$y = a x_1^{b_1} \dots \dots \dots x_n^{b_n}$$

Where :

- a = constant for equation,
- b<sub>1</sub> = elasticity of independent variable,
- x<sub>1</sub> = independent variable.

Expressed in logarithms this function takes the following form :

$$\text{Log } y = \text{log } a + b_1 \text{ log } x_1 + \dots \dots \dots + b_n \text{ log } x_n.$$

The choice of the function is dictated by the obvious reason that the exponent or 'b' coefficient is the elasticity of the independent variable (particularly the wage rate) that can be used directly. It shows the percentage by which there would be change in dependent variable due to the change in independent variable.

### 1. Demand for Labour

The demand has been measured in ratio form in terms of hired labour per acre of gross cropped area rather than in terms of the total hired labour in the district in order to eliminate the effect of the size of the district. The demand for labour has been postulated to depend on the: (a) paying capacity of the cultivator, (b) size of holding, (c) cropping pattern, (d) extent of irrigation, and (e) wage rate. The relationship expected with the demand for labour is positive in the case of (a), (b), (c) and (d), and negative in the case of (e). The *paying capacity* of the cultivators could be measured in terms of the per capita income of the cultivating families. But, because of the non-availability of separate income estimates for cultivators, we have taken the per capita income of the rural sector as the relative indicator of paying capacity of agriculture in different districts.<sup>11</sup> The *size of holdings* has been measured in terms of the average size of operational holdings in each district.<sup>12</sup> Labour requirement per acre vary considerably from crop to crop and therefore the higher the proportion of crops with large labour requirement the higher would be the demand for labour. *Cropping pattern* for our purpose has been measured in terms of the percentage of area under crops requiring more than 100 man-days per hectare to the total cropped area.<sup>13</sup> Labour requirement vary directly with the *extent of irrigation* which has been indicated here by the irrigated area as percentage of net area sown.<sup>14</sup> The *wage rate* variable has been expressed here in terms of the average wage per man-day.<sup>15</sup>

Before actually attempting to evaluate the relative contribution of various factors in the demand for hired labour<sup>16</sup> we calculated simple correlations (Table I) among the independent variables because inter-collinearity is likely to exist bet-

TABLE I—SIMPLE CORRELATION COEFFICIENTS BETWEEN THE INDEPENDENT VARIABLES FOR ALL THE DISTRICTS OF GUJARAT

	Wage rate	Per capita income	Size of holding	Crop pattern	Percentage of irrigated area
Wage rate .. .. .	1.000	.755	.734	-.619	-.025
Per capita income .. .. .		1.000	.802	-.645	.123
Size of holding .. .. .			1.000	-.736	.046
Crop pattern .. .. .				1.000	-.412
Percentage of irrigated area					1.000

ween the independent variables. In the case of inter-collinearity between variables the choice has to be made among the variables for working out the regression analysis.

11. The per capita income for the rural sector has been estimated at the district level from the income of agriculture and allied sector for the year 1959-60 taken from "Regional Disparities in Income of Gujarat State," *Quarterly Bulletin of Economics and Statistics*, Vol. III, No. 3, July-September, 1963, pp. 1-12 divided by the total population for the rural sector based on Census of India: 1961, Gujarat State, Vol. V, Part III—Household Economic Tables.

12. From Census of India : 1961, Gujarat State, Part I A (ii) B.

13. This has been based on cropwise man-days requirement given by V. G. Panse and S. D. Bokil : Cost of Cultivation of Some Indian Field Crops, I.C.A.R. Technical Bulletin (Agricultural) No. 3, Indian Council of Agricultural Research, New Delhi, 1966.

14. Data from Census of India : 1961, Gujarat State, Part I A (ii) B.

15. The data on wages which have been combined for field worker and other labour for the year 1960-61 are drawn from Basic Agricultural Statistics of Gujarat State, Directorate of Agriculture, Gujarat, 1968.

16. Data from Census of India : 1961, Gujarat State, *op. cit.*

The size of holding is found to be highly<sup>17</sup> correlated with the per capita income. We decided to retain the per capita income and drop the size of holding in the regression analysis, for the former gives wider idea of the paying capacity of the cultivators while irrigation and crop pattern take care of requirements. With the finally selected variables the demand function is stated as follows :

$$y = a x_1^{b_1} x_2^{b_2} x_3^{b_3} x_4^{b_4}$$

Where :

- y = per acre hired labour,
- x<sub>1</sub> = per day wage rate in rupees,
- x<sub>2</sub> = per capita income,
- x<sub>3</sub> = crop pattern,
- x<sub>4</sub> = percentage of irrigated area.

The regression analysis attempted on the data for 17 districts of Gujarat for 1960-61, yielded the results as given in Table II.

TABLE II—REGRESSION COEFFICIENTS AND THEIR STANDARD ERRORS

Variables	Coefficients
x <sub>1</sub> (wage rate)	-3.3279* (0.5166)
x <sub>2</sub> (per capita income)	2.0477* (0.5409)
x <sub>3</sub> (crop pattern)	0.3856* (0.0774)
x <sub>4</sub> (percentage of irrigated area)	0.6153* (0.0908)

Note : Figures in brackets are standard errors of the coefficients.

\* Significant at 1 per cent level.

Constant (a) = -2.7160.

