LABOUR QUALITY AND FARM LABOUR CONTRACTS

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INTRODUCTION

It is general practice, especially in the literature relating to economic development, to regard rural workers in underdeveloped countries as homogeneous. The implications of such an assumption are that, *i)* all workers face the same supply conditions, and, ii) all workers are identical in terms of skills. It has been routine practice to assume also that all farm activities are similar in terms of demand for skilled workers. This assumption of skill uniformity is crucial because in circumstances where skills are uniform, one might expect not to encounter variations in employment relations. Yet, the empirical literature suggests that a wide variety of labour contracts persist in traditional agriculture, and as technology changes new types of labour contracts emerge.

The economic literature relating to labour market analysis suggests that there may be clear differences in characteristics between family and hired workers, and within the 'hired workers' group, across the types of hired workers, due, it appears, to the different incentives faced by these workers. Clearly, family labour will have less incentive to restrict work effort, compared to hired workers. Family workers bear the incidence of losses due to shirking as it reduces the share of output available to the family. Recent empirical findings are also consistent with the view that there are significant skill differentials among farm workers, which in turn are crucial in shaping employment institutions. Indeed, there have been a number of analytical and empirical attempts to see whether imbalances in the demand for and supply of skilled labour is the reason for slow growth in employment in technologically advancing agriculture.

New farming technology often makes intensive use of skilled labour. In addition, the introduction of new technology is likely to increase the importance of regularity in labour supply. Deficient provision of labour of suitable quality may adversely affect technological adoption. In addition, technological changes may fail to deliver employment gains if labour markets and their contractual arrangements do not respond adequately to changes in the demand pattern. Sub-optimal adoption of labour saving devices in agriculture might be encouraged by an inadequate response in the

labour market. Analysis of contractual labour arrangements can provide insights about the ability of the labour market to adjust appropriately to changes in the patterns of labour demand.

The basic objective of the paper is to extend the theory of labour contracts to explain farm labour contracts in poor agrarian societies by explicit recognition of skill differentials, which are observed as characteristic of rural workers. A theoretical rationale for choice of long term or short term (casual) farm labour contracts' is developed using the "product-characteristics" and "product-grading" literature. An empirical model is also developed to enhance micro-level understanding of employer-employee relationships. Tests of the empirical model are expected to shed light on policy issues such as farm labour market regulation and technological adoption on farms.

In the first part of the next section, we have provided a brief survey of the labour contract literature relating to labour quality. We have also briefly sketched the "product-characteristics" and "product- grading" literature there. We have developed a model of labour grouping (grading) in the second part of the section. In the third section, demand for different types of workers is modelled as a derived demand function where quality characteristics form the arguments of the function. The subsequent section outlines the empirical model to be employed in the quantitative analysis.

THEORY

Economic theory as it relates to the classification of goods rests on the assumption that goods can be separated from each other with respect to quality. Consumers decide the level of quality and the goods to consume, depending upon their preference system. As goods may possess several quality traits, grading of goods to take account of the quality traits is of help to consumers in choosing the goods. It is argued that for such grading (or classification) to be meaningful, it should be based on a few important identifiable traits of goods (Freebairn, 1967; Zusman, 1967).

A parallel analysis of characteristics - quality causation, and grading can be performed for inputs also. Quality variations among the workers can be expected to be reflected through the characteristics they possess. These characteristics have implications for the contribution of workers to production. Oi's study (1983) is a seminal contribution to the labour economics literature which establishes that labour characteristics may play an important role in formation of employment relations. Oi's emphasis was on an explanation of the correlation between firm size and the rate of wage payment via quality of workers. Oi's thesis is that large firms have less endowment of supervision inputs (per workers), hence they seek employees who need less supervision and hence are of better quality. Because firms have to spend less on supervision, workers in such firms are paid more. The message of Oi's thesis is that workers differ in quality and firms choose quality levels according to their endowments of skill and capacity to monitor workers. Recent empirical work (Barth et al., 1987; Brown and Medoff, 1989) tend to confirm the quality-firm size-wage rate relationship proposed by Oi. Similar to this quality-firm size-wage rate literature, a careful survey of farm size-productivity literature provide an empirical basis by which Oi's thesis may be tested. The farm-productivity literature (Berry and Cline, 1979; Ghose, 1979; Sen, 1987; Verma and Bromley, 1987) also suggests that large farms tend to hire better quality workers and pay higher wage rates.

