Labor Characteristics and The Return to General and Specific Skills

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A worker with given characteristics or aptitudes for learning general and firm specific skills, will, upon entering the labor force for the first time, wish to join that firm where he expects his lifetime utility—or as a simplification, lifetime earnings—to be maximized. In a competitive framework with full and symmetric information, these earnings will include the scarcity return to his characteristics. If he already possesses or, while on the job, acquires general skills, he will obtain the scarcity value of his characteristics contributing to such skills. He may also acquire firm specific-skills in the course of his employment or training for it. Again, he will get the scarcity return to those of his characteristics which contribute to such skills.

Once a worker has acquired firm-specific skills, he operates in a short run in which he can only move to another firm by foregoing any return to these skills. Since the acquisition of such skills is often a very gradual process occurring over a considerable period of time, a switch to another firm could mean a considerable reduction in earnings while the worker sets about gradually acquiring the specific skills relevant to the new firm. Thus a part of the return to the characteristics which led to the acquisition of the original specific skills becomes a quasi-rent, which the firm could try to retain out of the worker’s earnings. This would, if it succeeds, lend some support to Becker’s (1975) and Okun’s (1981) conclusion that the firm will tend to keep most of the return to specific skills.

From one perspective, Becker’s and Okun’s results on the firm-specific skills flow from a short-run partial equilibrium analysis with ex post feasibility. In particular, this analysis does not focus on the point of decision-making, when the worker has to decide in which firm he should work and acquire his skills and what type of skills to acquire. At the moment of decision-making, the worker only has the abilities to acquire such skills; he has not yet acquired them and thus does not suffer from the implications of the fixity imposed by acquired-skills. Focusing on this point shifts the analysis from that of firm-specific skills and the rent generated by them to the demand for and supply of such abilities and the opportunities for acquiring them. These demands and supplies then get to determine the returns to these abilities and hence to what will ex post emerge as a rent to firm-specific skills.

From another perspective, Becker’s path-breaking analysis, focusing as it did on firm’s choice, can be enhanced by also examining workers’ choices and the role of information in the model. Under perfect symmetric information by workers and firms on workers’ abilities and costs of training, and on firms’ contributions to the acquisition of workers’ skills, the marginal workers would receive the market rate of return to their characteristics but the intra-marginal workers would earn a rent, in addition to the market return, to their intra-marginal special abilities (including intelligence, aptitudes, emotions, ‘right connections’ etc.). Similarly, the marginal firm would get the market rate of return to its inputs while the firm with superior

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Characteristics are not directly marketed. They are produced by either workers or firms. Of the five characteristics, abilities, schooling and experience are produced by workers. The workers are assumed to be sufficiently heterogeneous in the possession of these characteristics to produce any combination of aptitudes, schooling and experience that the firm wishes to employ. The remaining two characteristics of the general and specific environments are provided by the firm and are determined by its policies and practices in terms of industrial relations, capital equipment, etc. We will consider these as given, largely because of the problems of measuring them. With these as given, the return to these characteristics will be a quasi-rent, rather than being determined by marginal productivity analysis.

The firm is taken to employ workers with different aptitudes, schooling and experience, paying them wages corresponding to their levels of aptitudes, schooling and experience. These differing wage rates are assumed to be determined in competitive markets and are given to the firm. For given levels of characteristics, the firm can find its cost-minimizing set of workers. It can also derive the minimum cost of obtaining additional units of each of these characteristics. This cost can be treated as the market or opportunity price per unit of the characteristics in question.