Coefficient of multiple determination (R<sup>2</sup>) = 0.8690.

It has been found (Table II) that the elasticities of all the variables are significantly related to the magnitude of hired labour at 1 per cent level. The per capita income, percentage of irrigated area and crop pattern have significantly positive relationship with the demand for hired labour, whereas the wage rate has significantly negative relationship with it. This shows that by decreasing the wage rate, there would be increase in the demand for hired labour. Further, the independent variables included in the equation have been responsible for explaining about 87 per cent of the variations in the total amount of hired labour.

17. High is taken here to mean a correlation coefficient equal to or more than .80.



## 2. Supply of Labour

The supply of labour has been measured again in ratio form as in the case of demand, in terms of the agricultural labourers as a percentage to total working force. Theoretically, if supply of labour is not fixed and does not exceed the demand by a considerable extent, it is expected to be a function of the wage rates and the alternative employment opportunities. This relationship was, however, not found to hold in the empirical situation of Gujarat districts.<sup>18</sup> We consider our model adequate so far as the two major economic determinants of the supply of labour, *viz.*, wage rate and the alternative avenues of employment had been taken into account. In the present case one can think of a negative relationship of the labour supply to agriculture with the second variable as the earnings elsewhere are generally found to be higher than in agriculture. But the complete break down of the model in terms of the signs of coefficients (which are contrary to the expected ones for both the variables), their significance, which is absent in both the cases, and also precariously low explanatory power of the model, suggests that the supply side of the labour market is devoid of economic logic and its determinants are non-economic.

## 3. Wage Rate

Consequently, the relationship, *i.e.*,  $W = f(D, S)$  when subjected to empirical verification also yields results<sup>19</sup> which are not in conformity with the postulated relationships. Demand shows significantly negative relationship with the wage rate. The coefficient for supply shows a negative sign but the relationship is not significant. Demand and supply as independent variables are found to 'explain' about 29 per cent of the variations in the wage rate.

## 4. Conclusion

It has been found that the demand for labour is by and large a function of the capacity and the requirements of the cultivators, besides the wage rate. The variables other than wage rate, *viz.*, per capita income, irrigated area and crop pattern reflect the capacity and requirements. (The crop pattern in the way we defined it directly measured the labour requirements; while irrigation affects both the labour requirements and the income of the farmers; and per capita in-

18. The results of the regression analysis are as follows:

$$y = 0.6833 x_1 - 0.8534 x_2 + 0.4118$$

(0.6076)      (0.3651)

$$R^2 = 0.1133$$

Where :

y = percentage of agricultural labourers to total working force,

x<sub>1</sub> = per day wage rate in rupees,

x<sub>2</sub> = percentage of rural workers in occupation other than agriculture to the rural labour force.

Note : Figures in brackets are standard errors of the coefficients.

19. The results of the regression analysis are as follows :

$$y = 0.5188 x_1 - 0.0347 x_2 - 0.1468$$

(0.1038)      (0.0663)

$$R^2 = 0.2921$$

Where :

y = per day wage rate in rupees,

x<sub>1</sub> = percentage of agricultural workers to total working force (supply),

x<sub>2</sub> = per acre hired labour (demand).

Note : Figures in brackets are standard errors of the coefficients.

come directly measures the farmer's paying capacity. Each of these variables was found to have a significantly positive relationship with the demand and the wage as expected showed a significantly negative relationship with it. All these variables taken together explained a very high percentage of the variation in the demand for labour among the districts.

On the supply side, the wage rate is expected to affect the supply of labour to an employment only when alternative opportunities are available. In our model, the relationship was not found to hold. Probably, the supply of labour in the rural sector is demographically and institutionally so determined and fixed as not to vary with the wage rate. The prevalence of excess supply situation in the labour market further precludes the possibility of supply behaving as a function of price. On account of this break down of the market mechanism on the supply side the price of labour varies independently of the demand and supply situation.

Our analysis of the labour market variables in Gujarat districts thus brings out the conclusion that they play a limited role in the allocation of labour in the sense that wage variations affects the demand for labour while they seem to be completely ineffective in the pricing of labour in the agricultural sector. Demand for labour is found to be sufficiently responsive to wage rates along with some other variables; but supply of labour seems to be determined outside the system of the economic variables in the labour market. Consequently, wage rate determination is also independent of the market conditions.

Thus it is the supply side where the labour market mechanism seems to break down in Indian agriculture. In order that the supply at a point of time is flexible and responsive to wage rates, and thus the allocation and pricing of labour proceeds on the basis of market forces, the necessary condition lies in the availability of alternative employment opportunities. It is the lack of this conditions which makes the rural labour markets indifferent to economic logic.

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## THE AGRICULTURAL LABOUR PROBLEM IN THANJAVUR AND THE NEW AGRICULTURAL STRATEGY

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Thanjavur district is advantageously situated in the Cauvery delta, where canal irrigation from Cauvery river was known to have been in existence as far back as the second century. The network of the canal system spread throughout the district has earned credit to the river Cauvery for the highest utilization of irrigation water. The district ranks first in Tamil Nadu with 84 per cent of the net sown area benefiting from assured irrigation facilities. In 1965-66, a third of the area was sown more than once, which might have now risen to nearly a half (highest in the State) on account of various agricultural developmental pro-