Explicit introduction of the quality of workers in the analysis of employment relations in agriculture is quite recent. Nutritional-efficiency wage theory (Lebeinstein, 1963; Rodgers, 1975; Stiglitz, 1976; Bliss and Stern, 1978) developed to explain wage-productivity relationships in poor agrarian economics, also provides some insights on the issue of variation in labour contracts. The theory predicts that in such an economy employers pay higher wages to improve the nutritional levels of workers. To capture the full benefit of such an improvement, employers seek to engage workers for longer periods of time. The theory thus suggests that a quality differential is created via wage payments. The theory however does not provide an answer to the question of

which workers are likely to be chosen for participation in long term and short term employment relations.

There are several other variants of efficiency wage theory that imply the relationship between labour quality and the nature of employment relationships. One of the variants is the quality-efficiency model, which posits that the level of work effort depends upon wage rates. It is argued a that higher wage rate is successful in generating useful but hard-to-measure quality attributes among workers. Some of these attributes are said to be loyalty, honesty and reciprocity to the firm. Akerlof (1982, 1984) has proposed a model of 'partial gift exchange', which views a higher wage as a gift for which workers reciprocate by providing loyalty, effort and other forms of commitment that contribute to higher productivity. And because these higher wage rates generate quality traits they are fungible and specific to the firm, and it is in the interest of both employer and employee to foster a long term employment relationship. One can view such qualities as the firm-specific human capital generated by firms. The investment in such human capital is generally incorporated in the wage rate.

The incentive/efficiency model, on the other hand, focuses on the positive incentive effects of higher wages. The model emphasizes that low levels of wages have negative incentive effects in terms of quitting the jobs or shirking on the job (Yellen, 1984; Dasgupta and Ray, 1986). Higher wages deter workers from these costly acts as it arbitrarily increases the opportunity cost of job loss. Shapiro and Stiglitz (1984) has demonstrated that both higher wages and unemployment rates work as a disciplinary device to deter workers from shirking. Given the unemployment rate, a higher wage rate solicits shirking deterrence; given the wage rate, higher unemployment rates encourage less shirking.

Employment relations in agriculture have not received sufficient attention largely because of the widely held assumption that farm workers are homogeneous, as are the farm activities in terms of skills. Yet, the empirical evidence that labour contracts are not always uni-modal have attracted theoretical work. Bardhan (1979, 1983) extended the argument, observing that because of seasonality in farm activities consideration of

risk in the demand for and supply of labour services is introduced. Long term contracts are viewed as methods to minimise such risk. Eswaran and Kotwal (1985) place emphasis on the quality of workers when explaining farm employment relationships. Their argument is similar to that of the quality-efficiency wage model where higher quality in workers is imported through a higher wage rate. These models, by and large, make the assumption that farm workers are initially homogeneous; it is only after the application of an incentive mechanism that a quality differential is created.

Consideration of quality characteristics by the employer before negotiating the contract cannot be ruled out. Oi's theoretical contribution and the empirics that followed, suggest clear differences between types of workers. Transaction costs literature (Pollak 1985, Ben-porath 1980) also suggests that workers differ in quality due both, to the differences in the embodied characteristics and the incentives faced. We also propose that a clear distinction be maintained between explicit quality traits observable through characteristics, and incentive-induced quality. Inspired by the literature of the "New Consumer Theory" (Lancaster 1966) and the literature on "product-grading" (Farris, 1960; Freebairn, 1967; Zusman, 1967), we have tried to develop a parallel explanation for the choice of contracts and its consequences for farm production.

Let us begin by proposing that farm workers can be grouped according to quality. Quality indications may be derived from several characteristics, such as, reliability in labour supply experience, and physical strength. Assume that workers can be objectively grouped into low quality (LQ) and higher quality (HQ) workers. When ungrouped, workers are indistinguishable and face the same wage rate.