The above arguments yield the formal framework as one where the firm faces a technology

\[ Q = Q(Z_i, Z_j) \]

where

\[ Z_i = Z_i(X_1, X_2, X_3, \ldots) \]

\[ Z_j = Z_j(X_1, X_2, X_3, \ldots) \]

\[ X_i = X_i(n_1, X_{i1}, X_{i2}, X_{i3}, \ldots) \quad i = 1, 2, 3 \]

where

- \( Q \) output
- Activities
- \( Z_i \) general skills
- \( Z_j \) firm-specific skills
- Characteristics
  - \( X_1 \) Amount of aptitudes
  - \( X_2 \) Amount of schooling
  - \( X_3 \) Amount of experience
  - \( X_4 \) Amount of general environment
  - \( X_5 \) Amount of firm-specific environment
  - \( X_6 \) Amount of characteristic provided by the kth worker
- Traded goods
- \( n_i \) ith worker

Each of the above functions is assumed to be twice differentiable. The signs of the respective first-order partial derivatives are indicated under each argument of the functions. Assume that
The total wage bill of the firm is \( \sum w_i \), with the summation taken over all \( k \) workers. Therefore, from (6) and (7), the firm's rent \( R \) due to its provision of the general and specific environment is,

\[
R = Q - \sum_{i} w_i
\]

Given diminishing returns to characteristics in (1), \( R > 0 \). This rent can be divided into amounts due to the firm's provisions of the specific and general environments. This can be done if either of these has a market price. Of the two, it is the general environment which is likely to have such a price. General environment, by definition, is that which is provided by many firms and a competitive system will provide a market return to the firm for this provision. This return will be reflected in the firm's profits, after payments for labor and capital. Assuming the return to the firm's provision of the general environment to be known, subtraction of this amount from the total rent \( R \) will give the rent due to the firm's provision of specific skills.

The market return to the general environment will be zero if its provision was costless or if it was surplus to the economy. One can imagine a wide variety of types of general environment homogeneous among firms in the same lines of business, but which take careful planning and execution to inculcate among the workers. There would be a cost to bringing it about. Given this cost, it is unlikely to be a surplus good in the economy. From another perspective, if the worker could himself engage in production and generate the same marginal product as when he works in (other) firms, his wage would equal this marginal product and the return to the general environment would be zero. Note that in this case, each worker can be taken as able to replicate the general environment just by setting up in production, so that the general environment must be in surplus; hence, its return would be zero. In the likely case, managerial skills are needed to run a firm and these are scarce. Consequently, there is no reason to assume a zero-cost or surplus general environment as the most likely possibility.

The workers' own characteristics and the firm's provision of the general environment produce general skills. The productivity of, and the return to these skills, is thus shared between the workers and the firm. The payment to workers for their exercise of such skills must thus be less than the productivity of such skills. To see this formally, assume that the general environment is a variable. Thus, assuming the specific environment and specific skills to be zero, and looking at the additional kth worker's contribution to output when the firm increases its provision of the general environment in an appropriate amount, equation (1) implies that

\[
dQ = \sum_{i} Q_i Z_i dx_i + Q Z dx_i - w_i + Q_i Z_i dx_i
\]

In (9), the increase in output, \( dQ \), is divided between the worker's wage and a return to the firm for providing the general environment. The return to general skills, therefore, does not accrue totally to workers exercising those skills. This is somewhat different from Becker (1975), without necessarily contradicting him. Becker had concluded that in the case of general skills, the worker will be paid his marginal product (net of training costs). Becker's analysis can be interpreted to include in these costs a return to firm-provided inputs. This conclusion also holds in our analysis, as equation (5) shows. However, our analysis explicitly shows that the worker
will not receive the full marginal product of such skills, a point that has to be read into Becker’s analysis.

To take an extreme case with conclusions differing from Becker’s, consider a particular type of general skill for which the firms’ aggregate demand is limited relative to the workers’ total supply of characteristics for it. Since this type of skill would be in surplus, the workers will not receive a net return for it and hence will not receive any return for the characteristics that produce it, assuming that these characteristics cannot be used in any other activity. In such a case, the firms will retain the whole of the net return to the type of general skill being considered. It will not matter who pays initially for the acquisition of the skill, though, given that the same skill can be used in many firms, it is likely that the worker will pay this initial cost and be reimbursed for it by his employers in the course of his career.