In Figure 1, farmer-employers A and B are operating under iso-quants A1 and B1, exhibiting different preference systems. CD is the iso-cost line and both the farmers are facing the same resource constraints. MN represents the supply mix of HQ and LQ labour. When the labour force is ungrouped, both farmers operate at point S, where both iso-quants meet the supply-mix line. This eliminates the differences in the preference system, both being forced to operate essentially under the same iso-quant.

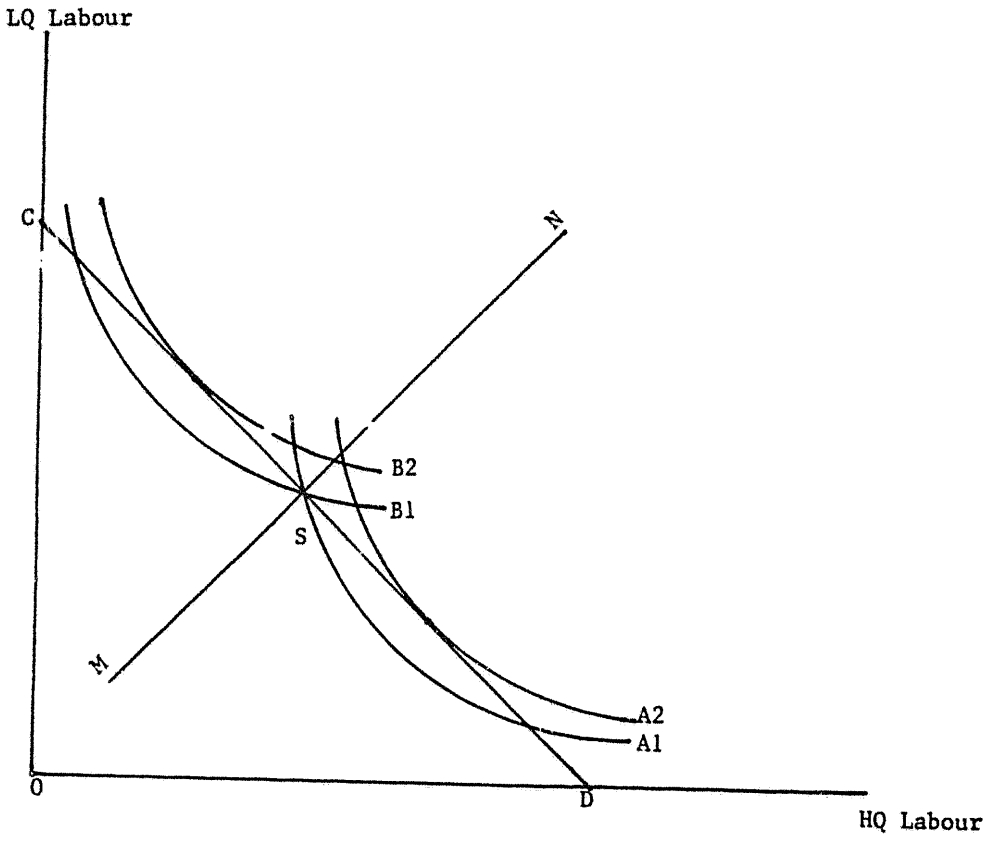

Figure 1: Labour grouping when preference systems are different

Because of differences in the preference system, the ratios of marginal physical products of two types of workers are not equal to the ratio of wage rates faced by the farmers, that is,

$$MPP^{A}_{HQ}/MPP^{A}_{LQ} \neq W_{HQ}/W_{LQ} \neq MPP^{B}_{HQ}/MPP^{B}_{LQ}$$

thus inflicting inefficiency on the economy.

Grouping the workers by quality releases the farmers from forced choice of operating at point S in the supply-mix line MN. In the figure, we have shifted the iso-quants to the tangency points to the CD line. This tangency is possible because of labour classification allowing farmers to move to highest possible iso-quants.

In Figure 2, a case with different cost constraints is presented. We assume that both the farmers share the same preference system. In the ungrouped labour situation, both operate at points where iso-quants intersect the iso-cost and supply-mix line. Again, grading of laborers allows farmers to move to higher iso-quants.

Similar to the employers, it can be demonstrated that such a classification is also beneficial to the workers. After quality grouping, the aggregate labour demand curve shifts upwards. This is demonstrated in Figures 3 and 4.

When the workers are not grouped, employer in Figure 3 is in equilibrium at S, where MN, CD and the iso-quant meet. After workers are grouped, the employer moves to a higher iso-quant. Assume that the employer was ready to pay Y when was operating at lower iso-quant. And because with classification of labour he can move to a higher iso-quant, he will be ready to pay more than before. Let us assume that the higher payment is indicated by ΔY. The wage rates when grouping exists are higher than when labour is not grouped.

$$\left.\begin{aligned} W_{GR} &= \frac{Y+\Delta Y}{L} \\ W_{UG} &= \frac{Y}{L} \end{aligned}\right\} \text{ and } W_{GR} > W_{UG}$$

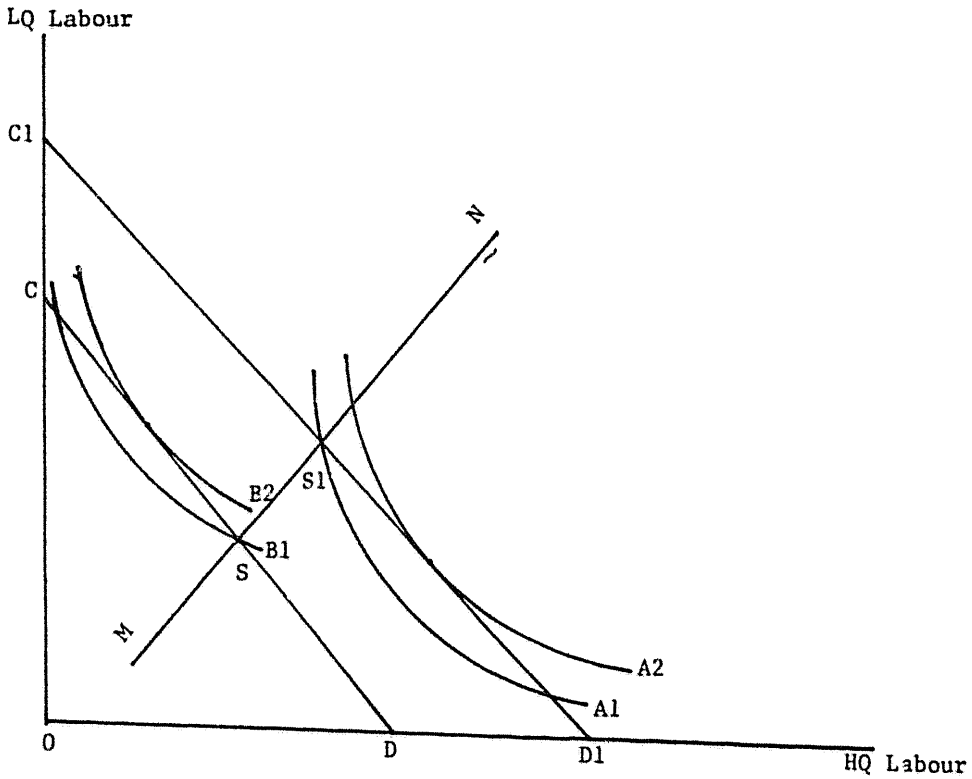