The return to the firm-specific environment can be treated in the same manner as that to the general environment. In the short-run, with the levels of those given, the return to both of these is a rent. This rent is also likely to be positive for both types of environments. In the long-run when these are variable, the returns to them will depend on their marginal products, which, in turn, depend upon their scarcity or cost of providing them. In both cases, the worker and the firm will receive the marginal product of the characteristics or environments that they supply.

This result differs quite a bit from Becker’s (1973) on firm-specific skills. Becker had concluded that the worker with firm-specific skills will receive less than his marginal product, with the firm capturing some or most, if not all, of the return to the firm-specific skills. The difference in results arises from Becker’s emphasis on the fixity of the firm—that is, non-transferability to other firms—of such skills while, in our analysis, these skills are partly dependent upon the worker’s characteristics (aptitudes, schooling and experience) which can be transferred to other firms. Our analysis thus goes further than Becker’s by looking at the determinants of firm-specific skills and separating those into the non-firm specific characteristics of workers and the specific environment of the firm. The worker gets the return to the former. The firm only gets the return to the latter.

Becker’s analysis does not allow a direct comparison between the wages of workers possessing firm-specific skills and those possessing mainly general skills, when both have the same innate characteristics and education. In fact, since the firm can retain a large part of the return to the skills of the former workers, but not those of the latter, there is a presumption from Becker’s analysis that the former would have lower wages. For our analytical framework, assume that all workers are identical but that there are two types of firms. One type uses only general skill occupations, contributing a general type of environment to them. The other type of firm uses only specific skills occupations, contributing a specific type of environment to them. Given perfect competition in the labor market, the present value of the two wage streams must be identical for both types of firms. Then the workers will receive the same return to their characteristics, no matter which type of firm and occupation they work in. If firms are free to move between the two types of occupations and have no particular advantage in providing general or specific environments, they must earn the same rents and profits in both types of occupations. Consequently, the return to general and firm-specific skills must then be identical, with firms and workers sharing this return in an identical manner, whether they go into general or firm-specific skills.

The returns to general and firm-specific skills can, and probably do, differ in the economy. This difference must arise from differences in the relative cost of generating them and the scarcity of the characteristics that produce them relative to the demand for such skills. There is no reason to assume that each pattern of production in the economy requires the same type of skills or that the aptitudes etc. possessed by the population are equally suitable for producing general and specific skills. The return to these skills would then differ. The wages of workers would differ on the basis of their differences in characteristics and differences in the returns to these.

CONCLUSION

This paper has extended the existing analysis of the returns to general and firm-specific skills by looking at their determinants and focusing on the return to them. Lancaster’s format using activities and characteristics provided an appropriate framework for our analysis. In this framework, workers possess characteristics and, in the long run, receive their market return depending upon their scarcity value.

This focus on the long-run symmetrical information determinants of wages echoes any consideration of the short-run non-transferability of firm-specific skills among firms. Short-run fixity will undoubtedly have some implications. These are of the type analyzed by Becker (1975) and, more recently, by Okun (1981, ch.2). They will modify the applicability of our results to the short-run. In particular, in the case of firm-specific skills, firms willing to ignore long-run considerations and the consequences of such violations, could take advantage of the non-transferability of such skills to pay workers less than what is due to them for their characteristics: the firm “taxes” away some part of the quasi-rent due to its workers for their firm-specific skills.

The short-run result is, however, subject to several limitations. One of these is that if the firm wishes to hire new workers with similar characteristics, these workers would wish to evaluate the firm’s policies with respect to its existing workers, as Okun (1981) has recently emphasized. If they see the firm appropriating the quasi-rent to the workers’ characteristics, while other firms do not, they will not join the firm. The firm’s desire to hire additional workers may, then, force it to honor the preceding long-run solution in which the worker gets the net return to his characteristics. Another factor making for this result is the fact that a worker’s productivity is not independent of his commitment and morale. A disgruntled worker, who is not paid the quasi-rent to his characteristics embodied in the firm-specific skill while workers in other firms are, could easily reduce his productivity sufficiently to eliminate the quasi-rent without being fired. The firm may, therefore, find it in its interest to stick close to the long-run solution and pay the worker the net return to his characteristics even in the short-run.