Figure 2: Labour grouping when cost constraints are different

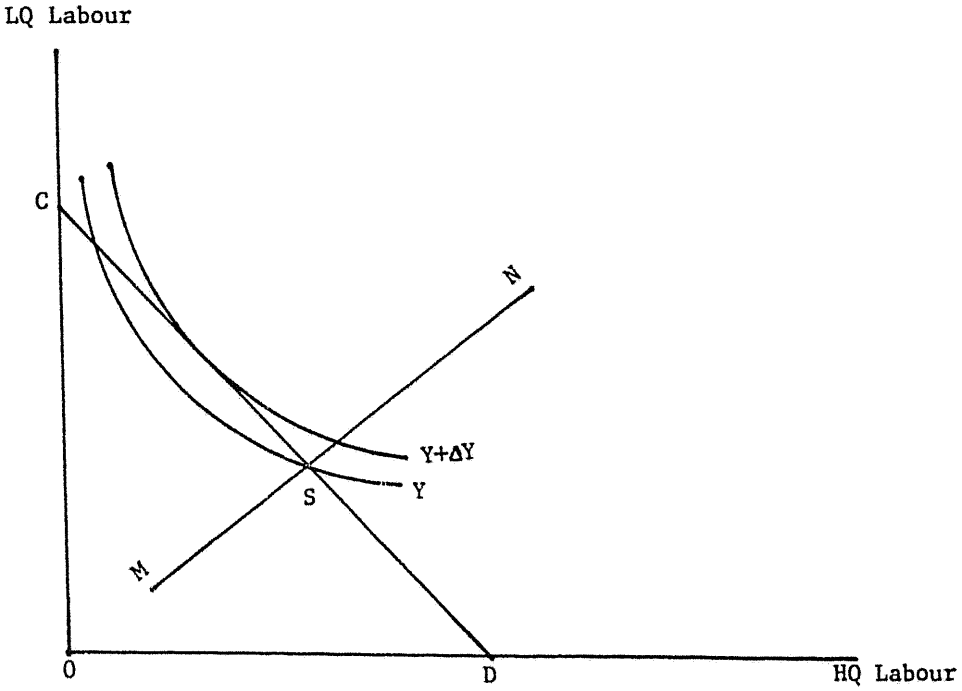

Figure 3: Labour grouping and the wage rate

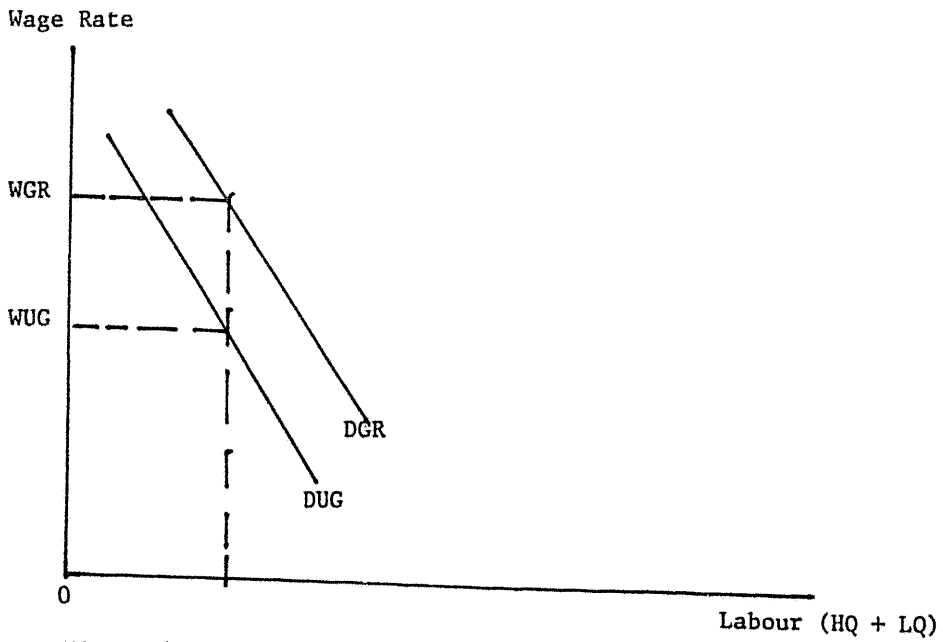

Figure 4: Labour grouping and a shift in the demand curve

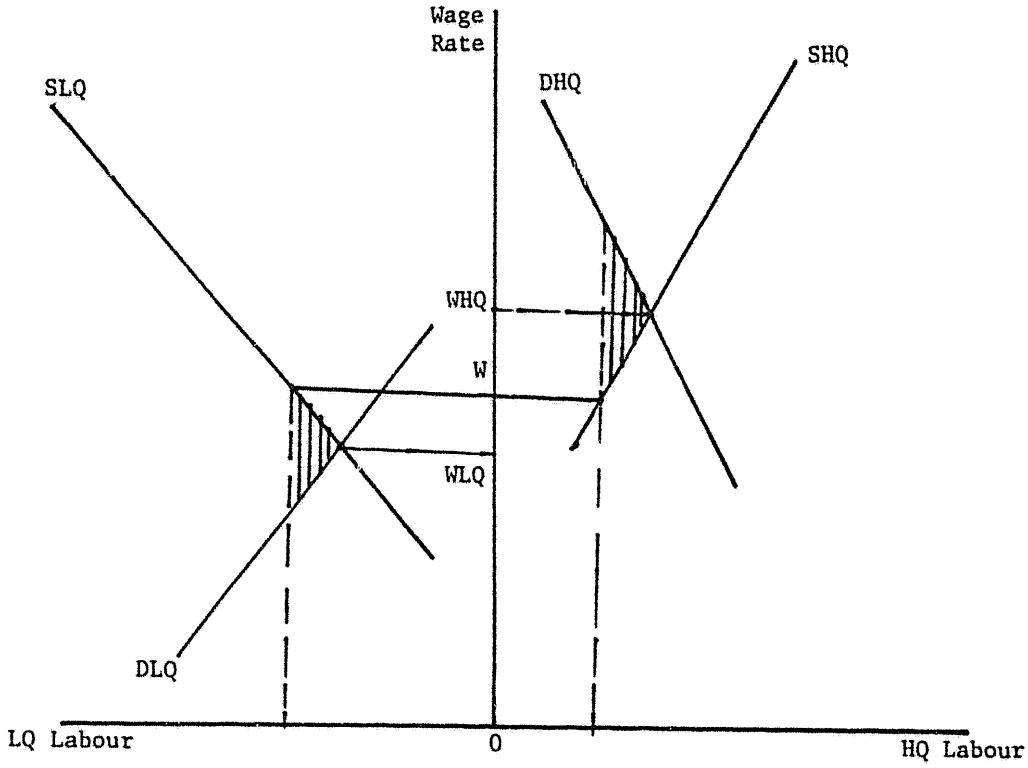

Figure 5: Labour grouping and social benefit

Thus the aggregate demand schedule for grouped workers lies to the right of the schedule when workers are ungrouped.

The gains manifested by grouping ot workers to the society can be illustrated using demand/supply model for different types of workers.

In Figure 5, in panels I and II, demand and supply curves for HQ and LQ workers are presented. When workers are not grouped, W is the wage rate applicable to both types of workers. This results into over-supply of LQ type workers and under-supply of HQ workers. This imbalance causes loss to the society equivalent to the shaded triangles. With the grouping of workers and allowing both the labour markets to attain equilibrium the loss is eliminated.

MODEL

The quality of workers consists of several characteristics such as:

(a) reliability in supply;

(b) supply of implicitly agreed work effort at minimum supervision;

(c) experience;

(d) physical strength (especially when manual work is involved).

Quality, hence, can be viewed as an aggregate term for a bundle of non-price characteristics that influence labour productivity and is valued by employees. It is argued that these non-price attributes are relevant to be entered into the derived demand function for labour services. Drawing upon "New Consumer Theory" and "Hedonic Pricing" literature, the following model is developed to analyse the effect of labour quality on labour demand.

Assume that a farm faces a production function of the general form:

$$Y = f(X_i, X_L, X_C) \qquad (1)$$

where : Y = output

X_i = non-labour inputs

X_L = workers of type L (long term workers)

X_C = workers of type C (casual workers)

The derived demand for X_L and X_C are:

$$X_L = d_L (p, \gamma_i, \gamma_L); X_C = d_C (p, \gamma_i, \gamma_C) \quad (2)$$

where : p = product output price

γ_i = prices of X_i

γ_L = effective wage rate for X_L

γ_C = effective wage rate for X_C

And:

$\gamma_L = \gamma_{Lp} + \gamma_{Lq}$;

$\gamma_C = \gamma_{Cp} + \gamma_{Cq}$;

where: γ_{Lp} = wage rate for X_L

γ_{Cp} = vage rate for X_C

γ_{Cq}; γ_{Lq} = non-wage costs associated with quality attributes (e.g., associated monitoring cost).