Our introduction of characteristics into the analysis allows a tie-up of the return to skills with what many analysts consider to be the basic determinants of lifetime earnings as aptitudes, family background and sex (in the presence of discrimination), etc. The maximization of the lifetime returns to these characteristics would channel individuals into differing combinations of general and specific skills. To illustrate, the greater uncertainty among young females, as compared with young males, about the duration of their labor force stay and their insecurity may make it optimal for them to go into the acquisition of general rather than firm-specific skills. A strong preference on the part of a considerable proportion of the population for general rather than firm-specific skills could drive down the relative net return to general skills. If such a preference disappears over time due to changing social factors or if it was itself endogenous to the economic process, the net returns to the
workers' characteristics producing the two types of skills would tend toward equality in the long run, though only if these characteristics were equally scarce relative to the demand for them or if they were perfect substitutes, though that seems doubtful.

FOOTNOTES
1. One procedure for finding these prices would be that used by Denison (1962) to evaluate the contribution of education, increased experience and better utilization of women workers, quality of man-hour's work due to shorter hours, etc.
2. We are not assuming that the general environment is a "public good" such as defense whose services expand continually as an additional worker is hired; it usually more difficult to organize and deal with a larger number of workers than a smaller number.

REFERENCES

INTRODUCTION
The magnitude and interpretation of regional earnings gaps has been a topic of considerable dispute in the literature on U.S. labor markets. Many early studies found that the South was a low-wage region and concluded that worker mobility generally failed to equalize earnings (Fuchs, 1967, Scully, 1969). This view has been challenged (Cowhill and Ghali, 1971; Bellante, 1979; Gerking and Weirick, 1983) on the basis of earnings adjustments for differences in human capital and local living costs, that contradicted earlier evidence of disequilibrium across regions. More recently, (Sahling and Smith, 1983) turn conventional wisdom on its head with their argument that, by the late 1970's, a regional gap had reemerged in which the South has become a high-wage region!

This study uses a unique supplement to the Current Population Survey which permits correction of several potential biases that may have plagued earlier studies. Employer-specific job tenure and establishment size are included in this analysis, as both factors are widely recognized as influencing workers' earnings. Since both tenure and establishment size are significantly higher in the Northeast and Northwest states, their exclusion from earlier studies may have biased estimates of regional earnings gaps. These variables are typically not available in the Current Population Survey, or in the decennial Census, the two data sources whose large size makes them most suitable for this type of study.

Nonmetropolitan price indexes have been used to deflate nonmetropolitan earnings. Failure to do this produces a serious underestimate of real nonmetropolitan earnings, since the cost-of-living is much lower outside of major metropolitan areas. Moreover, since the share of the population living in major metropolitan areas varies across regions, estimates of interregional wage gaps are also biased. Some researchers have avoided this problem by excluding workers not living in a major SMSA. This approach is costly, however, for it implies dropping over eighty percent of the Southern labor force from the sample.

After correcting for these potential sources of bias, it is found that regional real earnings gaps are significant and considerably larger than corresponding nominal gaps for metropolitan and nonmetropolitan workers. In particular, it is found that in the late 1970's an average worker in the "sunbelt" South and West enjoyed a significant real earnings premium over workers in "Frostbelt" Northeastal and Northwest states. Furthermore, these earnings gaps are smaller for more mobile groups of workers. It is concluded that, by the late 1970's, a disequilibrium real earnings gap had developed between "Frostbelt" and "sunbelt" labor markets.

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