Because γ_{Cq} and γ_{Lq} are non-wage costs they will depend upon the levels of quality characteristics offered by particular types of worker. Let q_{LK} and q_{CK} (K=1...S) denote the quality characteristics offered by the workers of type L and C respectively. K can represent the observed variables such as experience of the workers.

The effective wage cost for L type of labour, then, is:

$$\gamma_L = \gamma_{Lp} + \gamma_{Lq} (q_{L1}, q_{L2} \cdots q_{LS}) \quad (3)$$

Substituting the value of γ_L in Equation (2);

$$X_L = dL [p, \gamma_i, \gamma_L (\gamma_{Lp}, q_{L1} \cdots q_{LS})] \quad (4)$$

Equation (4) tells us that besides p, γ_i, γ_L, demand for L type labour is dependent also upon the non-wage cost associated with particular quality trait present in the worker.

In what follows we derive the effects on demand for labour of particular type due to wage rate changes, and changes in quality attributes.

i) The rate of change in the quantity of labour of type L as own wage rate (γ_L) changes may be written as:

$$= \frac{\partial X_L}{\partial \gamma_L} \quad \text{and} \tag{5}$$

ii) the rate of change in effective labour cost (of type L) as the quality attribute K changes

$$= \frac{\partial \gamma_L}{\partial q_{LK}} \tag{6}$$

From equations (5) and (6);

iii) the rate of change in labour demand (X_L) as the quality attribute K changes is:

$$\frac{\partial X_L}{\partial q_{LK}} = \frac{\partial X_L}{\partial \gamma_L} \frac{\partial \gamma_L}{\partial q_{LK}} \tag{7}$$

From equation (7), the quality elasticity of type L labour, can be written as:

$$\eta_L = \left(\frac{\partial X_L}{\partial \gamma_L} \frac{\partial \gamma_L}{\partial q_{LK}}\right) \frac{q_{LK}}{X_L} \tag{8}$$

Similarly, the quality elasticity of type C labour can be obtained as:

$$\eta_C = \left(\frac{\partial X_C}{\partial \gamma_C} \frac{\partial \gamma_C}{\partial q_{CK}}\right) \frac{q_{CK}}{X_C} \tag{9}$$

When both types of laborers are in use as in equation (1); then the cross quality elasticity of demand also can be obtained. The rate of change in demand of type L labour as quality characteristics (K) of type 'C' labour change is:

$$\frac{\partial X_L}{\partial q_{CK}} = \frac{\partial X_L}{\partial \gamma_C} \frac{\partial \gamma_C}{\partial q_{CK}} \tag{10}$$

And from equation (10), the cross quality elasticity of demand can be obtained as:

$$\left(\frac{\partial X_L}{\partial \gamma_C} \frac{\partial \gamma_C}{\partial q_{CK}}\right) \frac{q_{CK}}{X_L} \tag{11}$$

Thus by accounting for the quality attributes of workers as arguments in the derived labour demand function, the importance of labour quality can be appreciated.

EMPIRICAL MODEL

The efficiency and equity aspects of labour contracts can be investigated empirically by estimating the following set of production function.

We assume that the figure production function is of Cobb-Douglas type:

$$\ln Y = \ln k + \beta_1 \ln L + \sum_{\Sigma}^{n} \lambda_i \ln X_i + e \qquad (1)$$

where: Y = output

L = labour services

X_i = non-labour inputs

$L = L_f + L_p + L_c$

L_f = family labour

L_p = permanent labour

L_c = casual labour

$\beta i, \lambda i$ = regression coefficients

Instead of introducing L in the production function as the sum of different types of workers, as most such studies do, we want to introduce L as labour services produced by different types of laborers. We assume that the production function with respect to labour services may be adequately represented by a quadratic production function.

$$L = \alpha_1 L_f + \alpha_2 L_p + (1-\alpha_1-\alpha_2) L_C + \alpha_3 L_f^2$$
$$+ \alpha 4 L_p^2 + \alpha_5 L_C^2 + \alpha_6 L_f.L_p + \alpha_7 L_f.L_C + \alpha_8 L_p.L_C \qquad (2)$$

Equation (2) provides an opportunity to carry out tests which are not feasible employing conventional production functions such as CES and the Cobb-Douglas type. Some of the tests, crucial for our purpose are:

a. All labour inputs (L_f, L_P and L_C) can be separately entered into the function and are free to take zero values.

b. If α_3 through α_8 are equal to zero, then all interaction terms vanish from equation (2) and the labour production function reduces to:

$$L = \alpha_1 L_f + \alpha_2 L_p + (1-\alpha_1-\alpha_2) L_C \qquad (3)$$

And if $\alpha_1=\alpha_2=\frac{1}{3}$, then all the three separate labour inputs converge to one input with no quality differences. The quality differential can be observed by calculating the ratios of productivity i.e.,

$$\frac{\alpha_1}{1-\alpha_1-\alpha_2} \text{ and } \frac{\alpha_2}{1-\alpha_1-\alpha_2}$$

c. Differentiating equation (2) for marginal physical product of family labour (MPP_F):

$$\frac{\partial L}{\partial L_f} = \alpha_1+2\alpha_3 L_f+\alpha_6 L_P+\alpha_7 L_C \quad (4)$$

and $$\partial \left(\frac{\partial L}{\partial L_f}\right) / \partial L_C = \alpha_7 \quad (5)$$

$$\partial \left(\frac{\partial L}{\partial L_f}\right) / \partial L_P = \alpha_6 \quad (6)$$

The sign of α_6 and α_7 will provide information about the nature of the relationships among the type of workers. For example if α_6 assumes a negative sign, L_f and L_P are competitive. This type of test is not possible in Cobb-Douglas type functions, where L_f and L_P are always complements.

Estimates of equation (1) with L as specified in equation (2) provides an opportunity to compare the quality of different type of workers.

The suggestion made in the theory that the use of different types of workers (i.e. demand for quality-characteristics) is governed by the farm/crop characteristics, can be tested using a logistic function. A logit model of the following type may be utilized:

$$\text{Log}\left(\frac{p}{1-p}\right) = \alpha+B_i X_i \quad (7)$$

where: p = proportion of particular type of labour

X_i = the relevant variables.

The data to be employed in the analysis come from a cross sectional survey of farms from two main zones in the upland and lowland areas of Nepal. The data are at the crop level rather than at the farm level, a distinction which it is expected, will

facilitate analysis of the various types of labour contracts which have emerged and the mix of contracts with various levels of specialisation.

As the farm characteristics change the type of labour contracts, farm level analysis is expected to shed light on the factors shaping the choice of contracts and their mix. Crop level data will enable tracing of the effects of labour contracts on crop/farm level decisions.

CONCLUSION

In recognition of the needs to differentiate workers according to quality, an attempt has been made to extend the theory of labour contracts. From the product-market literature and the product-grading literature, theoretical reasons have been advanced to explain the existence of variations in labour contracts, and the rationale behind choices between labour contracts. The theory suggests that variations in quality characteristics may result in variations in employment relations. Reflection of quality levels through some kind of grading or grouping of workers has the potential to enhance efficiency in an agrarian society. Employment relations practiced in developing agriculture have been found to corroborate the theoretical deduction that there is gain in adopting a system which identifies labour of different qualities. The practice of a variety in contractual relationships indicates that institutions evolve which provide incentives to improve efficiency in the economy. Both employers and employees benefit from such practices. This is in contrast to the popularly held belief that the long term labour relation is a device designed to benefit employers at the expense of employees.

Empirical models have been outlined to put this theory to the test. Farm data on inputs-output relationship with a detailed breakdown of labour input by type will enable the performance of the required tests.

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